# 2007-2008 Indergraduate





# Leading the World in Aviation and Aerospace Education

#### DAYTONA BEACH, FLORIDA, CAMPUS

Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900 (386) 226-6000 Admissions: (386) 226-6100 or (800) 862-2416 Financial Aid: (800) 943-6279 E-mail (Admissions): dbadmit@erau.edu

#### PRESCOTT, ARIZONA, CAMPUS

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#### WORLDWIDE CAMPUSES AND ONLINE

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# http://www.erau.edu

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# Prescott Campus Academic Programs

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# Fall Semester 2007

(2	August 27 - December 15)	
	August 22-24	Orientation and Registration
	August 27	Classes begin
	September 3	HOLIDAY - Labor Day
	October 5	University Day - Prescott
	November 9	University Day - Daytona Beach
	November 12	Veterans Day
	November 21-23	HOLIDAY - Thanksgiving
	December 6	Last day of classes
	December 7	Study Day
	December 8,10-13	Final Examinations
	December*	Commencement - Daytona (TBA)
	December 15	Commencement - Prescott

# **Spring Semester 2008**

(January 9 - May 3)	
January 7-8	Orientation and Registration
January 9	Classes begin
January 21	HOLIDAY - Martin Luther King Day
February 18	HOLIDAY - Presidents Day
March 17-21	HOLIDAY - Spring Break
April 24	Last day of classes
April 25	Study Day
April 26, 28-May1	Final Examinations
May*	Commencement - Daytona (TBA)
May 3	Commencement - Prescott

# Summer Semester (Term A) 2008

(May 8 - June 23)	
May 6-7	Orientation and Registration
May 8	Classes begin
May 26	HOLIDAY - Memorial Day
June 19	Last day of classes
June 20	Study Day
June 21, 23	Final Examinations

# Summer Semester (Term B) 2008

(June 26 - August 11)	
June 24-25	Orientation and Registration
June 26	Classes begin
July 4	HOLIDAY - Independence Day
August 7	Last day of classes
August 8	Study Day
August 9, 11	Final Examinations

\* Commencement dates are subject to change.

#### This catalog becomes effective July 1, 2007.

The 2007 - 2008 academic calendar applies to the Daytona Beach and Prescott campuses. Worldwide Campus students should contact the local Embry-Riddle center director for the academic calendar applicable to their specific location. This calendar is currently under review and is subject to change.

Orientation programs for all new Daytona Beach and Prescott students are planned, scheduled, and conducted before registration each semester. A special orientation program for new international students is held prior to the general orientation required for all new students. New students will receive special information regarding the date, time, and place of orientation activities from Admissions approximately 30 calendar days in advance of the activities.

In compliance with federal laws and regulations, Embry-Riddle Aeronautical University does not discriminate on the basis of race, color, gender, creed, national and ethnic origin, age, or disability in any of its policies, procedures, or practices. An Equal Opportunity institution, the University does not discriminate in the recruitment and admission of students, in the recruitment and employment of faculty and staff, or in the operations of any programs and activities.

Designed for use during the one-year period stated on the cover, this catalog gives a general description of Embry-Riddle Aeronautical University and provides detailed information regarding the departments in the institution and curricula offered by the University. The provisions of the catalog do not constitute a contract between the student and the University. The faculty and trustees of Embry-Riddle Aeronautical University reserve the right to change, without prior notice, any provision, offering, or requirement in the catalog. This includes the right to adjust tuition and fees, as necessary. The University further reserves the right at all times to require a student to withdraw for cause.

#### Official University Photography

Embry-Riddle Aeronautical University reserves the right to photograph members of the University community, including, but not limited to, its students and faculty, in situations appropriate to the image of the academic institution, and to publish likenesses in Embry-Riddle Aeronautical University publications, videos, or other recruitment or promotional materials. However, the University will, to the extent feasible, honor requests of constituents who do not wish their images photographed or published.



#### To Our Students:

Thank you for choosing Embry-Riddle Aeronautical University for one of the most important investments you will make in your future. With thousands of students enrolled in our programs today, and over 70,000 alumni, you are now a member of a worldwide family of leaders in the aviation and space industry.

Our commitment is to provide you with quality programs and faculty, as well as responsive and caring student services. In reviewing this catalog, you will see a broad range of academic opportunities that prepare our graduates for fulfilling careers within our global industry. Many courses include projects where you will work with others as a team to solve real-world challenges.

As you read the history of Embry-Riddle, it will be clear that our University is evolving. In 80 years we have grown from the world's finest aviation institute to an internationally respected comprehensive university, committed to teaching, research,



scholarship, and professional service to the aviation and space community. I welcome you to an exciting and dynamic University, and to the Embry-Riddle experience.

hunon

John P. Johnson, Ph.D. President



Academic Complex - Prescott Campus

Embry-Riddle Aeronautical University is an independent, nonsectarian, nonprofit, coeducational university with a history dating back to the early days of aviation. The University serves culturally diverse students

motivated toward

careers in aviation and

aerospace. Residential

campuses in Daytona

Prescott, Arizona, pro-

ditional setting, while

an extensive network of campus learning

the United States and

abroad serves civilian

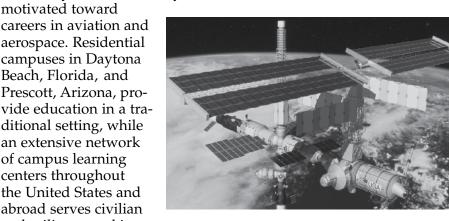
and military working

centers throughout

Beach, Florida, and

aerospace, and related disciplines.

To develop mature, responsible graduates capable of examining, evaluating, and appreciating the economic, political, cultural, moral, and technological aspects of



adults through ERAU-Worldwide. See: http://spa.erau.edu/plan/mission2.htm, for the entire mission.

It is the purpose of Embry-Riddle to provide a comprehensive education to prepare graduates for productive careers and responsible citizenship with special emphasis on the needs of aviation, aerospace, engineering, and related fields. To achieve this purpose, the University is dedicated to the following:

To offer undergraduate and graduate degree programs that prepare students for immediate productivity and career growth while providing a broad-based education, with emphasis on communication and analytical skills.

To emphasize academic excellence in the teaching of all courses and programs; to recruit and develop excellent faculty and staff; and to pursue research and creative activities that maintain and extend knowledge in aviation,

humankind and society, and to foster a better understanding of the workings of the free enterprise system and its social and economic benefits, and of the profit motive, as vital forces to the potential of individuals and groups.

To promote ethical and responsible behavior among its students and graduates in the

local, national, and international aviation and aerospace communities and in the community at large.

To develop and effectively deliver educational programs for the adult student and professional at the undergraduate and graduate levels, including off-campus degree programs, short courses, online learning, noncredit programs, seminars, workshops, and conferences.

To support each student's personal development by encouraging participation in programs and services that offer opportunities for enhanced physical, psychological, social, and spiritual growth; and by complementing the academic experience and contributing to the development of a wellrounded individual prepared for personal and professional success.

To engage in research, consulting services, and related activities that address the needs of aviation, aerospace, and related industries.



# EMBRY-RIDDLE AT A GLANCE

# Aviation and Embry-Riddle: The Lifelong Partnership

At the beginning of the last century no flying schools existed, much less an aviation university. It was not until 1903 that the Wright brothers achieved sustained, controlled flight by a powered aircraft and, in so doing, changed life on this planet forever.

It did not take long for aviation to come of age. By 1914, regular passenger service had been inaugurated in Florida between St. Petersburg and Tampa. Later that year, war



came to

the European skies. The combined effect of military and commercial demands produced a dynamic new industry.

Unlike many

other develop-

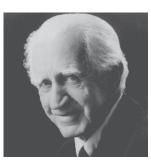
ments at the end

T. Higbee Embry

of the Industrial Revolution, aviation required a special education — learning how to fly, learning about safety and weather, and learning about engines — from skilled maintenance to the outer limits of performance.

This need for trained pilots and mechanics quickly led to the establishment of a new type of school, one focused totally on aviation. In the beginning, these organizations were often a combination of airplane dealership, airmail service, flight training center, and mechanic school. The original Embry-Riddle operations fit that mold precisely.

On December 17, 1925, exactly 22 years after the historic flight of the Wright Flyer, barnstormer John Paul Riddle and entrepreneur T. Higbee Embry founded the Embry-Riddle Company at Lunken Airport



in Cincinnati, Ohio. The following spring the company opened the Embry-Riddle School of Aviation, coinciding with the implementation of the Air Commerce Act of 1926, which required, for the

John Paul Riddle

first time, the certification and medical examination of pilots.

Although it was a volatile time for aviation enterprises, the school prospered. Others came and went regularly, but Embry-Riddle was not affected.

Within three years the school had become a subsidiary of AVCO, the parent of American Airlines. The school remained dormant during most of the 1930s, mirroring the casualties of the Great Depression. By the end of the decade, however, World War II erupted in Europe and the demand for skilled aviators and mechanics grew significantly. Embry-Riddle's second life was about to begin.

The Lunken Airport operation had long since disappeared, but in Florida Embry-Riddle opened several flight training centers and quickly became the world's largest aviation school. Allied nations sent thousands of fledgling airmen to the Embry-Riddle centers at Carlstrom, Dorr, and Chapman airfields to become pilots, mechanics, and aviation technicians. Some 25,000 men were trained by Embry-Riddle during the war years.

After the war, under the leadership of John and Isabel McKay, Embry-Riddle expanded its international outreach while strengthening its academic programs.



Jack R. Hunt

In 1965, with Jack R. Hunt as president, Embry-Riddle consolidated its flight, ground school, and technical training programs into one location. This move, which proved to be a moment of singular importance, was made possible by Daytona Beach

civic leaders who donated time, money, and the use of personal vehicles. The relocation signaled the rebirth of Embry-Riddle and the start of its odyssey to world-class status in aviation higher education. In June 1970, Embry-Riddle changed its name from "Institute" to "University," and resident centers were established at U.S. military aviation centers to serve the educational needs of active-duty military personnel. Application for Southern Association of Colleges and Schools accreditation through the Commission on Colleges was initiated in 1970 and received in 1972. The University has participated in the Self-Study process ever since.

Also under President Hunt's leadership, Embry-Riddle opened a western campus in Prescott, Arizona, on the 511-acre site of a former college. With superb flying weather and expansive grounds, the Prescott campus has been an outstanding companion to the University's eastern campus in Daytona Beach.

Continuing the legacy left behind by Hunt was Lt. Gen. Kenneth L. Tallman.



Lt. Gen. Kenneth L. Tallman

Tallman was president of Embry-Riddle for five years. He came to the University after a distinguished 35-year military career that included service as superintendent of the U.S. Air Force Academy. Under Tallman's leadership, a school of

graduate studies and the electrical engineering degree program were introduced. He led the University into research with the addition of the engineering physics degree program. He also developed stronger ties



between Embry-Riddle and the aviation/aerospace industry.

Dr. Steven M. Sliwa led the University from 1991 through 1998. Sliwa, the University's third president, is best known for creating an entrepreneurial environment and for developing

Steven M. Sliwa

strategic partnerships with industry. These partnerships included a joint venture with FlightSafety International; a partnership with Cessna Aircraft Company; a technology alliance with IBM; and an exclusive educational partnership with the Aircraft Owners and Pilots Association. He also spearheaded a \$100+ million capital expansion program, which included an \$11.5 million congressional line-item appropriation. In addition, new academic and research programs were created at his direction to respond to structural changes in the industry while increasing market share in the University's core programs.



Embry-Riddle's fourth president, Dr. George H. Ebbs, led the University from 1998 through 2005. During his tenure the annual college guide produced by U.S. News & World Report consistently ranked Embry-Riddle's aerospace engineering program No. 1

Dr. George H. Ebbs

in the nation among schools without doctoral programs. Embry-Riddle's programs in aerospace engineering, aeronautical science, and engineering physics are the largest in the nation.

Under the leadership of Dr. Ebbs, new graduate degree programs in safety science and space science were introduced, as well as new undergraduate degree programs in computer science, global security and intelligence studies, mechanical engineering, software engineering, and space physics. Major construction began on the Aviation Complex at the Daytona Beach Campus and the Academic Complex at the Prescott Campus.

Dr. Ebbs presided over three military contracts worth a total of more than \$57 million. Under those contracts Embry-Riddle provides aviation-related degree programs to the U.S. military in Europe, trains Air Force pilots at the U.S. Air Force Academy in Colorado Springs, and trains Air Force, Air National Guard, and international flight safety officers at Kirtland Air Force Base in Albuquerque, N.M.

Dr. John P. Johnson is the University's fifth president. He previously served as Embry-Riddle's interim president and as provost and chief academic officer. Under his leadership the University has expanded its



research activity, has established new degree programs, and is developing a global strategy to take its aviation and aerospace expertise overseas. Before joining Embry-Riddle, Dr. Johnson was the provost and vice-president for academic affairs at Texas A&M University,

Dr. John P. Johnson

Texarkana, and served as dean at the Medical University of South Carolina and at Northern Kentucky University. Embry-Riddle is a global institution that holds a prominent position in aviation/ aerospace education. The University is the world's largest independent aeronautical university and boasts a student body of 34,000 who come from all 50 states and more than 90 nations. The University offers more than 30 degree programs, at the bachelor and master level. Embry-Riddle provides flexible educational services to thousands of working adults through the Worldwide Campus. Many students receive their degrees from more than 130 teaching centers in the United States and Europe or through online learning.

#### ACCREDITATIONS AND AFFILIATIONS

Embry-Riddle Aeronautical University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (1866 Southern Lane, Decatur, GA 30033-4097, Telephone: 404-679-4501) to award degrees at the associate, bachelor, and master levels. The bachelor degree programs in Aerospace Engineering and Computer Engineering at the Daytona Beach and Prescott campuses, along with Civil Engineering, Engineering Physics, and Software Engineering at Daytona Beach, and Electrical Engineering at Prescott, are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET, 111 Market Place, Suite 1050, Baltimore, MD 21102-4012, Telephone: 410-347-7700, http://www.abet.org).

The following bachelor degree programs are accredited by the Aviation Accreditation Board International (AABI, formerly Council on Aviation Accreditation, 3410 Skyway Drive, Auburn, AL 86830, Telephone: 334-844-2431): Aeronautical Science (Daytona Beach and Prescott), Aviation Business Administration (Daytona Beach and Prescott), Applied Meteorology (Daytona Beach and Prescott), Safety Science (Daytona Beach), and Air Traffic Management (Daytona Beach). Under the College of Aviation at Daytona Beach, the Maintenance Management area of concentration and the Aerospace Electronics area of concentration are also accredited by AABI.

The bachelor degree programs in Aviation Business Administration (Daytona Beach and Prescott) are also accredited by the Association of Collegiate Business Schools and Programs (ACBSP). The MBA in Aviation at the Daytona Beach campus is accredited by the ACBSP.

Federal Aviation Administrationapproved certification programs include maintenance technology (airframe and power plant); flight (private, commercial, instrument, multi-engine, flight instructor, and instrument flight instructor ratings); and flight dispatch.

# **Statement of Values**

#### Student Success...

We understand that students are the lifeblood of Embry-Riddle. We focus and commit ourselves and our resources to the success of current, past, and future students. Our success is gauged by the difference we make in our students' lives.

#### Learning Environment...

We seek intellectual growth through study, research, questioning, listening, and debate. We value the enlightened interchange of ideas as we challenge one another to do more, to study, to learn, to share, and to grow. We expect members of the student body, faculty, and administration to exercise their academic freedoms and to preserve those of others. We commit ourselves to a lifelong endeavor of learning. We are all teachers and we are all students.

# Safety...

We care deeply about the health and safety of our students and fellow employees. We believe that each one of us, from the administration to the flight instructors, has a responsibility to make our workplaces safer for everyone. We support the open sharing of information on all safety issues and encourage all employees and students to report significant safety hazards or concerns.

# Integrity, Honesty, and Trust...

Integrity is the most valued employee trait. We believe that honesty is the foundation for interaction in all academic, administrative, and personal matters. The leadership team and each individual bear the responsibility for earning the trust of others.

# Diversity...

We respect the rights and property of all individuals regardless of gender, race, ethnicity, national origin, age, physical disability, economic background, sexual orientation, or religious belief. We believe in a community where all members are welcome, and individuals or groups are free from harassment.

#### Communication...

We speak candidly and we listen well. We hold that if every involved party has taken part in a decision, then everyone will support the decision. We believe that clear and frequent communication is essential for our safety, our relationships, and our productivity.

#### Process and Teamwork...

We believe that the process of collegial decision-making contributes to the quality of the decisions. We also understand and appreciate that the most successful outcomes occur when organizational units work cooperatively as teams.

# Character...

We accept responsibility for our actions. When we see a problem, we do not pass it off, we do not complain, we act. We involve others as appropriate to achieve our goals. We prize dedicated, committed, caring, conscientious, and creative individuals who strive for excellence in the performance of their duties and responsibilities.

# Change and Growth...

We appreciate that great organizations like Embry-Riddle are constantly changing, adapting to external pressures, and growing. All of our work units are constantly improving quality. We realize that our jobs require us to grow professionally and take on more responsibility. Growth requires calculated risk-taking and we empower one another to take appropriate risks and learn from our mistakes. We believe in a willingness to challenge traditions and constantly seek innovative ways to manage and solve problems.

# Fiscal Soundness and Investments...

We understand we must operate efficiently and effectively so that investments can be made in our capabilities and ourselves. We invest in technology as appropriate, principally to increase the quality and frequency of our interactions in support of our mission.

# Attitude...

We recognize, endorse, and empower leadership at all levels. We understand the joy of living in harmony with one another and strive to maintain an open, productive environment. We prize an upbeat, can-do attitude. We are members of the Embry-Riddle community because we want to be here, and this positive attitude is reflected in our communications with one another and our students.

# **Employee Creed**

Adopted by Jack R. Hunt in 1975 Updated and reaffirmed by President George H. Ebbs, Ph.D., 2003

A STUDENT... Is the most important person in this university.

A STUDENT... Is not an interruption of your work, but the purpose of it.

# A STUDENT...

Is not a cold statistic, but a flesh-and-blood human being with feelings and emotions like your own.

A STUDENT... Is not someone to argue or match wits with.

#### A STUDENT...

Is a person who brings us needs - it is our job to fill those needs.

#### A STUDENT...

Is deserving of the most courteous and attentive treatment we can provide.

#### A STUDENT...

Is the person who makes it possible to pay your salary whether you are faculty or staff.

> A STUDENT... Is the lifeblood of this and every university.

#### A STUDENT... Is something you once were, REMEMBER?

Embry-Riddle Aeronautical University is the world's oldest and largest fully accredited university specializing in aviation and aerospace. As a global institution, the University educates more than 34,000 students annually at its residential campuses in Daytona Beach, Florida, and Prescott, Arizona, and through its Worldwide Campus.

The Daytona Beach campus has 4,500 undergraduate and 390 graduate students. The Prescott campus enrolls 1,600 undergraduate and 40 graduate students. The Worldwide Campus has 21,000 undergraduate students and 6,100 graduate students.

Our students hail from all 50 states and 91 nations. At the Prescott campus, the top five states of origin in descending order are California, Arizona, Texas, Colorado, and Oregon. At the Daytona Beach campus, the top five states of origin are Florida, New York, New Jersey, Pennsylvania, and Texas. International students make up 8 percent of the student body at Daytona Beach and 3 percent at Prescott, with India at the top, followed by Korea and Japan. At the residential campuses, females constitute 16 percent of the student population.

The 185-acre Daytona Beach campus is located next to Daytona Beach International Airport. High-technology industries in the Daytona Beach and Orlando areas, as well as the Kennedy Space Center, provide the University with an outstanding support base. The campus offers state-of-theart facilities, including the new College of Aviation building, which has air traffic control simulation and research labs and a weather center. The Lehman Engineering and Technology Center houses the technol-



ogy for online learning, videoconferencing, decision support systems, and three-dimensional modeling. The Advanced Flight Simulation Center contains an FAA-certified Level-6 CRJ-200 simulator and Level-6 Frasca FTDs that provide a level of on-campus training unique to higher education. In addition, the Daytona Beach campus is constructing an academic building for the College of Business that will include hightech classrooms and faculty offices.

The University's 539-acre western campus is located in Prescott, Arizona, 100 miles north of Phoenix. New campus facilities include the Aerospace Experimental and Fabrication Building, the Academic Complex, and the Visitors Center. Due to open in 2008 is the Christine and Steven F. Udvar-Hazy Library and Learning Center. Also of note are the King Engineering and Technology Center, which is electronically linked to the Daytona Beach campus; the Robertson Aviation Safety Center, which is dedicated to the study of human factors, aircraft accident investigation, and aviation safety; and the Robertson Flight Simulation Center, which contains Frasca and Airbus A320 flight-training devices. In support of academic instruction are various laboratories for engineering graphics, materials, aircraft structures and composites, and basic circuits and electronic devices, in addition to a supersonic wind tunnel and shock tube.

The Worldwide Campus provides educational opportunities for civilian and military professionals who are unable to attend classes at one of the University's residential campuses. Its academic programs are offered in the classroom through a network of more than 130 centers in the United States, Canada, Europe, and the Middle East and through Web-based online learning. The Worldwide Campus headquarters is in Daytona Beach.

Embry-Riddle offers the student a choice of more than 30 undergraduate and graduate degree programs in aviation, aerospace, business, engineering, and related high-tech fields. *U.S. News & World Report's* "Best Colleges" guide ranks Embry-Riddle's aerospace engineering program No. 1 in the nation among schools without doctorate programs. Our aerospace engineering program is also the largest in the nation. The University's engineering physics program is the largest of all ABET-accredited engineering physics programs and is considered to be one of the best in the nation.

Embry-Riddle's undergraduate aeronautical science (professional pilot) program is the largest in the world; it's as large as the other top 10 U.S. collegiate flight programs combined. The program is supported by 92 instructional aircraft and 34 simulators. Embry-Riddle's precision flight teams consistently rank among the top in the nation in the SAFECON competition sponsored by the National Intercollegiate Flying Association.

While pursuing their education, our students gain valuable experience through participation in cooperative education and internship programs. Some 375 students were awarded co-op or intern positions during the 2005-2006 academic year. Students also accrue skills by assisting faculty members in conducting solution-oriented research and consulting projects for the aviation, aerospace, and other industries. In fiscal year 2005-2006, some 93 faculty members were involved in research and other activities with 111 sponsored projects. The total value of all active awards was almost \$28 million.

Within one year of graduation, 97 percent of Embry-Riddle graduates are either employed or have decided to continue their education. The major airlines hire more alumni from Embry-Riddle than from any other collegiate aviation program, and Embry-Riddle is the nation's largest supplier of air traffic controllers with bachelor degrees to the FAA.

Over the decades, Embry-Riddle has educated and trained thousands of men and women of the U.S. armed forces. The two Air Force ROTC detachments at Embry-Riddle's residential campuses form the largest university-based Air Force commissioning source in the nation. The detachments also produce more commissioned officers and more pilots and other rated officers for the Air Force than any other institution in the nation except the Air Force Academy. The University also hosts Army and Navy ROTC units. Currently Embry-Riddle has a \$30 million contract with the U.S. Department of Defense that maintains the University's long-time status as the sole provider of aviation-related degree programs to the U.S. military in Europe. Embry-Riddle also has a \$14.5 million contract to screen Air Force pilots at the U.S. Air Force Academy in Colorado Springs and provides training to Air Force, Air National Guard, and international flight safety officers at Kirtland Air Force Base in Albuquerque, N.M.

As aviation and aerospace continue to evolve, so does Embry-Riddle. The University is committed to the expansion of opportunities for students to work more closely with the aviation industry in the United States and in other nations. Guiding the process of evolution are dedicated teachers, administrators, alumni, trustees, and advisory board members who share our students' love of aviation and who strive to ensure Embry-Riddle's continued position as the world's premier aviation and aerospace university.

# Admission to the Residential Campuses

#### GENERAL PROCEDURES

New students are eligible for admission at the beginning of the fall, spring, and summer terms. High school students may apply at the beginning of their senior year. Applications received after the priority filing dates will be processed on a space-available basis.

Term	Filing Priority	Notification	Deposit
Fall	March 1	Rolling	May 1
Spring	November 1	Rolling	November 1
Summer Term A	April 1	Rolling	As requested
Summer Term B	June 1	Rolling	As requested

For more information and to request an application, contact the Admissions Office at:

#### **Embry-Riddle Aeronautical University**

Director of Admissions 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900 (386) 226-6100 or (800) 862-2416 email address: dbadmit@erau.edu http://www.embryriddle.edu

# FIRST-YEAR APPLICANT

The University defines a first-year candidate as one who is applying for degree status directly from high school. The University offers admission to all applicants who present an academic record that demonstrates their ability to graduate. To reach an admissions decision, the following information is considered: overall academic performance and grades, rank in class (if available), and standardized test scores. The University's Admissions Office implements established academic policies and requirements that define the necessary qualifications for admission.

#### **Embry-Riddle Aeronautical University**

Director of Admissions 3700 Willow Creek Road Prescott, AZ 86301-3720 (928) 777-6600 or (800) 888-3728 email address: pradmit@erau.edu http://www.embryriddle.edu

Entrance requirements to the University include: 4 years of English; 3 years minimum, 4 years preferred college preparatory mathematics; 3 years of social science; and 2 years of science including a laboratory science, 3 years preferred. Additional courses may be required depending on the major selected. Admitted students usually present more than the minimum requirements. The University reserves the right to change entrance requirements without prior notice.

#### STANDARDIZED TESTING

SAT I reasoning test or ACT is strongly recommended for admission for U.S. citizens and permanent residents. International students, please see page 22 for further admission requirements.

#### ENGLISH LANGUAGE PROFICIENCY

Admissions encourages all of our applicants for whom English is not the primary language spoken at home to take the TOEFL exam to supplement their verbal SAT I score. This information will aid the University in accurately assessing verbal skills. For more information about testing dates and locations, contact:

**TOEFL Services Educational Testing Service** P.O. Box 6151 Princeton, NJ 08541-6151 1-609-771-7100 (worldwide) 1-877-863-3546 http://www.toefl.org -OR-The College Board 5 Columbus Ave. New York, NY 10023 (212) 713-8000 -OR-The College Board Box 1025 Berkeley, CA 94701 http://www.collegeboard.com For more information, contact the Embry-Riddle Language Institute at: Daytona Beach Campus (386) 226-6192 fax: (386) 226-6165 email: erli@erau.edu

#### TRANSCRIPTS

The Admissions Office accepts either an official secondary school transcript or the General Education Development Certificate (GED). An official transcript or GED score report must be sent directly from the issuing institution to Embry-Riddle.

#### TRANSFER APPLICANTS

The University welcomes applicants who have demonstrated success at other institutions of higher education. For purposes of admission, a transfer student is defined as any student who has earned college credit or military credit after graduating from high school.

In making transfer admission decisions, the Admissions Office reviews official transcripts of all college-level work attempted and completed. Transfer candidates who have earned under 30 college-level credit hours must be required to submit an official final high school transcript. The minimum grade point average required for admission to Embry-Riddle is a 2.00 from the last institution attended and a combined GPA of 2.00. Most successful transfer applicants present at least a 2.50 (C+) average on a four-point scale. Applicants with grade point averages between a 2.00 and a 2.40 will be reviewed on a case-by-case basis.

The University reserves the right to refuse admission to students who are on probationary status or who were academically dismissed from other colleges or universities. If the University admits such students, they will

be admitted with conditional status.

#### TRANSFER CREDIT

- 1. Transfer credit may be granted under the following conditions:
  - a. Appropriate coursework completed at another accredited institution with a grade of A, B, C, P, or equivalent will be accepted.
  - b. Grades are not transferable.
  - c. Previous flight experience may be accepted in accordance with the Embry-Riddle policy as stated in the Advanced Standing section of this chapter.
  - d. Credit hours are transferable if earned at institutions accredited by the appropriate regional agency. Academic credit is accepted without regard to the date the course was completed. It is left to the discretion of the student, in consultation with the student's academic advisor, to determine whether to retake the courses when placement testing indicates a deficiency. Embry-Riddle has sole discretion in determining which and how many transfer credit hours will be accepted toward degree requirements.
  - e. Embry-Riddle evaluates previous academic credit on a course-bycourse basis. Acceptable transfer work will be indicated on the Embry-Riddle transcript. If classes are not applicable to the student's degree program at Embry-Riddle, they will be considered as electives in excess of minimum degree requirements. The level of credit (upper or lower division) is determined by evaluation of the course at Embry-Riddle.

- 2. Embry-Riddle may, at its discretion, require an evaluation examination for any course submitted for transfer credit if there is doubt concerning the equivalency of the transfer course with a similar course offered at Embry-Riddle. Embry-Riddle cannot guarantee that courses are transferable. Courses are accepted at the discretion of the University.
- 3. The transfer student's records (transcripts, etc.) will be evaluated according to the rules and regulations as described in this catalog, and in accordance with University policies in effect at the time of the student's admission to a degree program. After evaluation, the student will be sent a course-by-course outline of all transfer credit accepted by the University.

#### Nontraditional Student Applicants

Embry-Riddle acknowledges that full-time employment experiences often provide the motivation and discipline to be a successful student in college. If a student's academic career has been interrupted for a minimum of three years due to personal or financial reasons, the care of dependents, or serving time in the U.S. military, Embry-Riddle considers the student a nontraditional applicant and recognizes that his/her high school academic record may not accurately reflect the student's ability. When reviewing the student's application, unique circumstances are taken into account prior to determining whether the applicant should be a firstyear or transfer student. If a GED (General Education Development Certificate) has

been earned, an official copy of the results must be sent from the issuing agency. The following items must be provided by those wishing to be considered for admission:

- 1. Completed application form and \$50 application fee (nonrefundable).
- 2. Official copy of high school transcript or completion of the General Education Development Test (GED scores must be sent directly by the testing agency).
- 3. Documentation of activities or full-time employment experience (civilian, military, or any combination equaling three years).

# **RETURNING STUDENT APPLICANTS**

An Embry-Riddle student whose attendance at the University is interrupted may be required to apply for readmission. In such cases, a new application for admission must be filed with the Director of Admissions. For more information, refer to the Continued Enrollment section of the catalog.

# NONDEGREE SEEKING APPLICANTS

Embry-Riddle recognizes the needs of working adults who are interested in furthering their education for retraining or for enhancing professional skills. Students who meet University admission requirements are permitted to enroll in courses as special students in a nondegree seeking status. These students are permitted to continue their enrollment as long as they maintain satisfactory academic status or until they file a formal application for admission as a degree-seeking student. Persons interested in applying as nondegree seeking students can get more information from the Director of Admissions.

#### INTERNATIONAL APPLICANTS

Refers to nonresident, nonimmigrant students planning to study in the United States (typically on an F-1 or a J-1 visa.) The following items must be provided:

- 1. Completed application form and \$50 application fee (nonrefundable).
- 2. Official copy of upper secondary school academic records (must be sent directly from the school to Embry-Riddle). These records must arrive in the Admissions Office in the original envelope with an unbroken seal to be considered official. Both original language documents and English translations are required.
- 3. Standardized Test Scores The SAT I: Reasoning Test or the ACT is strongly recommended for admission. Standardized test results are always reviewed in conjunction with your academic record and are never the sole factor used to determine eligibility. For information about the SAT/ACT test dates and locations please contact: The College Board

5 Columbus Ave. New York, NY 10023 (212) 713-8000

-OR-

**The College Board** Box 1025 Berkeley, CA 94701

http://www.collegeboard.com -OR-

#### ACT

500 ACT Drive P.O. Box 168 Iowa City, IA 52243-0168 (319) 337-1270 http://www.act.org

#### 4. TOEFL Scores

To be admitted into a degree program, international students who will not be graduating from an English educational system or for whom English is not the primary language must submit official TOEFL scores. The preferred score for admissions is a 213 (computer based) or 550 (paper based). Students scoring below the preferred score may be deferred for enrollment to our Embry-Riddle Language Institute (ERLI). Admission to ERLI does not guarantee admission to an Embry-Riddle degree program. Admissions also encourages all applicants for whom English is not the primary language spoken at home to consider taking the SAT I to supplement their TOEFL score. This additional information will aid the University in accurately assessing verbal skills. For more information about testing dates and locations contact: **TOEFL** Services **Educational Testing Service** P.O. Box 6151 Princeton, NJ 08541-6151 1-609-771-7100 (worldwide) 1-877-0863-3546 http://www.toefl.org Additional information about the Embry-Riddle Language Institute is available by contacting the program at:

Daytona Beach Campus (386) 226-6192 fax: (386) 226-6165 email: erli@erau.edu

5. Transcripts from international postsecondary institutions. An official copy of record of study, grade obtained, examinations passed, and any diplomas, certificates, or degrees received at all secondary, postsecondary, university and professional schools attended must be sent directly to Embry-Riddle by the school. These records must arrive in the Admissions Office in the original envelope with an unbroken seal to be considered official. Both native documents and English translations are required. In addition, applicants may be required to have these transcripts evaluated by an outside evaluation service. If so required, the applicant will receive specific instructions about obtaining the evaluation during the admission process. The fee charged for this service is the responsibility of the applicant. The service provider must send the evaluation directly to Embry-Riddle. Following is a list of international translation and evaluation providers approved by Embry-Riddle: American Association of Collegiate **Registrars & Admissions Officers** (AACRAO).

> One Dupont Circle, NW Suite #520 Washington, DC 20036-1135 (202) 296-3359 fax: (202) 872-8857

Academic Credentials Evaluation Institute Inc. P.O. Box 6908 Beverly Hills, CA 90212 (310) 275-3530 (Request an evaluation relative to courses in the Embry-Riddle catalog.) (This is the preferred evaluator service *for the Prescott Campus.)* Educational Credential Evaluators Inc. P.O. Box 92970 Milwaukee, WI 53202-0970 (414) 289-3400 (*Request course by course evaluation.*) Foreign Credential Evaluations Inc. 1425 Market Blvd. Suite 330 PMB #305 Roswell, GA 30338 (770) 642-1108 fax: (770) 641-8381 International Education Research Foundation Inc. P.O. Box 66940 Los Angeles, CA 90066 (310) 258-9451 (Request a course by course evaluation.) Josef Silny & Associates P.O. Box 248233 Coral Gables, FL 33124 (305) 666-4133 email: info@jsilny.com (*Request course by course evaluation.*) World Education Services (WES) P.O. Box 745, Old Chelsea Station New York, NY 10113-0745 (800) 937-3898 -or- (212) 966-6311 fax: (212) 966-6395 email: info@wes.org (*Request course by course evaluation.*)

- 6. I-20 Requirements for International Students. Upon application, international students must submit the following:
  - a. Affidavit of Financial Support for International Students (see application booklet)
  - b. Supporting bank letter verifying appropriate funds on deposit.\* This amount will reflect the amount needed to cover tuition, fees, books, health insurance, and living expenses for one year, plus \$3,000 for each accompanying dependent. In the case of sponsored students, an official notification of public or private sponsorship will take the place of a bank letter. A University assistantship contract does not relieve a student from the requirement to provide both a financial affidavit and a supporting bank letter, unless waived by the appropriate University official. International students must be fully prepared upon arrival on campus to meet all normal living expenses and manage their finances for the period of time required to complete the degree.

\* See application for specific dollar amount requirement.

c. At least 30 days prior to matriculation, students accepted for admission must submit a \$200 advance tuition deposit, along with an admitted student enrollment form to confirm enrollment to the University. This form will be provided to accepted students by the Admissions Office.The deposit will be held in the student's account for one year and will be credited toward tuition during the first semester of attendance. After one year, if the student has not matriculated, the deposit is forfeited.

- d. The I-20 Form must be in the student's possession before departure and presented to the nearest U.S. embassy or consulate to obtain the necessary entry visa before departure to the United States.
- e. The I-20 will be issued to the student upon acceptance to the University, if all required documentation has been received.
- 7. Provide documentation of immunity to vaccine-preventable diseases as described in material sent from the University. At enrollment, all students from areas determined to be endemic or at high risk for tuberculosis will be required to have a tuberculosis skin test (Mantoux test) and additional medical follow-up as needed and directed by the campus Health Services Office.
- 8. All flight students must provide an FAA Medical Certificate, Class I or II, at least 60 calendar days before the desired enrollment date. Students who do not have access to an FAA-approved physician may take this exam after arriving in the United States.

International students desiring flight programs will be required to complete federal screening procedures where applicable.\*

\* Specifics will be provided during application process.

All materials submitted become the property of Embry-Riddle Aeronautical University and cannot be reproduced, returned, or forwarded.

# SEVIS

SEVIS is the Student and Exchange Visitor Information System, consisting of a governmental computerized system to maintain and manage data related to foreign students and exchange visitors during their stay in the United States. This system allows for real-time access to this information and assists colleges and universities in ensuring that students comply with the terms of their visas. For more information about SEVIS, please refer to the Bureau of Immigration and Customs Enforcement (ICE) Web site at http://www.ice.gov/sevis/.

#### ENGLISH AS A SECOND LANGUAGE — EMBRY-RIDDLE LANGUAGE INSTITUTE (ERLI)

The Embry-Riddle Language Institute (ERLI) is an intensive English program providing English language instruction and cultural orientation to non-native speakers of English. Most of our students plan to attend Embry-Riddle Aeronautical University, but we also welcome others who want only to improve their English language ability. If you desire to become more proficient in listening, speaking, reading, and writing the English language, this intensive English program is for you. Students benefit from a computer laboratory with up-to-date language-learning software and TOEFL preparation software. Students who wish to attend Embry-Riddle Aeronautical University can be granted conditional acceptance pending completion of our program or a passing TOEFL score, assuming they meet all other University admission requirements. Eligible students

are also able to earn a part-time recommendation after successful completion of a semester at ERLI, which allows them to begin their University studies while continuing their English language studies. Other benefits of our program include field trips, social events, and full access to all Embry-Riddle Aeronautical University facilities.

For more information please contact: Embry-Riddle Language Institute 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900 (386) 226-6192 fax: (386) 226-6165 email: erli@erau.edu

#### Admitted Student Information

Domestic students accepted for admission must submit a \$200 advance tuition deposit by the stated date. This deposit confirms attendance to the University and is credited toward the first semester's tuition.

If you decide to accept our offer of admission for the fall term, you must submit the tuition deposit by the Candidates Common Reply date of May 1. Spring term deposit date is Nov. 1. Summer term deposit dates are April 1 for summer A and May 1 for summer B.

The deposit will be held in the student's account for one year should the student enroll during that year. After one year the deposit is forfeited.

A student who cancels the application at any point in the admissions process may reactivate the application without a fee for one year at any time up to the admissions deadline for the same semester of the following academic year. After one year, a new application, fee, and supporting documents must be submitted.

#### Advanced Standing

Advanced standing may be awarded for prior learning achieved through postsecondary education, testing, work and/or training experience, or programs completed before enrollment at Embry-Riddle. Students who feel their background warrants consideration for advanced standing not already granted for specific courses may request course equivalency examinations. Flight experience will be evaluated in accordance with procedures outlined later in this section.

It is the student's responsibility to ensure that all documentation is submitted to the University. This information can either be sent with the application for admission or mailed under separate cover. Formal application for advanced standing for flight training must be made before the end of the student's first semester of attendance at the appropriate campus.

All academic evaluations for advanced standing will be completed before the end of the student's first semester of attendance at, or readmission to, the University. The student will be given a copy of the completed official evaluation and have 30 calendar days to question the credit awarded. Advanced standing and transfer credit granted in accordance with these procedures will be authenticated by the Admissions Office and maintained by the campus Records Office. Documentation that may be submitted for consideration toward advanced standing includes military training, FAA certificates, credit for examination scores, and professional experience. Credit may be awarded as follows:

- The University offers advanced placement credit toward a college degree to those students who present official College Entrance Examination Board (CEEB) Advanced Placement Test scores of 3 or better on any examination. Up to 30 hours of International Baccalaureate (IB) credit may be earned for official test scores of 4 or higher.
- 2. Embry-Riddle follows the standards recommended by the American Council on Education for awarding credit for the College Level Examination Program (CLEP) general examinations. To be officially evaluated for credit, the test scores must be submitted before the student's initial enrollment as a degree candidate. The number of credit hours recognized by Embry-Riddle for these examinations in various disciplines are as follows:

Communications	6 credit hours
Humanities	6 credit hours
Social Sciences	6 credit hours
Natural Sciences	6 credit hours
Mathematics	6 credit hours

3. The University has approved certain CLEP subject examinations, Defense Activity for Non-Traditional Educational Support (DANTES) examinations, and Excelsior College Examination (ECE) for award of credit as applicable to the student's program. Scores from these examinations must be submitted before initial enrollment as a degree candidate to be officially evaluated for credit. Credit for these examinations may not be applied toward the last 30 credit hours required for a bachelor degree or the last 15 credit hours required for an associate degree.

- 4. Training in military service schools will be considered for credit by each curriculum division, based on the recommendation of the American Council on Education.
- 5. Students who hold a pilot certificate may be eligible for advanced standing. Advanced standing based on a pilot certificate may be awarded for the appropriate flight course. A student who received college credit for their flight training may be eligible for advanced standing for certain academic courses. Contact the Aeronautical Science Department at the Daytona Beach Campus or the Flight Department at the Prescott Campus for a determination of the exact amount of credit to be awarded. In any case, advanced standing credit must be applied for during the first semester. To obtain credit, the applicable FAA certificate must be presented at the time that the advance standing request is made. All advance standing credit for flight courses will be recorded on academic transcripts after the first flight course is completed at Embry-Riddle.

Students holding a Commercial Pilot Certificate or Airline Transport Pilot Certificate, with significant recent experience beyond the basic certification level, may petition for additional credit. Students may be required to complete a flight evaluation or successfully complete a flight course on campus before becoming eligible to enroll in any offcampus Embry-Riddle affiliated airline training program. All certificate levels refer to U.S. FAA certificates. Foreign certificate holders must convert their licenses to FAA-issued certificates prior to any credit being awarded.

- 6. Degree programs for which holders of the FAA Airframe and Powerplant Certificate may receive advanced standing are Aviation Maintenance Science and Aeronautics.
- 7. The Aeronautics degree awards college credit based on an individual's past training and job experience in an aviation-related field. A description of advanced standing applicable to the Aeronautics degree may be found in the Academic Programs section of the catalog.
- 8. A student who possesses qualifications not listed above and who believes that his/her background warrants consideration for advanced standing may submit appropriate evidence of credentials for evaluation.

# DEGREE COMPLETION PROGRAM/ ACTIVE DUTY MILITARY PERSONNEL

All branches of the armed services offer various "Bootstrap" and degree completion programs. Embry-Riddle welcomes applications from qualified military personnel seeking to participate in such programs.

Applications must be submitted by established deadlines. Upon receipt of the student's application and supporting documents, the University will evaluate previous college coursework, military education, and work experience to determine eligibility for advanced standing. Each applicant receives a copy of the University evaluation form stating specifically the courses for which credit has been given.

#### **IMMUNIZATIONS**

To register for classes, entering students born after Dec. 31, 1956, must submit certified proof of immunization with two doses of MMR (measles/mumps/rubella) vaccine. These immunizations must have been administered after the student's first birthday with live virus vaccines. Students living on campus must also show proof of meningitis and hepatitis B vaccinations or sign and submit a waiver to decline them. For more information, refer to the University's Medical Report Form.

# FAA MEDICAL CERTIFICATE

Each student who is accepted as a flight student must submit a copy of the FAA Medical Certificate, Class I or II, at least 60 calendar days prior to the desired enrollment date.

# UNIVERSITY ACADEMIC REGULATIONS AND PROCEDURES

All Embry-Riddle students are responsible for knowing all academic regulations and procedures required for continued attendance at the University. Academic regulations and procedures are presented in University publications such as this catalog, the Student Handbook, the Flight Operations Manual, the Residence Hall Regulations pamphlet, the Curriculum Manual, and the Academic Policies and Procedures Manual. These documents are available for reference at campus records offices, student government offices, and academic departments throughout the University. A student who requires clarification of any policy or regulation should seek help from his/her academic advisor, program coordinator, or the appropriate office of Records and Registration. University regulations will not be waived because a student pleads ignorance of established policies and procedures.

The University reserves the right to change curricula and academic regulations and procedures without notice or obligation. Such changes are published in an addendum or in the next catalog.

Students should consult the graduate catalog for academic policies and regulations for graduate programs.

#### ACADEMIC ADVISING

At the residential campuses, each new student is assigned an academic advisor. Academic advisors help students choose and schedule academic programs that meet their educational goals.

Academic advisors post their scheduled office hours and students should call on them frequently and whenever assistance is needed.

# SCHEDULE OF CLASSES AND REGISTRATION

Students are required to register for each term of enrollment. At all locations students will be allowed to register via Web registration. However, at the Daytona Beach campus, first-year students and students in academic difficulty will be denied access to Web registration. They must see their academic advisor for approval of course selection prior to registration. At the Prescott campus, first-year students and students in academic difficulty must see their advisor, who will release their hold, allowing them to register on the Web. Registration must be completed and payment of all tuition deposits and fees must be made according to instructions published by the campus Records Office. Students are not officially enrolled until they complete all phases of registration, including financial requirements.

Penalties will be charged for late payment of fees. Late registration will be allowed during the first five days for the residential campuses if unusual circumstances prevent the student from registering during the scheduled period. Except for flight courses, registration will not be allowed after the last day of late registration. Special circumstances can be appealed through the dean of the college. Due to the scheduling requirements associated with flight training, flight course registration continues throughout the term.

A schedule of classes is prepared for each term at all locations served by the University. The University reserves the right to make necessary and appropriate adjustments to the published schedule to include cancellation or rescheduling of any class.

#### CLASS ATTENDANCE

Because regular attendance and punctuality are expected in all courses, attendance may be included in the grading criteria of an individual class. Absences are counted from the first scheduled meeting of the class.

Because minimum contact hour requirements have been imposed by the FAA for certain classes leading to FAA certificates, attendance requirements in those courses are rigorously enforced. Explanations for all absences should be given to the instructor in advance whenever possible.

A final examination is normally given in each course at the end of the term. A student who misses a final examination without advance permission from the instructor may be assigned a failing grade (F) for the course. A grade of incomplete (I) may be given if the student has obtained advance permission from the instructor or can provide satisfactory evidence that the absence could not be prevented.

# ACADEMIC INTEGRITY/CONDUCT

Embry-Riddle is committed to maintaining and upholding intellectual integrity. All students, faculty, and staff have obligations to prevent violations of academic integrity and take corrective action when they occur. The adjudication process will include the sanction imposed on students who commit the following academic violations, which may include a failing grade on the assignment, a failing grade for the course, suspension, or dismissal from the University:

- 1. Plagiarism: Presenting as one's own the ideas, words, or products of another. Plagiarism includes use of any source to complete academic assignments without proper acknowledgment of the source.
- 2. Cheating is a broad term that includes the following:
  - a. Giving or receiving help from unauthorized persons or materials during examinations.
  - b. The unauthorized communication of examination questions prior to, during, or following administration of the examination.
  - c. Collaboration on examinations or assignments expected to be individual work.
  - d. Fraud and deceit, which include knowingly furnishing false or misleading information or failing to furnish appropriate information when requested, such as when applying for admission to the University.

Students exhibiting the following undesirable acts of conduct may be suspended or dismissed from the University. Criminal acts must be reported to the appropriate law enforcement and University authorities.

- 1. Unauthorized alteration or misuse of one's own or another's academic records or transcripts.
- 2. Forging, altering, falsifying, destroying, or unauthorized use of a University document, record, or identification. This includes using the logo, stationery, or business cards of the University or otherwise identifying oneself as an agent of the University for personal, non-University business.

- Misuse of computing facilities and/or security violations, including attempted violations of computing facilities.
- 4. Conduct that disrupts the educational process of the University.

#### UNIT OF CREDIT

Semester credits are used throughout the University system. Transferred quarter hours will be converted to semester credit hours on the following basis: A quarter hour equals two-thirds of a semester hour.

#### COURSE LOAD STATUS

For residential campus students, 12 credit hours constitute the minimum load for full-time student status during the fall and spring terms. The minimum load for fulltime student status during each summer term is 6 credit hours. Students enrolled in fewer credits than the minimum full-time load are classified as part-time. All audited courses and courses taken for credit are counted in determining the student's load for a term.

The normal maximum load is 18 hours during spring and fall terms or 9 hours during summer terms. At all University locations, a student whose cumulative grade point average (GPA) is 3.00 or higher may register for an overload with advance approval of the appropriate program coordinator/chair.

#### CLASSIFICATION OF STUDENTS

Students are classified at the end of each term based on the total number of credit

hours earned in accordance with the following schedule:

First-Year:	fewer than 28 hours
Sophomore:	28-57 hours
Junior:	58-87 hours
Senior:	88 hours or more

#### GRADING SYSTEM

The following indicators, used on grade reports and transcripts, signify the quality of a student's academic performance.

Letter Grade	Student Performance	Grade Points Per Credit Hour
А	Superior	4
В	Above average	3
С	Average	2
D	Below average	1
F	Failure	0
WF	Withdrawal from the University-Failing	0
W	Withdrawal from a course	N/A
AU	Audit	N/A
Ι	Passing but incomplete	N/A
Р	Passing grade (credit)	N/A
S	Satisfactory (noncredit)	N/A
Т	Transfer credit	N/A
Ν	No grade submitted by instructor	N/A
x	Credit by means other than course equivalency examinations	N/A
XP	Credit by course equivalency exam	N/A
IP	In progress	N/A
NC	No credit awarded	N/A

# GRADE REPORTS

Final grades are issued at the end of each term. Students can access their grades immediately after they are posted, via Student Online Services. At the residential campuses, grade mailers will be mailed only to those students who have specifically requested a hard-copy grade report and supplied a "grades address" to the Records Office.

The University is prohibited from releasing grade information without the express written authorization of the student. Such authorization must be granted each term because blanket authorizations are prohibited by law.

#### GRADE POINT AVERAGES: GPA, CGPA

A term grade point average (GPA) and cumulative grade point average (CGPA) are computed for each student after every term. The GPA is calculated by dividing the number of grade points earned during the term by the number of hours attempted in that period. The CGPA is determined by dividing the total number of grade points by the total number of hours attempted at the University. Grade points and hours attempted are accrued in courses graded A, B, C, D, F, and WF only.

# DROPPING A COURSE

Students may drop a course, with no notation of course enrollment on their transcripts, during the drop period only. The drop period extends through the third week of spring and fall terms and the second week of summer terms for residential campus students.

# AUDITING A COURSE (AU)

Because students audit a course solely to enhance their knowledge, academic credit is not granted toward degree requirements for audited courses. Students may change their registration from audit to credit during the add period only. They may change from credit to audit until the last day of the withdrawal period. When a student auditing a course fails to maintain satisfactory attendance, as determined by the instructor, a grade of W will be assigned.

#### WITHDRAWING FROM A COURSE (W)

Residential campus students receive the grade W if they withdraw from a course by the end of the 10th week of spring and fall terms and the fifth week of summer terms. If they withdraw from a course after this period, they receive an F. If students stop attending their classes and fail to withdraw from the University, an F is assigned for each course in which they were enrolled.

Students may not drop or withdraw from a basic skills course without written permission from the chair of the department offering the course.

Students are not permitted to drop or withdraw from a course while a charge of academic dishonesty is pending. Students who withdraw from a flight course before their initial attempt at the final phase check receive a W.

#### WITHDRAWAL FROM THE UNIVERSITY

Residential campus students who leave the University for any reason must conduct an exit interview with the academic advisor in their college and officially process a withdrawal clearance through the Records Office. When a student withdraws from the University after the end of the scheduled withdrawal period, a WF grade will be assigned for all courses in which the student is enrolled unless an exception is granted for medical reasons or other extenuating circumstances.

# INCOMPLETE GRADES (I)

In exceptional cases, faculty may assign the temporary grade of incomplete (I) if a student is unable to complete the required work in a course because of medical emergency, death in the family, military duty, or other extenuating circumstances. If a student does not complete the course within the specified period of the following term, the grade I automatically converts to an F.

For residential campus students, the period to convert an I extends through the sixth week of subsequent spring and fall terms or the third week of subsequent summer terms.

# INCOMPLETE FLIGHT COURSES (IP)

Because the length of time required to complete flight courses varies and may not coincide with the end of the academic term, the temporary grade IP is assigned for flight courses in which students are still active. If the course is not subsequently completed the following term or extended further by the department chair, the grade IP automatically converts to an F.

Flight students may receive an F for excessive unexcused no-shows.

#### REPEATING A COURSE

With the exception of flight courses, which may be repeated only once, a student may repeat any University course. The grade for each attempt will appear on the student's permanent academic record. In determining the student's CGPA, the grade for subsequent attempts at a course replaces the previous grade a maximum of two times.

#### COURSE EQUIVALENCY EXAMS

Students who believe they possess sufficient knowledge and who have not previously failed that particular course may apply to take the course equivalency examination for a limited number of courses. At the residential campuses, course equivalency examinations must be completed prior to the time the student reaches the last 30 credits for a bachelor degree.

A nonrefundable fee is charged for administering each equivalency exam. Because students may take a course equivalency exam only once for each course, those failing a course equivalency examination must enroll in and complete the course to receive credit. Residential campus students submit their applications to the chair of the academic department offering the course.

# DEAN'S LIST AND HONOR ROLL

Students who have demonstrated academic excellence during a term are notified in writing by the appropriate campus Records and Registration Office. Additionally, a notation is placed on the academic transcript. To be eligible for term honors, students must have maintained at least a 2.00 CGPA and must not have received a D or F during the term. In addition, students must have achieved a term GPA of 3.50-4.00 for inclusion on the Dean's List or 3.20-3.49 for inclusion on the Honor Roll. A term is defined as one term (full-time status) at the residential campuses.

ACADEMIC WARNING, PROBATION, SUSPENSION, AND DISMISSAL

# Warning

A student whose cumulative grade point average (CGPA) is less than 2.00 for one term is placed on academic warning.

# Probation

A student whose CGPA is less than 2.00 for two consecutive terms is placed on academic probation. Students on probation are classified as students not in good standing and may not serve as elected members of the Student Government Association, may not participate in intercollegiate athletics as members of a University team, may not serve on the editorial staff of a campus publication or work on campus, and will lose eligibility for financial aid programs. The academic programs of students on warning or probation may be restricted. A student who has a term GPA of less than 1.00 may also be placed on academic probation or suspension in accordance with University academic policies.

# Suspension

A student whose CGPA is less than 2.00 for three consecutive terms, or a student on academic probation whose CGPA at the end of the subsequent period is below 2.00, is suspended from the University unless the student maintains a term GPA greater than 2.00.

A student who has a term GPA of less than 1.00 may be suspended or placed on academic probation.

#### Dismissal

A student who has been suspended and readmitted is on probationary status until the CGPA has been raised to 2.00. If the term GPA falls below 2.00 during the probationary period, the student is dismissed. Any previously suspended student who has been restored to good standing but whose academic performance subsequently deteriorates to a level that would qualify for initial suspension is dismissed. Academic dismissal is final and the student will not be readmitted to the University.

When a change of grade or the conversion of the grade I changes a student's academic status, the previous academic status of warning, probation, or suspension is removed and does not become part of the student's permanent record.

# SUSPENSION AND DISMISSAL FOR CAUSE

The University reserves the right to suspend or dismiss a student at any time and without further reason, if the student exhibits the following undesirable conduct:

1. Actions that pose a risk to the health, safety, or property of members of the University community, including, but not limited to, other students, faculty, staff, administrative officers, or the student himself/herself;

- 2. Conduct that disrupts the educational process of the University;
- 3. Any other just cause.

#### READMISSION

A student who has been suspended from the University for any reason must apply for readmission with the same campus to the Records and Registration Office at Daytona Beach and the director of Admissions at Prescott.

A student who has been academically suspended may apply for readmission after 12 calendar months following the suspension or after completing a minimum of 15 hours of academic credit with a CGPA of 2.50 or higher from an accredited institution. If the University readmits such students, they will be admitted with probationary status.

#### AREAS OF CONCENTRATION AND MINOR COURSES OF STUDY

Areas of concentration give students specialized preparation in a degree program. Minor courses of study are coherent academic programs designed to satisfy students' personal interests and to meet their professional needs. Students may consult with their program chairs or coordinators if assistance is needed in choosing areas of concentration or minors. Once a decision is reached, students who wish to declare an area of concentration or minor should contact Records and Registration. Some minor courses of study are not open to students pursuing particular degree programs. A minor must be in a discipline outside the student's major field of study.

The student becomes subject to the requirements of the minor as stated in the catalog in effect at the time of matriculation or the current catalog in effect at the time the minor is declared. The department/program chair responsible for a particular minor determines how students fulfill deficits in credits for a minor and certifies that students are qualified to receive the minor.

Areas of concentration and minor courses of study are posted on the student's academic transcript at the time the student graduates with a baccalaureate degree.

#### CHANGE OF DEGREE PROGRAM

Students may apply to change their degree programs if they meet academic qualifications and if the degree program is not at capacity. Students should contact their current program coordinator to initiate the application.

When a student elects to change degree programs, areas of concentration, or major within a degree program, the requirements of the catalog in effect at the time the request was approved apply, with certain exceptions. Students considering such changes should contact their academic advisor or department chair to determine how they will be affected.

#### Two Degrees of the Same Rank

To earn a second baccalaureate degree, students must complete a minimum of 30 credit hours of coursework over and above that required for the declared primary degree. At least 60 credit hours must be completed in residence at the University and at least 20 of the 30 additional credit hours must be 300-400 level courses.

To earn a second associate degree, students must complete at least 15 credit hours of coursework over and above that required for the primary degree. At least 30 credit hours must be completed in residence.

### CONTINUOUS ENROLLMENT

Students are considered to be continuously enrolled, regardless of the number of hours for which they register, unless they:

- 1. Enroll at another institution without advance written approval.
- 2. Fail to enroll in at least one course at Embry-Riddle in any two calendar year period.
- 3. Have been suspended or dismissed from the University.

Students failing to maintain continuous enrollment for any reason are required to reapply for admission under the catalog in effect at that time.

# CATALOG APPLICABILITY

The catalog in effect at the time of a student's initial matriculation remains applicable as long as the student remains in the original degree program, major, or area of concentration.

If a student does not maintain continuous enrollment at the University, the student must apply for readmission. The provisions of the catalog in effect at the time of readmission then become applicable to the student.

Curricular requirements stated in the applicable catalog will not be affected by subsequently published addenda to that catalog or by later catalogs unless the student elects to graduate under the provisions of a later catalog or addendum. Students electing to graduate under the provisions of a later catalog or addendum must meet all requirements (admission, transfer, graduation, and so on) contained in that catalog or addendum.

#### ATTENDANCE AT OTHER INSTITUTIONS

Once admitted to the University as degree candidates, students are expected to complete all work to be applied toward their degrees with the University unless advance written authorization is granted.

Residential campus students in good academic standing must petition to receive credit for courses or training, including flight instruction, outside the University while maintaining enrollment at Embry-Riddle. To initiate this procedure, students must process a Petition To Take Courses at Another Institution. If Records and Registration has no formal documentation of course equivalency, students must provide adequate evidence to the course-specific department chair that the petitioned courses are equivalent to Embry-Riddle courses or are acceptable as elective credit in their degree program. After the courses are deemed equivalent, the student's program coordinator evaluates the petition, considering such factors as the reasons for petitioning and the availability of the courses in the University curriculum.

Residential campus students may not co-enroll at a local institution. When not enrolled at Embry-Riddle, students who are local residents must follow normal petition procedures to enroll in courses at another local institution. For the Daytona Beach campus, a local resident constitutes a student who attended a high school in Volusia County or a student who resided in Volusia County prior to initial matriculation. For the Prescott campus, a local resident is a student who attended a high school in Yavapai County or a student who resided in Yavapai County prior to initial matriculation. Under certain circumstances, students may be permitted to take courses in ethnic studies or foreign languages as electives at a local institution.

After initial matriculation, Daytona Beach and Prescott students may not earn more than a total of 18 semester hours or that equivalent at another institution.

#### GRADUATION REQUIREMENTS

Students must complete the general graduation requirements as prescribed by the University, as well as all degree requirements specified in the degree being pursued. The following summary of graduation requirements is provided for all students:

- 1. Students must initiate an application for graduation. The application must be received by the Records Office within the time limit established by that office.
- 2. Students must successfully complete all required courses for a particular degree listed in the applicable catalog.
- 3. Students must successfully complete the minimum number of credit hours required for the degree as listed in the applicable catalog.

- Residential campus students pursuing a bachelor degree must complete the last 30 credit hours at the University.
- 5. Students pursuing a baccalaureate degree must complete a minimum of 40 credit hours in upper-division (300 and 400 level) courses. Credit transferred from other institutions will be accepted at the discretion of Embry-Riddle. Exceptions to the 40-hour upper-division requirement are authorized only when the specified required courses preclude achievement in the minimum credit hour requirements in the catalog listing for the degree. In such cases, all electives taken must be upper-level.
- 6. For degree completion, at least 25 percent of semester credit hours must be earned through Embry-Riddle instruction.
- 7. Students pursuing any undergraduate degree must earn a minimum cumulative grade point average (CGPA) of 2.00 for all work completed at the University. Candidates for the B.S. in Aerospace Engineering, B.S. in Civil Engineering, B.S. in Computer Engineering (B.S. in Computer Engineering and Software Engineering candidates must also earn a minimum CGPA of 2.00 in all AE, EE, ES, ET, SE, and CEC courses that fulfill any of the degree requirements), B.S. in Electrical Engineering, and the B.S. in Engineering Physics must also earn a minimum CGPA of 2.00 in all required core courses. Details are specified under the degree requirement headings of the Academic Programs section in this catalog.

- 8. Students will not be issued a diploma or transcript of their records until all debts or obligations owed to the University have been satisfied.
- Students will not be issued a diploma unless their behavior is in good standing, according to University policies and regulations. This includes, but is not limited to, not being on disciplinary probation.
- 10. Students will not be permitted to participate in formal graduation ceremonies conducted at the residential campuses until all the degree requirements listed above have been satisfied.
- 11. In the event that a graduating student does not attend a scheduled graduation exercise, the diploma is mailed to the address provided by the student.

# GRADUATION HONORS

Graduation honors recognize students who have demonstrated excellent performance throughout their Embry-Riddle academic career. They are only awarded to students who complete baccalaureate degree programs. To be eligible, the student must have completed at least 45 credit hours in residence. The level of graduation honors will be based on the cumulative grade point average for all courses taken at Embry-Riddle. The honors level will appear on the student's academic transcript with the degree information.

Graduation honors (baccalaureate only) will be awarded in accordance with the following criteria:

Honors Level	CGPA
Summa Cum Laude	At least
Magna Cum Laude	At least
-	than 3.9
Cum Laude	At least

At least 3.90 At least 3.70 and less than 3.90 At least 3.50 and less than 3.70

To be recognized for honors at the formal commencement ceremonies held at the Daytona Beach and Prescott campuses, all degree requirements must be met.

### TRANSCRIPT REQUESTS

A signed request for an academic transcript, accompanied by a fee, may be submitted by the student to the appropriate Records and Registration Office. Transcripts will not be released to students who have failed to meet their financial obligations to the University.

# PRIVACY OF STUDENT RECORDS

The University respects the rights and privacy of students in accordance with the Family Educational Rights and Privacy Act (FERPA). At its discretion, the University may disclose certain items of directory information without the consent of the student, unless the student submits a written nondisclosure request. Students are required to file a request for nondisclosure on an annual basis. Directory information consists of student name, address, telephone number, date and place of birth, major fields of study, dates of attendance, degrees and awards received, most recent previous school attended, photograph, and e-mail address.

The University will obtain written consent from students before disclosing any personally identifiable information from their education records with the exception of the directory information. The receipt of a written request to release an education record via fax satisfies this requirement. Such written consent must specify:

- 1. The records to be released.
- 2. The purpose of the disclosure.
- 3. Identify the party or class of parties to whom disclosure may be made and their address.
- 4. When transcripts are to be sent by fax, the written request must contain the telephone fax number where the transcript is to be sent. Generally, transcripts should be faxed only if an urgency exists. A faxed transcript may be considered official by the recipient, subject to their policies, security measures, and validation procedures. In addition to the faxed transcript, an official validated transcript will be mailed directly to the recipient.
- 5. Must be signed and dated by the student or former student.

The law gives students and former students the right to inspect and review information contained in their education records. The student must submit a written request to the appropriate Records and Registration Office. The appropriate Records and Registration Office must make the records available for inspection and review within 45 days of the request.

FERPA allows disclosure of educational records or their components under certain conditions. Students desiring additional information on FERPA may contact the Records and Registration or Student Services Offices.

#### FLIGHT COURSE RELATED INFORMATION

All flight training at Embry-Riddle is done in late-model, fully equipped aircraft. In addition, procedures trainers and flighttraining devices give the student a safe, flexible, and cost-effective training environment. The Daytona Beach campus uses the Gemini Flight concept, whereby two students fly together along with their instructor as a team. This gives the student additional exposure to flight training at no additional cost. The flight-training program operates under all applicable FAA rules, regulations, and requirements. The student is responsible for adhering to those rules, regulations, and requirements, which are contained in the Embry-Riddle Flight Operations Manual and local campus bulletins.

While flight training is an integral part of the Aeronautical Science program, it is also contained in other degree programs, either as an area of concentration, minor course of study, or as elective credit on a spaceavailable basis. Students should investigate the applicability of certain courses to their program along with the necessary prerequisite/corequisite course requirements prior to making any commitment and investment.

# FLIGHT COURSE SCHEDULING

Students usually begin their initial flight course sometime during their first year in attendance. The exact start date depends on the academic preparation of the student, student desire, weather conditions, and aircraft and instructor availability. The length of time required to complete a course will also vary based on these same factors. All flight-training courses may begin and end at any time during the academic year and may not coincide with the beginning and ending dates of the published semester schedule. Therefore, students who begin a flight course late in the semester should be prepared for training in that course to continue into the next semester.

Flight courses require a minimum block of time and may include flying on weekends. Study, preparation, and some flight lessons may require time outside this block. Students, particularly beginning students, are cautioned not to overload their course schedules when taking a flight course.

See the University Academic Regulations and Procedures section of this catalog for additional information about University policies on flight courses. The Embry-Riddle Flight Operations Manual also contains information on flightline policies and procedures.

# CREDIT FOR FLIGHT TRAINING AT OTHER INSTITUTIONS

All students desiring to complete off-campus flight training for credit after matriculation must be approved in writing in advance by the Flight Department. The credit that will be awarded (advance standing) and the procedures for requesting credit when training is completed will be specified in the written approval (Off Campus Authorization Form). The following general rules apply as specified under each heading. Please address any questions to the Flight Department.

#### **BS** in Aeronautical Science

The Aeronautical Science (AS) degree is accredited by the Aviation Accreditation

Board International (AABI) and is governed by the following criteria. Aeronautical Science students will be awarded credit for FAA certificates held prior to matriculation to Embry-Riddle, and may be approved to complete one certificate or rating if flight training from an appropriately rated instructor was logged prior to matriculation. If FAA certificates are held, this training must have occurred after the attainment of the most recent certificate for which credit is granted. Except as provided above, after a student matriculates all flight training must be completed at Embry-Riddle or approved at another CAA flight education accredited college or university. In all cases, students must satisfactorily complete at least one flight course on campus after advance standing is awarded or CAA-approved courses are transferred.

# Flight Minors or Areas of Concentration

Individuals pursuing areas of concentration and minor courses of study that require a flight (FA) course must satisfactorily complete at least one FA course on campus after completion of the approved off-campus flight training. If students declare a change of program to the B.S. in Aeronautical Science degree, the advanced standing credit for flight training after matriculation may not transfer.

# **Open Elective Credit**

Students who are not pursuing the B.S. in Aeronautical Science degree, Flight minor, or AOCs requiring FA courses, and who desire to complete off-campus flight training for credit after matriculation must receive approval by the Flight Department in writing and in advance of the anticipated training. If students declare a change of program to the B.S. in Aeronautical Science degree, the advanced standing credit for flight training after matriculation may not transfer. Transferring to a Flight minor or Area of Concentration would necessitate satisfactorily completing at least one FA course on campus after the awarding of transfer credit and advance standing.

### Awarding Advance Standing

Upon completion of the approved flight training, all students must show their copy of the approved Off Campus Training Authorization Request Form, in addition to the appropriate documents of their training, to the Flight Department. Approved advanced standing credit will be applied to the student's transcript. See above restrictions regarding change of programs, AOC, and minor courses of study.

#### AVIATION AND TRANSPORTATION SECURITY ACT

The Aviation and Transportation Security Act (ATSA) requires students registered for Flight (FA) courses to show acceptable documentation of U.S. citizenship OR to complete background check requirements.

Students enrolled in an FA course must present ONE of the following to the Embry-Riddle Records Office prior to being allowed to start flight training:

- 1. A valid, unexpired U.S. passport
- 2. An original birth certificate with raised seal documenting birth in the United States or one of its territories

- 3. An original U.S. naturalization certificate with raised seal, Form N-550 or Form N-570
- 4. An original certification of birth abroad, Form FS-545 or Form DS-1350 -OR-

An original certificate of U.S. citizenship, Form N-560 or Form N-561

If using other than a valid passport, a valid driver license with a photo or a government-issued photo ID will also be required. Photocopies of the above are not acceptable, even certified copies. This process needs to be completed only one time for the entire curriculum at Embry-Riddle.

Those unable to complete the above requirements, including international and permanent resident alien students, will be able to register for FA courses but must comply with U.S. Department of Homeland Security (DHS) notification requirements. Before receiving any flight training, they must provide DHS through the Transportation Security Administration (TSA) a set of fingerprints, a photo, a processing fee, and must register online. Once the student is registered and has received authorization from the TSA, the student may begin training. Some advanced flight courses may require a waiting period of up to 30 days. If Embry-Riddle receives any directive from the DHS or TSA, the student may be administratively withdrawn as appropriate to the DHS or TSA directive. This information and fee, but not the fingerprints, must be sent periodically during flight training and will be coordinated through Embry-Riddle's International Students Office. Please contact the Aeronautical Science Department at the Daytona Beach campus or the Flight Department at the Prescott campus for more information.

#### MANDATORY STUDENT DRUG TESTING

Success in the aviation industry requires a commitment to excel and the discipline to avoid unsafe practices. The use of illegal drugs constitutes an unsafe practice and is incompatible with an aviation environment. Therefore, the University reserves the right to immediately suspend or dismiss any student who uses or possesses illegal drugs. In the effort to maintain a work and educational environment that is safe for its employees and students, the University has established a mandatory student drug testing program.

#### Scope

The drug testing program applies to all students who engage in flight training at the University.

The University tests for marijuana, cocaine, opiates, amphetamines, and phencyclidine (PCP) as follows:

- 1. Random testing of students engaged in flight training.
- 2. Required postaccident testing for students involved in an aircraft accident. Students are tested for drugs within 32 hours after an accident. An accident is defined as any occurrence associated with the operation of an aircraft that results in any person suffering death or serious injury, or where the aircraft receives substantial damage as deter-

mined by the National Transportation Safety Board. The accident can occur at any point between the time a person boards the aircraft with the intention of flight and the time all have disembarked. In the event that drug testing is required, students who fail to comply with testing procedures, refuse to be tested, or test positive for illegal drugs are subject to the following actions:

- 1. Students who fail to comply with all University directives concerning the place of testing, the manner in which they are to arrive at the test site, and any other related matters are subject to disciplinary action up to and including dismissal from the University.
- 2. Students who refuse to be tested after being requested to do so by the University will be dismissed from the flight program and possibly the University.
- 3. Students whose test results show positive for the use of an illegal or nonprescribed drug, as verified by a medical review officer, will result in dismissal from the Flight program and up to and including dismissal from the University.

# Testing

The cost of drug testing is the responsibility of the University. Embry-Riddle has contracted with a professional testing service as the certified laboratory for the collection and analysis of test specimens. This testing service will adhere to all requirements for chain of custody, test reporting, and specimen retention in accordance with proposed DOT and FAA regulations.

# Notification

Students applying to attend the residential campuses are notified of the drug testing requirement through various University publications. The drug testing policy is also explained on appropriate flight course registration forms.

### **Student Education and Assistance**

Embry-Riddle promotes substance abuse awareness by sponsoring educational programs and distributing literature. The University is additionally committed to assisting students in the resolution of problems associated with substance abuse and encourages students to seek additional help through referrals from the University Health Services and Counseling Offices.

# STUDENT ACCOUNTS

At the time of acceptance for admission, a University account is opened for each student. This account remains open until graduation. The primary use of this account is for University charges and payments. If an account shows credit balances, a student may request a refund in the form of cash or a check. Each student is encouraged to open and maintain an account at a local bank for personal matters.

### **BILLING ADDRESS**

Residential campus students are assigned an Embry-Riddle email address, which is their primary address for all University correspondence. However, all financial statements can be sent to any address designated by the student. Billing-address change forms are available through the Web site http://www.erau.edu.

All student account information may be obtained on Embry-Riddle's Web site. A PIN (issued at Student Orientation) is required to access any student's academic or financial information.

# PAYMENT PROCEDURES

Cash, Visa, MasterCard, Discover, American Express, and personal checks are acceptable forms of payment. Payments made by mail should be addressed to the campus Cashier Office and timed to arrive prior to the first day of class. Charges incurred subsequent to registration are due 30 days from the date of invoice or the last day of class, whichever occurs first. All payments should include the student's name and identification number.

Bills for tuition and fees, issued at the end of registration, are payable on the first day of class. If full payment cannot be made by this date, tuition-payment agreements on outstanding balances are available. There will be fees incurred for deferring payment. Fees may vary depending on the campus attended.

When a student's account is delinquent, registration for that term is subject to cancellation and registration for any subsequent semester will be denied. A delinquent student account will result in suspension of all academic processing and information on class performance, grades, and transcripts will be withheld. Continued delinquency may result in administrative withdrawal from the University. Administrative withdrawal will not relieve a student of the obligation to pay outstanding debts. Sums remaining unpaid will be charged interest at the maximum rate allowed by law. The student is also subject to the costs of collection, including collection agency fees and reasonable attorney's fees for making such collection. Delinquent accounts may be reported to one or all three major credit bureaus.

# BOOKS, SUPPLIES, AND TOOLS

Purchases are made directly from the University Bookstore. Cash, checks, Eagle Dollars, Visa, MasterCard, and American Express are accepted. Students whose estimated financial aid is higher than the total amount for tuition and fees may request these funds from the Bursar Office for book purchases.

# DELINQUENT ACCOUNTS

When a student's account is delinquent, registration for that term is subject to cancellation and registration for any subsequent semester will be denied. A delinquent student account will result in suspension of all academic processing and information on class performance, grades, and transcripts will be withheld. Continued delinguency may result in administrative withdrawal from the University. Administrative withdrawal will not relieve a student of the obligation to pay outstanding debts. Sums remaining unpaid will be charged interest at the maximum rate allowed by law. The student is also subject to the costs of collection, including collection-agency fees and reasonable attorney's fees for making such collection. Delinquent accounts may be reported to one or all three major credit bureaus.

Residential Campus Tuition and Fees

#### Fall 2007/Spring 2008 Tuition

Students registering for coursework during the spring or fall term totaling 12-16 credit hours are billed according to a "block tuition" rate. Registration for coursework equaling 1-11 credit hours is charged on a per-credit-hour basis. Students whose undergraduate course loads during fall or spring semesters are greater than 16 hours are charged the semester rate plus a percredit-hour charge for those credit hours over 16.

Courses taken in the Aviation Maintenance Science Department (AMS courses) are billed separately from other academic courses, and have a lower per credit-hour tuition rate. AMS courses do not fall under the "block tuition" rate.

Summer tuition rates are determined solely by the number of credit hours per term. Each summer term is billed separately.

Detailed tuition rates are described in the 2007/2008 financial insert at: http://www.erau.edu/er/costs.html.

# **Hourly Flight Rates**

Rates vary by type of aircraft or simulator. Please see the financial insert applicable to your campus for specific rates.

# **Payment for Flight Instruction**

The University uses a cash-basis payment method for all flight instruction. Payment is expected at the completion of each training session.

The following is a description of the flight-payment process.

After completing the training session, you will proceed to the Flight Operations Payment Station. A flight ticket will be presented to you indicating the type of instruction and the number of hours you just received. Your signature and the instructor's signature will be required to validate this instruction. Charges for that session will be calculated and payment will be collected using your credit card, Eagle Card, or personal check. Your payment will be processed and you will be given a receipt.

If your method of payment cannot be processed for whatever reason, the training session will be charged to your student account. A hold will be placed on your flight account until this transaction is paid. Any further instruction, not already scheduled, will be suspended until payment is received.

If you do not wish to use a credit card

or do not have one, Eagle Dollars or checks give you other options. Any combination of these payment methods may be used at any time.

# **Room and Board**

Room and Board fees may be incurred each semester by students attending the Daytona Beach or Prescott campus and should be used when estimating the cost of attendance. Freshman and sophomore students may be required to live in University-managed housing and participate in the Embry-Riddle Dining Services meal program. A variety of meal plans are offered that may be supplemented with the Eagle Card to suit individual needs. Please refer to the campus financial brochure and/or Housing and Dining Services brochures for the appropriate campus for current options, requirements, and costs.

# **Mandatory Fees**

The following fees are mandatory where applicable. Please see the financial insert at http://www.erau.edu/er/costs.html.

- Student Government Association fee
- Health service fee
- International student insurance fee
- International student service fee
- Technology fee
- Student facility fee (Daytona Beach campus only)

#### **User Fees**

Other fees apply for services that are not considered mandatory. Please see the financial insert at http://www.erau.edu/er/ costs.html.

#### **REFUND POLICY**

Students who officially withdraw from all classes are eligible for partial refund of tuition. Spring and fall tuition refunds at the Daytona Beach and Prescott campuses for reduction of hours are not available after the last day of add/drop. Summer term refunds at these campuses are calculated on a per course basis. During all terms the effective date of the withdrawal, as determined by the Records Office, governs refund computations. Students who are suspended for disciplinary reasons will not be eligible for a full or percentage refund. Please reference the Withdrawal/Refund Schedule applicable to the campus you are attending.

The following are refundable according to the Withdrawal/Refund Schedules:

- Tuition
- Student Government Association fees
- Housing fees (less housing processing fee)
- International student service fee
- Health service fee
- Technology fee
- Student facility fee ( Daytona Beach campus only)
- Meal plans unused balance at time of withdrawal

UNIVERSITY WITHDRAWAL/REFUND SCHEDULE

#### Fall/Spring Semesters

Period I	Class days 1-5*	100%
Period II	Class days 6-10	80%
Period III	Class days 11-15	60%

Period IV	Class days 16-20	40%
Period V	Class days 21-25	20%
Period VI	Class days 26 and after	0%

\*Less \$100 administrative fee

#### Summer A/B terms

Period I	Class days 1-3*	100%
Period II	Class days 4-6	80%
Period III	Class days 7-9	60%
Period IV	Class days 10-12	40%
Period V	Class days 13-15	20%
Period VI	Class days 16 and after	0%

\*Less \$100 administrative fee

Requests for refunds due to circumstances clearly beyond the student's control, such as illness or required military service, must be in writing and must be accompanied by appropriate documentation, such as a physician's statement or military orders.

A request for refund must be submitted within 60 days of the date that the student completed a change of registration. Refund petition requests will normally be processed within 10 business days. Personal appeals for denied requests must contain additional documentation not previously presented.

#### DEPARTMENT OF EDUCATION WITHDRAWAL/REFUNDS POLICY

Students receiving financial aid who withdraw will be subject to the refund policies specified by the U.S. Department of Education. Refunds of federal aid for students who officially withdraw on or before the 60% point of the enrollment period will be determined by calculating and comparing the amounts due under the federal refund schedule and the University refund schedule.

#### REQUIRED ADVANCE TUITION DEPOSIT (NEW STUDENTS ONLY)

The deposit is refundable in full, provided written notice is furnished at least 60 days before the first day of registration for the semester.

#### HOUSING CONTRACTS

Students who have housing contracts must contact the Housing Office to release their obligation. Any refunds will be determined at that time. All housing deposits will remain on account until the housing contract expires. The Housing Office will authorize release of the deposit to the student account.

#### FINANCIAL ASSISTANCE

Embry-Riddle participates in a number of federal, state, and University-administered programs that help students and their families meet educational costs.

Embry-Riddle believes the primary responsibility for financing education lies with the student and the student's family. Therefore, the student should apply for financial aid early, save money, look for ways to reduce costs, and become aware of specific program requirements by reading all financial aid publications. Financial aid awards are meant to supplement what the student and family can contribute toward costs and rarely cover all educational expenses. All financial assistance will be limited to the student's individual remaining need or Embry-Riddle's established cost of attendance.

A complete description of financial

assistance programs and optional financing programs available to students and their parents is published annually by the Financial Aid Office. Students should consult this publication for information about eligibility criteria, application procedures, and deadline dates. Published information is available on the Web under the Financial Aid section (http://www.embryriddle.edu). Students who expect to need help in meeting their financial obligations are encouraged to seek such assistance through one or more of the programs available for this purpose.

### ELIGIBILITY REQUIREMENTS

To be considered eligible to apply for most financial programs, students must:

- 1. Be U.S. citizens or eligible noncitizens
- 2. Be enrolled or accepted for enrollment as at least a half-time student in a degree program
- 3. Be making satisfactory progress toward a degree
- 4. Be registered with Selective Service if required to do so
- 5. Establish financial need
- 6. Not be in default on a loan or owe a repayment on a previous financial aid award received at any institution

# THE APPLICATION PROCESS

After applying for admission to the University, students may complete the federal application (FAFSA) at http:// www.fafsa.ed.gov. Each year, students are required to reapply for financial aid. Students are mailed a federal PIN by the Department of Education to renew their aid application each year at http://www.fafsa. ed.gov. Returning students may also request application materials from the Financial Aid Office. Students attending the Worldwide Campus may request their financial aid materials through the center, the Financial Aid Office, or at http://www.fafsa.ed.gov. All students are encouraged to complete the FAFSA by Embry-Riddle's priority deadline of March 1.

# EXTENDED PAYMENTS

Students who use financial assistance to pay their University charges may have the payment date extended for the amount of their award if their funds are not ready to be disbursed by the date payment is due. This is called a payment extension. Any difference between the total charges and the amount of the extension granted must be paid according to the University's payment procedure. To qualify for a payment extension, students must have applied for financial assistance and must have received final approval of their award.

# PROGRAMS AVAILABLE

The major categories of financial assistance programs include grants, scholarships, loans, and student employment. Loans from state and federal government sources or from private lenders must be repaid; the interest rate, however, is usually low, and the repayment period is extended. Grants and scholarships do not have to be repaid, nor does the income earned through student employment. Most of these programs are based on the student's financial need.

## Grants

#### Federal

- Federal Pell Grant
- Federal Supplemental Educational Opportunity Grant

#### State and Institutional

- Arizona Leveraging Educational Assistance Partnership (LEAP)
- Arizona Private Postsecondary Financial Assistance Program (PFAP)
- Family Grant
- Florida Student Assistance Grant
- Florida Resident Access Grant
- Florida Bright Futures Scholarship Program
- Grants from other states

#### Loans

#### Federal

- Federal Stafford Loan
- Federal Parent Loan for Undergraduate Students
- Federal Perkins Loan
- Other private-sector educational loans

# Employment

#### Federal

- Federal Work-Study Program *Embry-Riddle* 
  - Embry-Riddle Student Employment
  - Off-Campus Referral Program
  - Resident Advisor Program

# Scholarships

#### Embry-Riddle

A limited number of academic scholarships are awarded to entering freshmen and college transfers who possess outstanding academic credentials. An incoming student's completed application for admission to the University is the only application required for scholarship awarding consideration. For more information about scholarships, students should contact the Financial Aid Office of the campus they plan to attend.

OTHER FINANCIAL Assistance Programs

# **Reserve Officer Training Corps**

The following campus-based organizations provide tuition scholarships to students who meet specific academic, medical, and physical requirements. In addition, Embry-Riddle offers special financial assurances to ROTC Scholarship winners. For more information on all requirements and benefits, refer to the Special Academic Programs and Opportunities section of the catalog.

- Air Force Reserve Officer Training Corps (ROTC)
- Army Reserve Officer Training Corps (ROTC)
- Naval Reserve Officer Training Corps (ROTC)
- U.S. Marine Corps Platoon Leaders Class Program

# STUDENT GOVERNMENT ASSOCIATION LEADERSHIP PROGRAM

The Student Government Association (SGA) at each residential campus offers partial tuition waivers for elected officials of the organization. The amount of the waiver varies depending on the position held. The goal is to stimulate interest in holding elected office and to recognize the commitment student leaders make in such positions.

For information about the criteria students must meet to run in an SGA election, or for other information about the program, contact the Student Government Association office.

#### FLIGHT LEADERSHIP/FELLOWSHIP PROGRAM

The Flight Leadership/Fellowship Program is available to students enrolled in the Aeronautical Science degree program. It is designed to identify, develop, and reward students for demonstrated outstanding academic and leadership abilities.

Students are selected for the Flight Leadership portion of the program based on academic excellence and leadership potential. Selection for the Flight Fellowship portion is made from those Flight Leadership students who complete all required flight courses, demonstrate outstanding academic and leadership qualities, and satisfactorily complete the Embry-Riddle Flight Instructor Evaluation and Standardization Program. While not every Flight Leadership student is offered a Flight Fellowship, those who are selected will serve as a department flight instructor and tutor while finishing their degree requirements. The Flight Leadership Program is highly competitive. Interested students should contact the chief flight instructor for additional information.

# ATHLETIC GRANTS

The University offers a limited number of Athletic Grants for qualified students. Awards are available for baseball, basketball, golf, men's and women's soccer, men's and women's tennis, wrestling, women's volleyball, and men's and women's cross-country. The maximum value permitted by the NAIA is the actual cost of tuition, room, board, books, and fees. However, most grants are awarded as partial tuition waivers. To qualify, students must meet both University and NAIA eligibility requirements. The grants are highly competitive, and interested students should contact the Athletic Department for specific details.

#### RONALD E. MCNAIR SCHOLARS PROGRAM

Named in honor of the African-American mission specialist who died in the 1986 Challenger disaster, and funded by a U.S. Department of Education TRiO grant, this prestigious diversity program offers financial aid and academic and other support services to eligible under-served (low income/first generation) and/or underrepresented (certain ethnic minorities and women in certain fields of study) upperdivision students who are interested in pursuing graduate studies leading to a Ph.D. after leaving Embry-Riddle. In addition to some financial aid, the program provides academic mentoring, academic and career counseling, Graduate Record Examination (GRE) preparation, a three-hour course in research methodology and statistics, funded research opportunities, and cultural/social activities. Acceptance in the program is based on a special application process and is selective. Eligible transfer students are welcome to apply.

For more information, contact: McNair Scholars Program (928) 777-6935 brandsd@erau.edu http://mcnair.pr.erau.edu

#### VETERANS EDUCATION BENEFITS

Embry-Riddle degree programs are approved by the appropriate State Department of Veterans Affairs (State Approving Agency) for enrollment of persons eligible to receive education benefits from the Department of Veterans Affairs (DVA).

Students must be pursuing a degree in a specific program to be eligible to receive benefits. Admission procedures for veterans and other eligible persons are the same as those for other students. Students who do not satisfy all requirements for full admission may be certified for two terms; however, they may be required to repay the DVA for some or all benefits received if they do not achieve full admission status during that time.

Title 38, United States Code, sections 3474 and 3524, requires that education assistance to veterans and other eligible persons be discontinued when the student ceases to make satisfactory progress toward completion of the training objective. Accordingly, benefits will be interrupted for undergraduate students whose CGPA is less than 2.00 for three consecutive terms or who are otherwise subject to suspension. The DVA will be appropriately notified of the unsatisfactory progress. The student must submit a written request to reinstate education benefits. The request must include proof of academic counseling and the conditions for continued enrollment or re-entrance. The DVA will determine eligibility for reinstatement of benefits, based in part on the school's recommendation.

A veteran's progress will be measured according to University standards as published in this catalog, and the rules and regulations of the DVA apply. The criteria used to evaluate progress are subject to change. Application and interpretation of the criteria are solely at the discretion of Embry-Riddle. Students are responsible for notifying the certifying official of any change in their enrollment or change in personal information affecting their eligibility. Students also must remain in compliance with University and Department of Veterans Affairs requirements. Students may receive education benefits only for courses that are required for their designated degree program. Students who receive DVA benefits are subject to strict academic regulations and should be aware of how auditing courses, repeating a course, changing degree programs or enrollment status, and other actions may affect their eligibility to receive benefits.

For further information concerning approved programs and the application process, eligible persons should contact the Veterans Certifying Official at the campus they plan to attend. Embry-Riddle Aeronautical University believes that a well-rounded education extends beyond the classroom. The opportunities for co-curricular involvement are limitless and are designed to encourage the personal and educational development of all students.

# STUDENT ACTIVITIES

The mission of the Student Activities Office is to provide students with the opportunity to experience co-curricular programs that support and complement the educational process and contribute to a well-rounded education. Student Activities works with other areas of the campus to offer cultural, intellectual, recreational, and entertainment events for all Embry-Riddle students, while providing a learning experience not available in other academic settings.

There are over 125 student organizations on the Daytona Beach campus and over 80 on the Prescott campus. Each campus has sports clubs, special interest groups, Greek life (sororities and fraternities), honor societies, aviation clubs, military organizations, and religious clubs. The Student Activities Office provides support for all these organizations in addition to assisting students in starting a new student organization. Involvement in any student organization develops skills in social responsibility, strong group dynamics, leadership, communication, management, budgeting, and decision making. Students have the opportunity to learn about all the organizations at the fall and spring Activities/Club Fair.

The Student Activities Office is also the point of contact for the Programming Board (Touch-N-Go Productions in Daytona Beach and Board of Campus Activities in Prescott), leadership development, and Homecoming activities.

For specific campus information, visit the Student Activities Office in Daytona Beach, located in room 106 in the John Paul Riddle Student Center, or in Prescott in the Student Hangar, building 16.

# STUDENT GOVERNMENT ASSOCIATION

The Student Government Association (SGA) is responsible for providing a link between the students and the faculty, staff, and administration. While being the voice of the students, the SGA provides many services, represents the student body, and is actively involved with student activities. SGA services to the students include, but are not limited to; a free beverage service, safe ride, which provides a free taxi ride to students when they are in unsafe situations; directory; discount cards; lawyer service; lockers; banners; color printer; and free faxing. SGA members also participate on almost every committee, and the president of the SGA is a member of Embry-Riddle's Board of Trustees. For the Prescott campus direct questions, comments, or concerns to prsga@erau.edu or call (928) 777-3784. For the Daytona Beach campus direct questions, comments, or concerns to sgapres@erau.edu or call (386) 226-6045.

#### JUDICIAL AFFAIRS

The Dean of Students Office at the Daytona Beach and Prescott campuses offers a variety of services to assist students with problems such as personal and family emergencies. The department oversees all nonacademic judicial issues and disciplinary records.

# INTRAMURAL AND RECREATIONAL SPORTS

Intramural and Recreational Sports at each residential campus strives to create an atmosphere of competition and fun by offering a wide variety of activities ranging from team

sports such as flag football, volleyball, basketball, dodgeball, floor hockey, and softball to individual competition in such sports as table tennis, racquetball, and tennis. Other sports are also available on request.

The director assists chartered clubs and organizations with the use of sports facilities and equipment. An equipment-loan program offers many items for free checkout on an overnight

basis with a valid University I.D. card. Students are encouraged to use all on-campus sports-related facilities (outdoor swimming pool, tennis and basketball courts, playing fields, indoor racquetball, gymnasium, and fitness center). Hours vary for each facility and are posted.

In addition to on-campus recreational activities, each area offers a virtually unlimited variety of outdoor recreational opportunities. Hiking, camping, fishing, sailing, and skiing are a few of the activities available in the surrounding area.

Whether students seek a highly competitive league to demonstrate their athletic skills or select a competition that encourages



group participation for fun and to stay in shape and reduce the stress in their lives, they are sure to find what they are looking for in intramural recreational sports.

#### INTERCOLLEGIATE ATHLETICS

Embry-Riddle Intercollegiate Athletics brings exciting and highly competitive varsity sports to the Daytona Beach and

> Prescott campuses. All Embry-Riddle students are admitted to regular-season home events free of charge, and everyone is encouraged to get involved and support the Eagles. The University is a member of the National Association of Intercollegiate Athletics (NAIA) and successfully competes against opponents from all levels of college athletics. Many of the University's sports pro-

grams are ranked among the top 25 teams in the nation and are perennial contenders for conference, regional, and national championships. The 1999-2000 year saw the Eagles basketball program win the NAIA Division II national championship. Prescott's wrestling team has finished in the top seven out of eight years, including a sixth-place finish in 2005, in which they were recognized with the prestigious National Champion of Character Sportsmanship Award at the national tournament. Eagles baseball competed in the NAIA World Series in 1999, 2002, 2003, and 2004. Women's soccer has participated in the national tournament the past three years, as has women's golf, finishing fifth in the nation in 2004. Men's and women's tennis have made five consecutive national championship appearances. In addition, the Daytona Beach campus won the Florida Sun Conference Commissioner's Cup for best all-around athletic program for the fifth straight year in 2003-2004.

The University sponsors 14 intercollegiate sport programs at the Daytona Beach campus, including men's baseball, basketball, cross-country, golf, soccer, tennis, and track and field; women's cross-country, golf, soccer, tennis, track and field, and volleyball; and co-ed cheerleading. Men's wrestling, women's and men's soccer, and women's volleyball are sports sponsored at the Prescott campus. Any student who meets both University and NAIA eligibility requirements is able to compete for a position on a varsity team. Athletic grantsin-aid, in varying amounts, are generally awarded to recruited varsity student-athletes, with walk-on players earning the right to compete for scholarship assistance, when available.

For more information on the Eagles, including game schedules, rosters, results, and statistics, or to sign up for the Daytona Beach campus' student athletic support group, The Flock, log on to http://www. embryriddlesports.com.

For tryout information, contact the Intercollegiate Athletics department at the residential campus of your choice.

#### FIRST YEAR PROGRAMS

Dedicated to helping students achieve their academic goals, the First Year Programs team consists of highly qualified academic advisors, student assistants, peer mentors, and tutors who work together with faculty and staff campus-wide to assist students in their transition to university life.

The First Year Programs Center at the Daytona Beach campus focuses on the academic success of first-year students through developmental and intentional academic advisement. First Year Programs provides academic counseling, grade monitoring, academic intervention strategies, tutoring, supplemental instruction, and acts as a liaison between students and all departments on campus by referring students to appropriate sources of information and specialized services on campus.

First Year Programs also oversees the college success course offerings for the campus, coordinates with the Living-Learning Program in the residence halls, and runs the "First Class" program for first-year students who begin their studies early during the Summer B semester as well as the First Generation Student program designed to help students who are among the first generation in their families to attend a university.

On the Prescott campus, each college has an embedded academic advisor who conducts new student academic advising and registration, facilitates academic planning and scheduling, assists students in overcoming academic hurdles, and helps students comply with academic requirements. Faculty advisors serve as role models and mentors, work to build strong relationships with students, and assist students with educational, career, and life decisions.

A Career Services program manager is available in each college to facilitate students in searching for intern or co-operative education opportunities and in finding a position in industry upon graduation. Additional services are provided to all Prescott campus students in order to promote student success. First, all colleges provide a first semester class designed to transition first-time students into the University and their chosen program. Second, academic assistance (tutoring) is available for all Prescott campus students who wish to participate. Third, disability support services are provided to students who qualify for services. Students may contact the Disability Support Services office for confidential consultations.

#### LIBRARIES

The mission of the Embry-Riddle libraries is to provide materials, services, and facilities to students, faculty, and staff in support of the University's commitment to excellence in teaching, learning, and research. Library services and resources are provided through two main libraries: the Jack R. Hunt Library in Daytona Beach serves the Florida campus and students of Embry-Riddle Worldwide, and the Prescott Library serves the Arizona campus. Both facilities are state-of-the-art and hold a combined total of over 120.000 volumes and 1,800 periodical titles in addition to government documents, reports, conference proceedings, and multimedia sources. The libraries are fully automated with online catalogs and Internet access. Both offer specialized electronic databases for Embry-Riddle students and various public-access sources for the general public. The Prescott Library holds special materials relating to aviation safety in the Aviation Safety and Security Archive, and the Hunt Library houses a historical aviation collection dating from 1909. The libraries participate in local, state, and national networking consortia that give students access to virtually unlimited information worldwide via the Internet and through local arrangements and reciprocal borrowing agreements. Both facilities are open over 90 hours per week (with extended hours during exam periods). Information professionals with specialized training in aviation and aerospace assist students and teach research skills, including how to identify, evaluate, and use information in all formats.

### INFORMATION TECHNOLOGY SERVICES

Information Technology strives to provide students with stable, secure, highly available, always-on systems via the Web that offer a leading-edge in technology. The Embry-Riddle Web portal, known as ERNIE (Embry-Riddle Network for Information Exchange) can be found at http://ernie. erau.edu. ERNIE accounts are provided to all students. ERNIE gives students onestop-shopping for class and University information as well as details on campus events. ERNIE also provides a number of services that students can access, such as email, unofficial transcripts, class grades, class schedules, account balances, and flight schedules. Additional services are available and more are continually being added. ERNIE can be accessed from any computer with an Internet connection. Information Technology also provides the following services:

- Computerized labs and classrooms
- Email accounts
- Network storage space for class assignments
- Storage space for personal Web pages

- Assistance in connecting to the Residential Network (ResNet) for oncampus housing
- Voicemail accounts for on-campus housing
- Popular Microsoft software titles available.
- Telecommunications support for University Housing
- Wireless Internet access in many buildings

As the technology used in the aviation and aerospace industries grows and advances, so are the tools of teaching future aviation and aerospace pioneers.

# STUDENT EMPLOYMENT

The Student Employment Office provides assistance to students seeking part-time employment on-or off-campus at the Daytona Beach and Prescott locations. Oncampus employment is available to students regardless of financial need. Working on-or off-campus not only gives students more financial support, but also helps them develop self-confidence, gain valuable employment and credit references, establish a work record, and acquire useful skills in time management, financial planning, and communication.

Because students work and serve each other at Embry-Riddle, a sense of community is created. Students are participants in the life and work of the University as well as consumers of the educational program. Embry-Riddle depends on student workers for much of the work essential to sustain day-to-day operations. Embry-Riddle adheres to the principle of equal employment opportunities for all students.

#### SAFETY AND SECURITY

Safety and security at Embry-Riddle is provided by the University's Safety Office, an in-house unit consisting of full-time officers and part-time student assistants. The Safety Office provides patrol and escort services, parking and traffic services, life safety systems, crime prevention, communications/ dispatch services, and locksmith services.

The patrol and communications sections provide 24-hour service to the University and its satellite locations. Safety officers respond to routine requests for service as well as to emergency situations. They also conduct field investigations as required and provide specialized security service to the University's flightline. The parking and traffic services section manages campus parking, traffic, and associated enforcement functions. It also provides support for special events. The crime prevention section actively engages in safety education and crime prevention programs for students, faculty, and staff. The department maintains a close liaison with local law enforcement agencies to provide the safest possible learning environment.

# CAMPUS MINISTRY

The University recognizes that the typical student feels challenged by the many questions, experiences, and world views encountered on campus. It also recognizes that because students are faced with a consuming social life and the subtle influence of peers, it is important to encourage and promote spiritual development. Special opportunities for deepening faith such as meetings and programs sponsored by student religious clubs and pastoral counseling are offered during the regular academic year. At the Prescott campus, a Community Interfaith Directory is published by the Counseling Office, and local church groups are invited to offer their worship services to students. At the Daytona Beach campus, worship services are available each Sunday at the Interfaith Chapel.

### DISABILITY SUPPORT SERVICES

The University is committed to ensuring access and providing reasonable accommodation for students with documented disabilities who request assistance. The director is the coordinator of Disability Support Services at the Daytona Beach campus and Worldwide; the director of Student Activities coordinates Disability Support Services for students at the Prescott campus.

Students' needs are addressed on an individual basis with regard to their specific disabilities, academic and career goals, learning styles, and objectives for personal development. Campus-specific services might include academic advisement or assistance with planning academic schedules, registration assistance and advance registration, academic intervention programs, time management training, study skills assistance, arrangements for peer tutoring, testing modifications, advocacy, and facilitation of physical access. The University does not provide diagnostic testing but will make referrals for evaluation by area specialists. Costs associated with testing referrals are

the responsibility of the individual student. Because certain academic programs are FAA-certified, those programs are subject to regulation by that agency. Therefore, regulatory limitations may delay or preclude participation or licensure in those programs by persons with certain disabilities. Prospective students considering a program of study are encouraged to contact the Disability Support Services coordinator for information on eligibility concerns or campus-specific services.

# HEALTH SERVICES

Maintaining good health promotes a productive university experience. The Health Services staff is committed to promoting student wellness through direct care, education, and assistance with lifestyle modification.

Services include assessment, prescriptive and nursing care, referrals, wellness education and counseling, women's health care, medical grounding of flight students, and assistance with aerospace medical concerns.

Students must satisfy the mandatory immunization requirement prior to enrollment or participate in campus-based clinics. The Medical Report form supplied by University Admissions indicates the immunizations that students must document in order to register for courses and live in University-managed housing.

Prospective flight students should be aware that certain sensory impairments, medical, neurobiological, and psychological conditions, and prescriptive medications may delay or preclude medical certification by the FAA. These issues should be discussed with an aviation medical examiner (AME) to ensure participation in flight instruction. Students may also contact the Health Services clinical staff for information on eligibility for medical certification.

Health insurance is strongly recommended for all students. Individual policies should be reviewed prior to enrollment to ascertain adequate coverage and to determine approved providers if off-campus referrals are indicated or desired. A campus group policy is available for purchase with rates determined annually. Information on benefits, premiums, enrollment, and claims is available by visiting: http://www.studentresources.com or by

calling, toll free, (800) 237-0903.

International students should contact the International Student Services Office about their specific insurance requirements.

## COUNSELING SERVICES

The college experience is highly complicated, offering students tremendous intellectual and personal opportunities, as well as difficult challenges and demands. Many students find themselves seeking counseling as a way of learning, growing, and dealing with these experiences.

Individual counseling provides an avenue for students to meet one-to-one with a counselor to discuss and explore the issues, concerns, and feelings they are experiencing. Issues addressed in counseling vary from adjustment to college life, relationship problems, and stress, to more serious problems. Counseling is available without cost to students, and the content and records of sessions are confidential.

# THE RESIDENCE LIFE PROGRAM

Embry-Riddle provides campus housing for students on the Daytona Beach and Prescott campuses. Embry-Riddle believes that the on-campus living experience is an integral and positive part of a well-rounded university education. Interaction with other students in the campus community living environment is a major contributor to student success. National research shows that students who live on campus earn better grades, tend to be more involved in campus activities, and are more likely to graduate than students who live off campus. The campus housing systems at both residential campuses offer programs and services that support the academic mission of the University and promote student success. All residence halls are staffed by specially trained personnel who are committed to helping students and promoting a positive community environment.

# **RESIDENTIAL FACILITIES**

Residence halls on the Daytona Beach and Prescott campuses are furnished and air-conditioned. Housing fees include all utilities, Internet, and cable TV access (with the exception of Internet at the Chanute Complex in Daytona Beach). Although computer labs are conveniently located in academic buildings on both campuses, firstyear students should provide their own personal computers for use in residential housing.

All residence halls have vending facilities and easy access to laundry facilities and campus dining areas. On each campus, firstyear students are assigned to buildings that are specially designated for new students.

Upperclass students can live in a variety of campus residences, including suites and apartments, on a space-available basis. Accommodations for disabled students are available on both residential campuses. Requests for these spaces should be made to the Director of Housing and Residence Life.

# HOUSING POLICIES AND APPLICATION POLICY

<u>Residency Policy:</u> All first-year students under 21 years of age with less than 28 earned credit hours are required to live in Embry-Riddle-managed housing for their first full academic year (fall and spring). First-year students are also required to participate in the Dining Services meal program.

Exceptions to the residency and board requirements are as follows:

- Students who are 21 years of age on or before Sept. 1, 2007
- Students who are legally married
- Students who are full-time, year-round residents of Volusia County, Florida (Daytona Beach campus) or Yavapai County, Arizona (Prescott campus) for a minimum of one year prior to entering Embry-Riddle

All requests for exception must be submitted in writing to the Director of Housing and Residence Life with supporting documentation of circumstances.

# **Application Process:**

Housing brochures and contracts are sent to students who have been accepted to the University. Completed contracts must be returned to the appropriate campus Housing Office with a \$250 deposit no later than June 1, 2007, in order to receive a priority room assignment. New students over the age of 21 may apply for ERAU-managed housing; however, assignments are made on a space-available basis.

# **Prescott Policy and Process:**

• Completed Housing contracts received by June 15, 2007, are guaranteed a space in Embry-Riddle-managed housing, not necessarily a specific location or room type.

# ROOM AND BOARD COSTS

Room rates and dining costs vary per campus. Please note the following information for each location.

# Daytona Beach Campus

Room Costs: The room rate for all first-year student residence halls is \$2,375 per semester, per person. Rates for upperclass student apartments are generally higher.

Board Costs: All first-year students are required to purchase a 14-meal-per-week plan (\$1,540 per semester) for each of their first consecutive fall and spring semesters. First-year students may upgrade to larger meal plans if desired.

#### **Prescott Campus**

- 2-person bedroom: \$2,150 per semester, per person, per double occupancy, Thumb Butte Complex, first-year students only
- 2-bedroom suite: \$2,150 semester, per person, per double occupancy, Village Complex, first-year students only

- 3-bedroom suite: \$1,995 per semester, per person, per double occupancy
- 3-bedroom suite with kitchenette: \$2,075 per semester, per person, per double occupancy, Mingus Mountain Complex
- 2-bedroom apartments: \$2,150 per semester, per person, per double occupancy, Village Complex, upperclass students

# **Board Costs:**

All first-year students are required to purchase a minimum seven-day all-access meal plan (\$1,499 per semester) for each of their consecutive fall and spring semesters. Firstyear students may upgrade to a larger meal plan if desired.

# New Students:

• Students released or who cancel the housing contract on or after the first day of classes will be charged an \$800 administration fee.

# **Current Students:**

• Current students released or who cancel the housing contract after April 30, 2007, will be charged an \$800 administration fee.

# EAGLE CARD

The Eagle Card is the official Embry-Riddle Aeronautical University identification card for all students that you will receive at orientation. It should be readily available at all times to present to University officials who may request verification. The Eagle Card is the property of Embry-Riddle Aeronautical University, which reserves the right to revoke use of the Eagle Card on any of its accounts at any time. Only the individual to whom it is issued may use the Eagle Card. Other uses include:

Activity Card: Your Eagle Card allows you access to student activities, events, games, voting, and other services provided by Embry-Riddle.

Access Card: If you reside in on-campus University Housing, your Eagle Card will give you access to the residence halls. Also, certain labs and buildings require the use of an Eagle Card for entry.

**Library:** You must present your Eagle Card each time you check out library materials.

**Debit Card:** Your Eagle Card offers two debit accounts that are managed by the University. The Eagle Dollar account can be used at any University point of sale, including vending, copy, and laundry machines. The Flight account can only be accessed at the Flight Payment Stations to pay for any of your flight activities.

**Meal Plans:** These are accessed via your Eagle Card. (See the Dining Services section for more information regarding meal plans.)

# Deposits

The Eagle Dollars and Flight Account minimum deposit is \$1.00. Deposits to either account can be made at the Cashier Office or via the Web at http://www.erau.edu/eaglecard. The University reserves the right to suspend any account if a negative balance goes unpaid for more than 30 days, or if a student account is delinquent.

#### Transactions

The cardholder must present their Eagle Card at the time of purchase. All sales transactions charged to an account through the use of the Eagle Card are final at the point and time of sale. The cardholder is responsible for observing the amount charged during the transaction and monitoring balances. A cardholder can check their account balances online at http://www.erau.edu/ eaglecard.

#### Statements

The cardholder may request a detailed statement of the Eagle Card transaction history and/or activity at the Eagle Card Center.

# Account Closing and Refund

Your funds in an Eagle Card account are not transferable and there are no cash withdrawals permitted from the account(s). The funds will stay there semester-to-semester, year-to-year, and will not be refunded unless the cardholder withdraws, graduates, or is dismissed from the University, with proof required. Flight Account refunds can be requested upon flight course completion or withdrawal from the flight program. A request for a refund must be submitted to the Eagle Card Center in writing at the Daytona Beach campus, and at the Cashier Office at the Prescott campus. A \$10.00 processing fee will be applied to any remaining funds in your Eagle Dollars account.

# Lost or Stolen Card

The cardholder is required to immediately contact the Eagle Card Center during normal business hours (8 a.m. to 4 p.m.), the Safety Office after business hours, or via the Web at http://www.erau.edu/eaglecard, if an Eagle Card is lost or stolen. The cardholder is responsible for all transactions charged to their accounts prior to proper notification to the Eagle Card Center, the Safety Office, or via the Web. Once the card has been reported as lost or stolen, all accounts and privileges accessed with use of the Eagle Card will be deactivated.

# Replacement of Lost/Stolen or Replacement Cards

A replacement fee of \$10.00 will be charged for lost cards. The fee will be waived if a card was reported as stolen and a report number was issued by Campus Safety. Temporary cards are available free of charge for up to seven days. A replacement fee of \$5.00 will be charged for damaged cards if the cardholder turns in the nonfunctioning card to the Eagle Card Center.

#### **Error Resolution**

If you feel there has been an error on your account, please notify the Eagle Card Office within 60 days from the date of the transaction in question. In order to resolve the problem we will require the following:

- Name, student ID number, and Social Security number
- Description of the error or transaction in question
- Dollar amount of the transaction in question
- A clear explanation of why you believe there is an error

# **Disclosure of Accounting Information to Third Parties**

The University will disclose information to third parties about the account holder's account(s) or the transfer made only: (1) in order to comply with court orders or other applicable laws, or (2) if the account holder gives written or verbal permission, or (3) if the student's account receivables is in the third party's name. All policies and procedures are subject to change

# DINING SERVICES

A variety of nutritious and satisfying dining services and meal plan options are offered on the Daytona Beach and Prescott campuses. At both locations, dining facilities are conveniently located to residence halls and offer a wide range of food selections, from full hot meals to fast food and snacks. Students can also enjoy weekly specials and events such as cookouts, buffets, and celebrations. Dining service hours are designed to meet the needs of students, with meals available throughout the day. Accommodations can be made for students with special dietary needs or medical conditions. Dining service personnel are available to consult with students on an individual basis. Requests for special services should be made to the director of Dining Services at each campus.

Meal plan requirements and options vary per campus. Please note the following information for each location.

# Daytona Beach Campus

All first-year students are required to purchase a minimum 14-meal-per-week plan for each of their first consecutive fall and spring semesters. This minimum required plan provides 14 full meals per week and flexible Riddle Bucks that can be used to purchase individual food items at any campus dining location. First-year students may upgrade to a larger meal plan that offers 19 meals per week. Detailed dining service information will be sent to all incoming first-year students to help with their meal plan choice.

# **Prescott Campus**

All first-year students are required to purchase a minimum seven-day all-access meal plan (\$1,499 per semester) for each of their consecutive fall and spring semesters. This plan includes \$75 in Flexi cash that can be used to purchase individual items to go at any campus dining location. First-year students may upgrade to a larger meal plan that offers \$350 in Flexi cash. Other plan options are available for students not required to live in University-managed housing with information available from the Housing Office.

#### MAIL

## **Daytona Beach Campus**

Prior to a student's arrival, all personal mail, UPS, Federal Express, deliveries, etc., should be addressed as follows:

IF BOX NUMBER IS KNOWN:

This format for USPS only: Student Name (include middle initial) P.O. Box 14\_\_\_\_ Daytona Beach, FL 32114-3977

This format for UPS and FEDEX: Student Name (include middle initial) Mail # 14\_\_\_\_ Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3977

#### IF BOX NUMBER IS UNKNOWN: Student Name "New Student" Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900

#### **Prescott Campus**

Prior to a student's arrival, all personal mail, UPS, Federal Express, deliveries, etc., should be addressed as follows:

IF BOX NUMBER IS KNOWN: ERAU Box #\_\_\_\_ Student Name 3700 Willow Creek Road Prescott, AZ 86301-3720 IF BOX NUMBER IS UNKNOWN: Student Name

ERAU New Student 3700 Willow Creek Road Prescott, AZ 86301-3720

All students are assigned a mailbox and are required to check it on a daily basis.

#### INTERNATIONAL STUDENT SERVICES

The International Student Services Office at Davtona Beach and the Center for International Programs and Services at Prescott serve as the central point of contact for issues concerning international students at Embry-Riddle. An International Student Orientation is held each semester to familiarize students with University policies and procedure as well as the American education system in general. The office provides services that include advising students on immigration regulations and financial and personal matters. The office also assists international students with the processing of forms and documentation of status required by foreign governments, sponsors, the U.S. government, and the University.

International Student Services staff members continually strive to provide opportunities for international students to become involved in campus and community programs that promote a cross-cultural awareness with University faculty, staff, and students as well as the local communities of Daytona Beach and Prescott. Some of these activities include International Days on both campuses, programs with local families to introduce students to the community, speaking engagements in local schools and at community service organizations, and trips to area attractions such as amusement parks, national parks, and cultural festivals.

#### CAREER SERVICES

Career Services provides career resources and career development assistance to all Embry-Riddle students and alumni. The Career Services Web site offers students and alumni a virtual library of job search aids, including interview tips, sample resumes and cover letters, company profiles, direct links to employment Web sites, cooperative education/internship opportunities, current job listings, and a Web-based resume referral service.

Industry/Career Expos are held in the fall on both campuses. Over 100 companies visit the campuses to recruit students for full-time, cooperative education, and internship opportunities and to provide information on the industry. On-campus interviews and informational presentations are also scheduled year-round.

Career Services employs a staff of program managers to provide one-on-one career advisement, mock interviews, and resume critique services. Career Services encourages students to contact them early in their education to explore career options and to develop a successful job search strategy.

# ACADEMIC PROGRAMS BY CAMPUS LOCATION

Embry-Riddle offers students opportunities to pursue academic programs in a wide variety of aviation and aerospace fields. Each degree program includes both general education and academic specialization, the two components complementing each other. Detailed information about specific degree programs begins on page 69 of this section of the catalog. Minor courses of study are described in the following section.

The University currently offers the following bachelor and master degree programs at its residential campuses.

#### Daytona Beach, Florida, Campus

#### **College of Arts and Sciences**

- B.S. in Aerospace Studies
- B.S. in Communication
- **B.S.** in Engineering Physics

B.S. in Engineering Physics/M.S. in Space Science

B.S. in Human Factors Psychology

B.S. in Human Factors Psychology/ M.S. in Human Factors and Systems

**B.S.** in Space Physics

M.S. in Human Factors and Systems

M.S. in Space Science

Still Exploring

#### **College of Aviation**

B.S. in Aeronautical Science

B.S. in Aeronautics

**B.S. in Aerospace Electronics** 

#### B.S. in Air Traffic Management B.S. in Civil Engineering B.S. in Applied Meteorology B.S. in Computer Engineering **B.S. in Aviation Maintenance Science** B.S. in Computer Engineering/ M.S. of Software Engineering **B.S.** in Homeland Security **B.S. in Computer Science B.S. in Safety Science B.S.** in Electrical Engineering M.S. in Aeronautics **B.S.** in Mechanical Engineering Still Exploring **B.S.** in Software Engineering College of Business B.S. in Software Engineering/ B.S. in Business Administration M.S. in Software Engineering **B.S.** in Aviation Management M. of Aerospace Engineering M. of Business Administration M.S. in Aerospace Engineering Still Exploring M. of Software Engineering College of Engineering Still Exploring Accelerated Program in Aerospace

Prescott, Arizona, Campus

**B.S.** in Aerospace Engineering

Engineering

#### College of Arts and Sciences

B.S. in Aerospace Studies

B.S. in Aviation Business Administration

B.S. in Aviation Environmental Science

B.S. in Computer Science

B.S. in Global Security and Intelligence Studies

B.S. in Space Physics

Still Exploring **College of Aviation** B.S. in Aeronautical Science B.S. in Aeronautics B.S. in Applied Meteorology B.S. in Safety Science B.S. in Safety Science/M.S. in Safety Science Still Exploring

#### **College of Engineering**

B.S. in Aerospace EngineeringB.S. in Computer EngineeringB.S. in Electrical EngineeringB.S. in Mechanical EngineeringStill Exploring

Embry-Riddle reserves the right to terminate or modify program requirements and content, as well as the sequence of program offerings from term to term, for educational, financial, or other reasons that it determines are sufficient to warrant such action.

# BASIC SKILLS REQUIREMENT

Embry-Riddle recognizes the importance of communication and quantitative skills in all areas of aerospace. Successful pilots, engineers, airport managers, aviation maintenance technicians, and other aviation professionals must possess these skills to perform their jobs effectively. Embry-Riddle, therefore, requires all students, including transfer students, to demonstrate proficiency in writing, reading, and mathematics before they are permitted to complete registration during their first term at the University. Proficiency may be demonstrated by earning qualifying scores on SAT/ACT tests, or by transferring credit for college-level English and mathematics courses.

If they cannot demonstrate proficiency in these basic skills, students must enroll in COM 020, Fundamentals of Communication, a reading, writing, and critical thinking skills course. Quantitative skills courses (MA 006, MA 106) help students prepare for introductory mathematics courses required in the various degree programs.

Students whose primary language is not English are required to demonstrate advanced English proficiency by achieving a satisfactory score on a placement test. Students unable to demonstrate such proficiency must enroll in appropriate basic skills courses in their first term at the University. These courses are COM 008, Academic English, and COM 018, Advanced Academic English.

Although basic skills courses are computed into the student's term grade point average (GPA) and cumulative grade point average (CGPA), credits earned in basic skills courses do not apply to minimum degree requirements in any degree program.

#### EMBRY-RIDDLE HONORS PROGRAM

The Honors Program at Embry-Riddle is highly selective, offering students an enriched educational experience while also giving them opportunities to enhance campus and community life for others. Honors Program students enroll in several general education seminars focused on relevant, stimulating, interdisciplinary topics that encourage critical and creative thinking. Honors classes are small, the faculty are carefully selected, and the courses are student-centered and discussion-oriented. The Honors experience in the major emphasizes close involvement with selected faculty, research opportunities, and individually tailored projects. The program also adds to campus life through its guest speaker series and through activities sponsored by its student organization. Graduates of the Honors Program are models of academic excellence and student leadership.

Some features of the Honors Program:

- Nine credit hours of Honors in general education; nine credit hours of Honors in the major. The Honors Program does not add credit hours to any major.
- Honors seminars no larger than 20 students.
- Honors faculty.
- Guest speakers who spend time with students in Honors seminars.
- Honors housing for freshman students.
- Priority registration for classes.
- Research opportunities.
- Co-op and internship opportunities
- Summer study-abroad opportunities.

# **General Education**

#### INTRODUCTION

Recognizing its general and special missions in education, Embry-Riddle embraces a general education program. This course of study ensures that students possess the attributes expected of all university graduates. Encouraging intellectual self-reliance and ability, the general education program enables students, regardless of their degree program, to understand the significance of acquiring a broad range of knowledge.

Throughout the general education program, students gain and enhance competence in written and oral communication. They practice reasoning and critical thinking skills and demonstrate computer proficiency. As students engage in this course of study, they familiarize themselves with and investigate ideas and methodologies from several disciplines. These include the arts and humanities, the social sciences, and the natural sciences and mathematics. The program also helps students recognize interrelationships among the disciplines.

Promoting the appreciation of varied perspectives, the general education program provides intellectual stimulation, ensuring that students are broadly educated. This course of study empowers students to make informed value judgments, to expand their knowledge and understanding of themselves, and to lead meaningful, responsible, and satisfying lives as individuals, professionals, and concerned members of their society and the world.

### GENERAL EDUCATION REQUIREMENTS

Embry-Riddle's general education program encourages effective learning and provides a coherent base for students to pursue their academic specializations. In specific support of the goals of general education, candidates for bachelor degrees must complete coursework or demonstrate competency in the following areas. The faculty certify all coursework accepted for general education credit as advancing general education objectives. They additionally establish methods for students to demonstrate competency in these areas of study. Because certain degree programs require particular courses in the general education program, refer to the degree requirements section of the catalog before selecting general education courses.

 Communication Theory and Skills 9 hours

In order to lead meaningful and responsible lives in complex societies, students produce, evaluate, articulate, and interpret information and meanings in oral and written communications.

- 2. Mathematics
  - 6 hours

In order to develop quantitative reasoning skills and to use and understand the language of science and technology, students must demonstrate mathematical proficiency for three of these hours by placement, examination, or course completion. One course must have college algebra as a prerequisite. 3. Computer Science/Information Technology

3 hours

In order to use computers and to understand and evaluate their significance in the solution of problems, students study the concepts, techniques, and tools of computing.

4. Physical and Life Sciences 6 hours

In order to appreciate current understandings of the natural world, students study the concepts and methods of the physical and life sciences, applying the techniques of scientific inquiry to problem-solving. All students participate in a laboratory experience.

5. Humanities

3-6 hours lower-level \*3 hours 300-400 level In order to participate in the complexity of human experiences that arise in a framework of historical and social contexts, students are exposed to the humanities. Such areas of studies may include cultural, aesthetic, philosophical, and spiritual dimensions of the human condition.

6. Social Sciences

3-6 hours lower-level \*3 hours 300-400 level In order to understand interrelationships between the individual and society and connections between historical memory and the future, students examine the social sciences, including history, economics, psychology, or sociology.

#### **General Education Requirement 36 Hours Total**

\* In order to experience advanced studies in either the Humanities or Social Sciences, students must choose at least one upper-level elective in the Humanities or Social Sciences.

#### STILL EXPLORING ENGINEEERING Freshman

Students exploring engineering who have not selected a specific degree program may, during their freshman year, enroll in the courses listed in the common engineering first-year catalog description. This enables an engineering student interested in engineering to explore the content of all the engineering programs over their freshman year prior to declaring a major at the beginning of their sophomore year. The courses apply toward any engineering degree. Still Exploring students should follow the common freshman engineering program, then select a degree program upon completion. After a degree program is chosen, an advisor will be assigned to the student to discuss courses to take and future career goals. Pre-college preparation in math and physics is essential for success in engineering. If it is necessary to enroll in more basic math and physics courses to ensure that preparation, students should understand it may take them longer to complete the degree they choose.

<b>Communication Theory and Skills</b> (One course must be college composition.)	6
Computer Science /Information Technology Elective	3
Humanities (Lower-Level)	3
Social Sciences	6
Mathematics (Highest placement possible; one course for which college algebra is a prerequisite.)	6-8
Physical Sciences	6-10
(One course must contain a laboratory.)	
UNIV 101 (required)	1

#### THE COMMON FIRST-YEAR ENGINEERING PROGRAM

The Common Freshman Engineering Program is a joint responsibility between the College of Engineering and all departments in the College. The purpose of this coordination is to ensure success of all engineering programs at the freshman level. In industry, engineers in a certain discipline have to work with engineers in other disciplines, so it is in the best interest of our engineering students that they interact with students in other engineering programs. This is accomplished via team projects, common engineering courses, and invited colloquium speakers. The First-Year Program ensures that instructors involved in the program have the appropriate quality and experience to teach the freshman courses. The program maintains consistency in the continuous processes of outcomes assessment throughout all the College of Engineering curricula as required by the program's accrediting agencies. The program also deals with personal matters that may arise in freshman engineering courses.

The College of Engineering First-Year Advising Program focuses on advising and retaining all engineering freshmen starting from the time they make their tuition deposit until they finish their first year.

# Academic Programs at the Daytona Beach Campus

# **College of Arts and Sciences** Dr. William F. Grams, Interim Dean

The College of Arts and Sciences is home to several outstanding degree programs and, in addition, is the primary provider of the curricula that fulfill the university's general education goals. Students may choose to pursue such majors as Aerospace Studies, Communication, Engineering Physics, Space Physics, and Human Factors Psychology. Minor programs of study are offered in Mathematics as well as many of the major fields.

The College of Arts and Sciences' primary responsibility is to provide a high-quality educational opportunity to all adequately prepared students. It seeks to inculcate in its students a lifelong love of learning; an appreciation of the cultural, intellectual, and historical impact of the search for truth and knowledge; the opportunity for professional specialization; and emotional and social development through out-of-class experiences. All students are expected to master the skills that enable them to communicate clearly, to understand the logic of mathematics and the methods of scientific inquiry, and to understand their cultural heritage and that of others. The College seeks to develop in its students the ability to think independently, to accept responsibility, to

interact with people different from themselves, to assess ideas, to challenge orthodoxies, and to criticize opinions in order to achieve the intellectual, ethical, and aesthetic maturity expected in educated citizens. The College affirms the right of all students to achieve an educational level limited only by their own commitment and ability.

The College endorses the use of nontraditional experiences to enhance learning, including cooperative education, industry internships, study abroad, and undergraduate research involvement. The College participates in the university Honors Program; thus students of exceptional academic promise can experience unique and challenging programs of study.

The College of Arts and Sciences is home to Air Force, Army, and Naval Reserve Officers Training Corps (ROTC). The ROTC programs give students an opportunity to receive military training while pursuing a baccalaureate degree. Several significant scholarships are available for students interested in these excellent programs.

# Aerospace Studies

**Bachelor of Science** 

# PROGRAM PLAN OF STUDY AND REQUIREMENTS

A unique interdisciplinary degree program, Aerospace Studies offers students an opportunity to design a program of study that serves their needs and aspirations. This flexible degree, born in response to appeals from corporate leaders, nurtures worldly thinkers who understand the intersections between technologies and humans.

Aerospace Studies requires coursework in general education, a core curriculum, three minors, and open electives. General education provides a broad foundation of study, upon which the ASP core expands. ASP core courses aim to enhance communication and analytical abilities and to help students gain an understanding of history, art, and literature, all of which shape an awareness of what it means to be human. Courses in the core also prepare students to discover meaningful connections among their three minors. The element of choice in Aerospace Studies, primarily lodged in the selection of minor courses of study, obliges them to explore the University's offerings in search of a configuration that will help them attain future goals. In the capstone experience, each ASP student engages in a cooperative internship or writes a senior thesis.

Aerospace Studies students acquire foundational knowledge and skills that cross academic boundaries, enabling them to make creative connections. These abilities, in addition to an entrepreneurial spirit that arises from a self-designed program, position these majors to continue their education or to excel in a wide variety of professions.

#### DEGREE REQUIREMENTS

The Bachelor of Science degree in Aerospace Studies requires successful completion of a minimum of 120 credit hours. Included in the 120 credit hours must be 40 credit hours of upper-division courses (300-400 level)

#### GENERAL EDUCATION

Courses	Credits
Communication Theory and Skills*	9
Computer Science	3
Lower-Level Humanities*	3
Mathematics	6
Physical and Life Sciences	6
Lower-Level Social Sciences*	6
HU/SS 300-400 level*	3
Total Credits	36

\* Embry-Riddle courses Communication Theory and Skills, Humanities, and Social Sciences may be chosen from those listed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories.

<b>COMMUNICATION</b>	THEORY	AND	SKILLS

COM 122, 219, 221, 222
<u>Humanities</u>
LOWER-LEVEL:
HU 140-146
UPPER-LEVEL:
300-400 level
Social Sciences
LOWER-LEVEL:
EC 200, 210, 211

# Academic Programs at the Daytona Beach Campus

(EC 200 is not acceptable together with EC 210 or EC 211 or their equivalent.) PSY 101 SS 110, 120, 130 UPPER-LEVEL: SS 302, 305, 310, 320, 325, 326, 331

6S 302, 305, 310, 320, 325, 326, 331, 340, 350, 352, 360

#### CORE REQUIREMENTS/CATEGORIES

#### **Aviation Foundation**

Cour AS AS SS	120 110	Title Introduction to Aeronautical Science - Introduction to Space Flight -OR- History of Aviation -OR- Private Pilot Certificate	Credits OR-
Total	Cre	dits	3
Hun	nani	ties Survey	
HŪ (mus	140 141 t be t	<b>Title</b> Western Humanities -OR- Western Humanities II taken in addition to HU 140's series co ducation)	Credits
Total	Cre	dits	3
Man	age	ment Foundation	
Cour BA BA	201	Title Principles of Management -OR- International Business	Credits
Total			3
			3
		ciplinary Research and Skills	
HU	335 338	Title Technology and Modern Civilization Traversing the Borders	
Total	Cre	dits	3
Inter	rnati	ional Perspectives	
Cour Two SS	cour	<b>Title</b> ses selected from the following: U.S. Military History 1900-Present	Credits
SS SS SS	325 326 331	International Studies Russian-American Relations Current Issues in America	
SS SS	333	U.SAsian Relations Contemporary Africa and the World	

- SS 336 The Modern Middle East in World Affairs
   SS 340 American Foreign Policy
- SS 363 Inter-American Relations

#### **Total Credits**

3

#### **Philosophical Perspectives**

	-		
Cour	se	Title	Credits
		Values and Ethics -OR-	
		World Philosophy -OR-	
HU	345	Comparative Religions	
Total	Cree	dits	3
Upp	er-L	evel Literature	
Cour	se	Title	Credits
HU	300	World Literature -OR-	
HU	305	Modern Literature -OR-	
HU	310	American Literature	
Total	Cre	dits	3
Upp	er-L	evel Communication	
Cour	se	Title	Credits
COM	[225]	Science and Technology Communicat	ion -OR-
COM	[322	Aviation and Aerospace Communicat	ion -OR-
COM	[350	Environmental Communication -OR-	
HU	420	Applied Cross-Cultural Communicat	ion
Total	Cre	dits	3
Capstone Experience			

Cou	rse Title	Credits
CE	396/397 Cooperative Education -OR-	
HU	475 Senior Thesis	
Tota	l Credits	3
Tota	Credits Required	30

#### **MINORS**

Students must select three minor fields of study. Required credits in each minor vary, depending on the minors chosen. See Minor Courses of Study in this catalog.

Total Credits	45/54
Open Electives	0-9
TOTAL DEGREE CREDITS	120

# Communication

**Bachelor of Science** 

The Bachelor of Science in Communication requires students to integrate knowledge of science and technology with practice in communication. In this program, students learn how scientists think, how they frame research questions, and how they use various methodologies to pursue their goals. Communication students additionally practice gathering, analyzing, and disseminating scientific and technological information to a variety of audiences. A significant element of the program is the capstone experience, an internship in which students put theory into practice.

As modern society is increasingly influenced by developments in science and technology, the demand for skilled communicators in these fields continues to grow. Aviation, aerospace, and business industries, for example, require more internal communications specialists, as well as professionals in media and public relations, to relay information clearly and accurately. This program addresses that nationwide necessity.

News organizations rely on science communicators in various fields, including meteorology, environmentalism, medicine, and technology. Communication students work in traditional written media, such as newspapers, newsletters, magazines, and journals, as well as in cutting-edge information retrieval and delivery systems, including Web sites and networked blogs.

This focused, yet flexible, course of study requires students to hone specialized communication skills and to produce portfolios displaying those skills. These graduates, the next generation of communication specialists, are positioned to enter three specific career paths, including: 1) communicating science information to specific and general audiences through a variety of mass media, 2) representing companies and organizations through media relations, using written, oral, and visual media, and 3) communicating news to general audiences through print and electronic media.

# DEGREE REQUIREMENTS

The Bachelor of Science degree in Communication requires successful completion of a minimum of 120 credit hours, of which 40 credit hours must be upper-division courses (300-400 level.)

The Communication program requires coursework in General Education, the Communication Core, Communication Specified Electives, a Minor, and Open Electives:

# GENERAL EDUCATION

Courses Communication Theory & Skills Computer Science Lower-Level Humanities* Mathematics Physical and Life Sciences Lower-Level Social Sciences*	3 6 6
HU/SS 300-400 level*	

\* Embry-Riddle courses in the general education categories of Communication Theory and Skills, Humanities, and Social Sciences may be chosen from those listed below,

assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories.

COMMUNICATION THEORY AND SKILLS COM 122, 219, 221

#### HUMANITIES

Lower Level: HU 140-146 Upper Level: 300-400 level

#### SOCIAL SCIENCES

Lower Level: EC 200, 210, 211 (EC 200 is not acceptable together with EC 210 or EC 211 or their equivalent.), PSY 101, SS 110, 120, 130

Upper Level: HU 319, 363, 415, 375, 412, 420, 460 SS 325, 326, 332, 333, 334, 336, 363

# CORE REQUIREMENTS

The Communication core has three components: Required Communication Courses, Aviation and Aerospace Foundation Courses, and Science Foundation Courses.

#### **Required Courses**

This component of the Communication Core requires students to complete eight courses, including the following:

Course	Title	Credits
COM 260	Introduction to Media	3
COM 265	Introduction to News Writing	3
COM 225	Science & Technology Communication	n3
COM 320	Mass Communication Law & Ethics.	3
COM 322	Aviation & Aerospace Communication	n3
	Environmental Communication	3
COM 410	Advanced Professional Writing -OR-	
COM 360	Media Relations I	3
	/7 Internship/Co-Op -OR-	
COM 399	/499 Directed Study	3
Total Cree	dits	24

#### **Total Credits**

#### **Aviation/Aerospace Foundation Courses**

This component of the Communication Core requires students to complete two courses from among the following:

Cou	rse	Title	Credits
AS	120	Principles of Aeronautical Science	3
SS	130	History of Aviation	3
SP	110	History of Aviation Introduction to Space Flight	3
Tota			6

#### Science Foundation Courses

This component of the Communication Core requires students to complete two courses from among the following:

	8	
Course	Title	Credits
HU 335	Technology & Modern Civilization	3
SS/PS 302	2Evolution of Scientific Thought	3
HU 302	Contemporary Issues in Science	3
Total Cree	dits	6
Total Cree	dits for Communication Core	36

# SPECIFIED ELECTIVES

To supplement coursework from the Communication Core, students complete five classes selected from among the following specified electives in Communication, Humanities, and Social Sciences:

Course	Title	Credits
COM 364	Visual Design	3
	Web Design Workshop	
COM 412	Advanced Technical Writing	3
	Nonverbal Communication	
	Media Relations II.	
HU 143	Introduction to Rhetoric	3
HU 319	Advanced Speech	3
HU 363	Communication and Society	3
HU 375	Nature of Language	3
HU 420	Applied Cross-Cultural Communicat	ion .3
Internatio	onal Relations Course(s), including SS	325,
	333, 334, 336, 363	
Total Cre	dits	15

# MINOR

In consultation with their advisor and/or Communication program coordinator, students select a minor that enhances their knowledge base and increases their job prospects. Total credits in the minor vary, depending on the minor chosen. Suggested minors include:

Minors	<b>Required Credits</b>
Environmental Studies	15-16
Human Factors	

International Relations15
Business Administration
Information Technology18
Aeronautical Studies
Aviation Safety15
Aviation Weather15
Space Studies

# **OPEN ELECTIVES**

Students complete open electives, experiencing the breadth of curriculum offerings of the University or selecting an additional minor.

Open Electives: Total Credits	
TOTAL DEGREE CREDITS	120

120

# **Engineering Physics**

**Bachelor of Science** 

The Bachelor of Science in Engineering Physics, offered only at the Daytona Beach campus, is designed to produce graduates with the knowledge and skills of both scientists and engineers. Combining the fields of space systems engineering and space physics, this program focuses on the scientific challenges and planning associated with mission design and research related to the exploration of the space environment. Because of the strong emphasis on fundamentals, the Engineering Physics program provides not only an excellent stepping stone into the space program, but also the flexibility to enter a broad variety of engineering and physics applications and graduate programs.

The Engineering Physics degree program has a full engineering accreditation by the Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology (111 Market Place, Suite 1050, Baltimore, MD 21204-4012, telephone: 410-347-7700) and is administered by the Physical Sciences Department. This program supports the University's purpose "to provide a comprehensive education to prepare graduates for productive careers and responsible citizenship with special emphasis on the needs of aviation, aerospace engineering, and related fields." The educational objectives of the Engineering Physics program ensure that our graduates:

- Effectively use mathematical, scientific, and modern engineering tools in the professional practice of engineering.
- Pursue successful careers built upon under-

standing of ethical and professional responsibility, good citizenship, and on the ability to be a life-long learner.

- Demonstrate oral and written communication skills, and the ability to work in teams across disciplines.
- Demonstrate the ability to identify, formulate, and solve real-world technical problems, incorporating political, economic, and environmental considerations.

# ADMISSION REQUIREMENTS

To enter this program, students must have completed four years of high school science and mathematics, demonstrating a high level of competency. Successful candidates for this program will be prepared to enter Calculus I and Chemistry for Engineers.

# DEGREE REQUIREMENTS

The Bachelor of Science in Engineering Physics degree program requires 136 credit hours. The program can be completed in eight semesters and one summer term. The courses necessary to earn this degree are listed below.

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

A grade of C or better is required in MA 241, MA 242, MA 243, PS 215, PS 208, and PS 219.

#### **FRESHMAN YEAR**

Cour	se	Title	Credits
		Communication Theory and Skills*	6
		Lower-Level Humanities*	3
		Lower-Level Social Sciences*	3
EGR	111	Engineering Drawing	2
EP	101	Current Topics in Space Sciences	1
MA	241	Calculus and Analytic Geometry I	4
MA	242	Calculus and Analytic Geometry II	4
PS	140	Chemistry for Engineers	4
PS		Chemistry for Engineers Laboratory.	
PS		Physics I	
PS		Physics Laboratory I	
Total	Cree	dits	32

#### SOPHOMORE YEAR

#### Course Title

Credits
•

		Communication Theory and Skills*	3
EGR	115	Intro to Computing for Engineers	3
ES		Statics	
ES	202	Solid Mechanics	3
ES	204	Dynamics	3
HU		Humanities Elective	3
MA	243	Calculus and Analytic Geometry III	4
MA	345	Differential Equations and	
		Matrix Methods	4
PS	208	Physics II	3
PS	219	Physics III.	3
PS		Physics Laboratory III	
PS	290	Physics Laboratory Practicum*	0
Total	Cre	dits	33

\* May be taken in the fourth or fifth semester.

#### JUNIOR YEAR

Cour	se	Title	Credits
EE	335	Electrical Engineering I	2
EE	336	Electrical Engineering Laboratory	1
EP	320	Electro Optical Engineering	3
EP		Introduction to Space Systems Design	
EP	393	Spaceflight Dynamics	2
EP	394	Space Systems Engineering	3
ES	206	Fluid Mechanics	3
ES	305	Thermodynamics	3
MA	441	Advanced Engineering Mathematics I	[3
MA	442	Advanced Engineering Mathematics I	I3
PS	303	Modern Physics	3
PS	305	Modern Physics Laboratory	1
PS	320	Classical Mechanics	3
Total	Cre	dits	32

#### SUMMER SESSION

(Must be taken before seventh semester)

Course	5	Title	Credits
SS/PSY	Y	Elective	3
ES 3	20	Engineering Materials Science	2
ES 3	21	Engineering Materials Science Lab	1
		Open Elective	
Total C	Cre	dits	9

## **Total Credits**

#### SENIOR YEAR

Course		Title	Credits
		Engineering Elective	3
HU		Upper-Level Humanities Elective	3
EP	391	Microcomputers and Electronic	
		Instrumentation	3
EP	410	Space Physics	3
EP	440	Engineering Electricity and	
		Magnetism	3
EP	455	Quantum Physics	
EP	496	Space Systems Design I	2
EP	497	Space Systems Design II	3
ME	200	Machine Shop Laboratory	1
SS		Upper-Level Social Sciences*	3
		Open Elective	3
Total Credits		30	
TOTAL DEGREE CREDITS		136	

\* Embry-Riddle courses in the general education categories of Communication Theory and Skills, Humanities and Social Sciences, and the Engineering Electives may be chosen from those listed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified above in the Engineering Physics vertical outline.

Communication Theory and Skills
COM 122, 219, 221, 222, 351, 360
<u>Humanities</u>
LOWER-LEVEL:
HU 140-146, 250
UPPER-LEVEL:
HU 300-400
Social Sciences
LOWER-LEVEL:
EC 200, PSY 220, SS 110, 120, 130, 204, 210
UPPER-LEVEL:
HF 300, PSY 350, 365, SS 300 level
Engineering Electives
AE/AEL/CEC/CIV/CS/EE/EGR/EL/EP/ES/

# Accelerated Program in Engineering Physics / Space Science

Bachelor of Science in Engineering Physics Master of Science in Space Science

The accelerated program allows exceptional students to complete both the Bachelor of Science in Engineering Physics (BSEP) and Master of Science in Space Science (MSSPS) degrees. Students enrolled in the BSEP program may apply for entry into the accelerated program when they attain junior standing. Students must have a minimum CGPA of 3.2 in EP/ES/MA/PS courses for selection. This program is available at the Daytona Beach campus only.

# DEGREE REQUIREMENTS

Students in this program must meet the following requirements:

- Maintain at least a 3.0 CGPA throughout the academic program.
- Maintain at least a 3.0 CPGA for the graduate credits.
- Complete a total of 151 credit hours as listed below.

#### FIRST YEAR

Cour	se	Title	Credits
		Communication Theory and Skills	6
		Lower-Level Humanities	3
		Lower-Level Social Science	
EGR	111	Engineering Drawing	2
EP		Current Topics in Space Sciences	
MA	241	Calculus and Analytic Geometry I	4
MA		Calculus and Analytic Geometry II	
PS	140	Chemistry for Engineers	4
PS	141	Chemistry for Engineers Laboratory.	1
PS	215	Physics I	3
PS	216	Physics Laboratory I	1
Total	Cre	dits	32

#### SECOND YEAR

Cour	se	Title	Credits
		Communication Theory and Skills	3
EGR	115	Introduction to Computing for Engine	
ES		Statics	
ES	202	Solid Mechanics	3
ES		Dynamics	
HU/		Upper-Level HU/SS Elective	
		Calculus and Analytic Geometry III	
		Differential Equations and	
		Matrix Methods	4
PS	208	Physics II	3
PS		Physics III	
PS		Physics Laboratory III	
PS	290	Physics Laboratory Practicum	0
Total	Cre	dits	33

# THIRD YEAR

# Course Title

#### EP EP 340 Introduction to Space Systems Design ...2 ΕP 393 Spaceflight Dynamics.....2 EP EP 501 Numerical Methods for Engineers & Scientists..... ES ES 441 Advanced Engineering Mathematics I ... 3 MA MA 303 Modern Physics......3 PS 305 Modern Physics Laboratory .....1 PS PS **Total Credits** 32

#### SUMMER SESSION

Cou	rse	Title	Credits
HU/	SS	Upper-Level HU/SS Elective	3
ES	320	Engineering Materials Science	2
ES	321	Engineering Materials Science Labora	atory1
EE	335	Electrical Engineering I	2
EE	336	Electrical Engineering I Laboratory	1
Total Credits		9	

#### Credits

# FOURTH YEAR

Cour	se	Title	Credits
EP	505	Advanced Spacecraft Dynamics	
		& Control	3
EP	5XX	Graduate Elective	3
EP	391	Microcomputers and Electronic	
		Instrumentation	3
EP		Space Physics	
EP	440	Engineering Electricity and Magnetisi	n 3
EP		Quantum Physics	
EP	496	Space Systems Design I	2
EP		Space Systems Design II	
ME		Machine Shop Laboratory	
Total	Cree	dits	24
TOTAL DEGREE CREDITS			130

# GRADUATE-LEVEL STUDIES

Course		Title	Credits
EP	509	Advanced Space Physics	3
EP	600	Experimental Methods in Space Scien	ice3
		Spacecraft Power & Thermal Design.	

# **Option I - Thesis**

	Title Thesis -AND- Graduate Elective	,	
Option 1	II- Non-Thesis		
Course	Title Graduate Electives	<b>Credits</b> 12	
Total Cre	dits	21	
TOTAL BS/MS DEGREE CREDITS 151			

# Human Factors Psychology

#### **Bachelor of Science**

The Bachelor of Science degree in Human Factors Psychology emphasizes human behavior, ergonomics, and human capabilities. The program seeks to develop a student with the capacity to design, conduct, and apply human factors research to the design of simple and complex systems. The goal of the program is to educate and graduate professionals who are equipped for employment as human factors specialists or to continue their education in graduate school.

Human Factors Psychology is an applied discipline that develops knowledge concerning the abilities and limitations of humans to sense, store, and process information, as well as to act. This knowledge is applied to the design, use, and maintenance of human/ machine systems. Depending on its goals, the system is then optimized with respect to human performance. The environmental factors affecting system performance are recognized as important and are considered systematically. When relevant data are not available, they must be uncovered through research efforts. This requires considerable skill in experimental design and quantitative methodology. Students will receive training in the content and techniques of human factors, including statistical and quantitative procedures, experimental design, survey methods, computer techniques, and other research methodologies.

# DEGREE REQUIREMENTS

The Bachelor of Science in Human Factors Psychology can be earned in eight semesters assuming appropriate background and fulltime enrollment. Successful completion of a minimum of 123 credit hours is required.

Students are encouraged to choose a minor field of study. Minors that complement Human Factors are Air Traffic Control, Aviation Safety, Computer Science, Flight, and Mathematics. Most minors can be accommodated within the 15 hours of open electives required in the program.

Students will be encouraged to have an applied practicum experience. This requirement may be fulfilled in several ways, including co-ops, internships, or working on an on-campus research team. Practicums provide opportunities to gain practical experience in real-world settings. A practicum experience is highly regarded by employers and increases the student's employment potential after graduation. Typically, students will engage in practical experience activities toward the end of the degree program so they can take maximum advantage of their undergraduate experience.

# GENERAL EDUCATION

Courses*	Credits
Communication Theory and Skills	9
Mathematics	6
Computer Science	3
Physical and Life Sciences	
(one course must include a laboratory)	6
Lower-Level Humanities	3
Lower-Level Social Sciences	6
HU/SS 300-400 level	3
Total Credits	36

Embry-Riddle courses in general education may be chosen from those listed below, assuming prerequisites are met. Courses from other institutions are acceptable if they fall into these broad categories.

<u>Communication Theory and Skills</u> COM 122, 219, 221, 222, 351, 360, 364, 410, 411, 412 HU 143, 319, 351, 355, 361, 362, 363, 370, 375, 420 Mathematics

MA 111, 112, 140, 142, 145, 222, 241, 242, 243 Computer Science

IT 109, CS 118, BA 120

PHYSICAL AND LIFE SCIENCES PS 101-109, 142, 302, 304, 308, 309

#### HUMANITIES

LOWER-LEVEL: HU 140s series, 250 UPPER-LEVEL: HU 300-315, 320-345

#### SOCIAL SCIENCES

LOWER-LEVEL: PSY 101 (required) and 3 credits from the following: EC 200-211, SS 110-130, 204, 210 UPPER LEVEL: SS 302-361

# CORE REQUIREMENTS\*\*

#### COLLEGE SUCCESS

UNIV 101

#### **Total Credits**

ADVANCED COMMUNICATION

For the Advanced Communication requirement, Human Factors majors are required to take one Advanced Communication class for a total of three credits. This exists in addition to the nine credits (three classes) taken for the Communication General Education Requirement.

COM 360, 364, 410, 411, 415, 460

HU 335, 361, 362, 363, 375, 415, 420

#### **Total Credits**

#### COMPUTER SCIENCE

Six credit hours from CS courses listed below. These courses are in addition to those taken as General Education.

CEC 220, 222

- CS 118, 125, 223
- IT All courses in the curriculum may be used SE 300

#### **Total Credits**

PSYCHOLOGY AND HUMAN FACTORS

Course	Title	Credits
HF 210	) Human Factors I: Principles	
	and Fundamentals	
HF 302	2 Human Factors II: Analytic Methods	
	and Techniques	4
	5 Human Factors III: Test and Evaluati	
HF 400 PSY 312	<ol> <li>Human Factors IV: System Design .</li> <li>Research Analysis in Psychology</li> </ol>	4
PSY 322	2 Research Design	<del>4</del> 1
PSY 310	) Sensation and Perception	<del>1</del> 3
PSY 315	5 Cognitive Psychology	3
PSY 335	5 Physiological Psychology	3
HF 310	) Human Computer Interaction	3
HF 312	2 Ergonomics and Bioengineering	3
HF 412	2 Simulating Humans in	
	Complex Systems	3
Total Cr	edits	41
AVIATIO	<u>DN</u>	
Course	Title	Credits
AS 120	) Principles of Aeronautical Science -C	R-
SP 110	) Introduction to Space Flight -OR-	
FAA	Private Pilot Certificate -OR-	
WX 201	Survey of Meteorology	3
Total Cr	edits	3
PRACTIC	CUM	
Course	Title	Credits
HF 490	) Practicum in Human Factors	
	Psychology	3
Total Co	re Credits	57

# SPECIFIED ELECTIVES

Take two courses from each of the following two groups of courses and any one additional course from either group (15 credit hours total).

#### Group I: Applied Systems in Human Factors

Course		Title	Credits
HF	315	Automation and Systems Issues in	
		Aviation	3
HF	325	Human Factors and System Safety	3
HF	330	Human Factors in Space	3
HF		Human Factors in Air Traffic Control	
HF	340	Human Factors and Product Liability	3
HF	410	Human Factors in Crew Station Desig	gn 3
HF		Human Factors in Simulation System	
HF	422	Applied Ergonomic Design, Analysis	
		and Evaluation	3

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#### **Group II: Psychological Foundations of Human Factors**

Course		Title	Credits
PSY	320	Aviation Psychology	3
PSY	340	Industrial-Órganizational Psychology.	3
PSY	345	Training and Development	3
PSY	350	Social Psychology	3
PSY	400	Introduction to Cognitive Science	3
	(Otł	ner courses with approval of advisor.)	
Total Specified Elective Credits			15
Open Elective Credits			15
Total Elective Credits			30
TOTAL DEGREE CREDITS			123

# Suggested Program of Study

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

#### FRESHMAN YEAR

Course Title	Credits
Communication Theory and Skills*	6
Computer Science*	3
Lower-Level Humanities*	
Mathematics*	
Physical and Life Sciences*	3
HF 210 Human Factors I: Principles and	
Fundamentals	
HU HU/PSY/SS 300-400 level*	
PSY 101 Intro to Psychology*	3
UNIV101 College Success	1
Total Credits	31

#### SOPHOMORE YEAR

Course Title	Credits
Communication Theory and Skills*	3
Lower-Level Social Sciences*	
Physical and Life Sciences*	3
Computer Science**	3
HF 302 Human Factors II: Analytic Methods	
and Techniques	4
HU Advanced Communication**	
PSY 312 Research Analysis in Psychology	4
PSY 335 Physiological Psychology	3
AS 120 Principles of Aeronautical Science –C	)R-
SP 110 Introduction to Space Flight –OR–	
FAA Private Pilot Certificate –OR-	
WX 201 Survey of Meteorology**	3
Open electives	
Total Credits	32

#### JUNIOR YEAR

,			
Course		Title	Credits
Compute		r Science **	3
HF	305	Human Factors III: Test and Evaluation	on4
HF	490	Practicum in Human Factors	
		Psychology	3
HF/I	PSY	Specified Electives	6
PSY	322	Research Design	4
PSY	310	Sensation and Perception	3
PSY	315	Cognitive Psychology	3
HF	312	Ergonomics and Biomechanics	3
Total Crec		dits	29
SENI	OR	YEAR	
Cour	se	Title	Credits
HF	310	Human Computer Interaction	3
		Simulating Humans in Complex	
		Systems	3
HF	400	Human Factors IV: System Design	4
HF/I	PSY	Specified Electives	9
		Open Electives	12
Total	Cre	dits	31

#### \* General Education Requirement

\*\* Degree Core Requirement

TOTAL DEGREE CREDITS

- \*\*\* Please refer to the Graduate Catalog for a listing of available graduate-level electives
- ‡ All Psychology and Human Factors courses must be passed with a "C" or better to count toward degree completion.

123

# Human Factors Psychology/ Master of Human Factors and Systems

#### **Bachelor of Science**

#### Master of Human Factors and Systems

In conjunction with the Bachelor of Science in Human Factors Psychology and the traditional master degree in Human Factors and Systems, the Department of Human Factors and Systems also offers a five-year master degree program in Human Factors and Systems. The five-year master program offers upper-level undergraduates in the major the chance to begin their graduate work while completing their bachelor degree program. The program is open to all undergraduate Human Factors students who meet eligibility requirements that include a CGPA of 3.20 and junior-year standing.

Student applications will be reviewed for the program and students accepted into the five-year master program will be notified of such at the end of their junior year. During their senior undergraduate year, they will take HFS 500 and one additional graduate course (six credits) that will fulfill requirements for both the bachelor and the master degree program. Five-year master students are required to complete 30 credits of graduate work to complete the degree program. Both the Bachelor of Science degree in Human Factors Psychology and the master degree in Human Factors and Systems will be awarded when the student completes the master degree program.

# GENERAL EDUCATION

Course*	Credits
Communication Theory and Skills	9

Mathematics	
Physical and Life Sciences (one course must inclu-	 1e
a laboratory)	6
Lower-Level Humanities	3
Lower-Level Social Sciences	6
HU/SS 300-400 Level	3
Total Credits	36

Embry-Riddle courses in general education may be chosen from those listed below, assuming prerequisites are met. Courses from other institutions are acceptable if they fall into these broad categories.

COMMUNICATION THEORY AND SKILLS COM 122, 219, 221, 222, 351, 360, 364, 410, 411, 412 HU 143, 319, 351, 355, 361, 362, 363, 370, 375, 420 MATHEMATICS MA 111, 112, 140, 142, 145, 222, 241, 242, 243 COMPUTER SCIENCE IT 109, CS 118, BA 120 Physical and Life Sciences PS 101-109, 142, 302, 304, 308, 309 HUMANITIES LOWER-LEVEL: HU 140s series, 250 UPPER-LEVEL: HU 300-315, 320-345 SOCIAL SCIENCES LOWER-LEVEL: PSY 101 (required) and 3 credits from the following: EC 200-211, SS 110-130, 204, 210

UPPER-LEVEL: SS 302-361

# CORE REQUIREMENTS \*\*

College Success UNIV 101.....1

#### ADVANCED COMMUNICATION

For the Advanced Communication requirement, Human Factors majors are required to take one Advanced Communication class for a total of three credits. This exists in addition to the nine credits (three classes) taken for the Communication General Education Requirement.

COM 360, 364, 410, 411, 415, 460

HU 361, 362, 363, 375, 415, 420

#### **Total Credits**

#### **COMPUTER SCIENCE**

Six credit hours from CS courses listed below. These courses are in addition to those taken as General Education.

CEC 220, 222 118, 125, 223

- CS
- IT All courses in the curriculum may be used SE 300

#### **Total Credits**

#### **PSYCHOLOGY AND HUMAN FACTORS**

Course		se	Title	Credits
	HF	210	Human Factors I: Principles	
			and Fundamentals	3
	HF	302	Human Factors II: Analytic Methods	
			and Techniques	4
	HF	305	Human Factors III: Test and Evaluation	on4
	HF		Human Factors IV: System Design	
	PSY	312	Research Analysis in Psychology	4
	PSY	322	Research Design	4
	PSY		Sensation and Perception	
	PSY	315	Cognitive Psychology	3
	PSY	335	Physiological Psychology	3
	HF	310	Human Computer Interaction	3
	HF	312	Ergonomics and Bioengineering	3
	HF	412	Simulating Humans in	
			Complex Systems	3
	Total	Cre	dits	41

#### Total Credits

#### **AVIATION** Credits Course Title AS 120 Principles of Aeronautical Science -OR-SP 110 Introduction to Space Flight -OR-FAA Private Pilot Certificate -OR-WX 201 Survey of Meteorology..... . . . 3 **Total Credits** 3 PRACTICUM Course Title Credits HF 490 Practicum in Human Factors Psychology..... . . . . 3 **Total Core Credits** 57

# SPECIFIED ELECTIVES

3

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Take two courses from each of the following two groups of courses and any one additional course from either group (15 credit hours total).

#### **Group I Applied Systems in Human Factors**

Course		Title	Credits
HF	315	Automation and Systems Issues	
		in Aviation	
HF	325	Human Factors and System Safety	3
HF	326	Human Performance in	
		Extreme Environments	3
HF		Human Factors in Space	
HF	335	Human Factors in Air Traffic Control	3
HF	340	Human Factors and Product Liability	3
HF	410	Human Factors in Crew Station Desig	gn 3
HF		Human Factors in Simulation System	
HF	422	Applied Ergonomic Design, Analysis	,
		and Evaluation	3

#### Group II: Psychological Foundations of Human Factors

PSY         340           PSY         345           PSY         350           PSY         400           (Other co           Total Spe           Open Ele	Title Aviation Psychology Industrial-Organizational Psychology. Training and Development Social Psychology Introduction to Cognitive Science urses with approval of advisor.) cified Undergraduate Elective Credits ctive Credits	3 3 3 3		
Undergraduate Senior Year         HFS 500 Systems Concepts (Fall)				

# **GRADUATE-LEVEL STUDIES**

Two graduate-level HFS courses are taken in the senior year as described above. 27 credits remain.

Course	Title	Credits
HFS 510	Research Design and Analysis I	3
HFS 610	Research Design and Analysis II	3
HFS 615	Sensation and Perception	3
	Thesis	
HFS	Graduate Elective***	12
Total Credits		
TOTAL DEGREE CREDITS		

# Suggested Program of Study

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

#### FRESHMAN YEAR

Course	Title	Credits
Communi	cation Theory and Skills*	6
Computer	Science*	3
Lower-Le	vel Humanities <sup>*</sup>	3
Mathemat	tics*	6
Physical a	nd Life Sciences*	3
HF 210	Human Factors I: Principles	
	and Fundamentals	
HU/PSY/	'SS 300-400 level*	3
PSY 101	Intro to Psychology*	3
UNIV101	College Success	1
Total Cree	lits	31

#### SOPHOMORE YEAR

#### Course Title

Cradita

Cour	se	inte	Creans
Com	mun	ication Theory and Skills*	3
Lowe	er-Le	vel Social Sciences*	3
Phys	ical a	and Life Sciences*	3
Com	pute	r Science**	3
		Human Factors II: Analytic Methods	
		and Techniques	
HU	Adv	vanced Communication**	3
PSY	312	Research Analysis in Psychology	4
PSY	335	Physiological Psychology	3
AS		Principles of Aeronautical Science - C	
SP	110	Introduction to Space Flight – OR –	
FAA		Private Pilot Certificate – OR-	
WX	201	Survey of Meteorology**	3
Total	Cre	dits	29

#### **Total Credits**

#### JUNIOR YEAR

Course	Title	Credits
Computer	Science **	3
	Human Factors III: Test and Evaluation	
HF/PSY	Specified Electives	9
PSY 305	Research Design	4
PSY 310	Sensation and Perception	3
PSY 315	Cognitive Psychology	3
HF 312	Ergonomics and Biomechanics	3
	Open Electives	3
Total Credits		32
SUMMER TERM		

#### Course Title Credits

490 Practicum in Human Factors HF

Students must spend the term performing a co-op engaged in a human factors engineering activity (analysis, design, or test).

#### SENIOR YEAR

Cour	se	Title	Credits
HF	310	Human Computer Interaction	3
HF	412	Simulating Humans in Complex Syste	ems 3
HF	400	Human Factors IV: System Design	4
HFS	500	Systems Concepts	3
HFS	620	Memory and Cognition	3
HF/I	PSY	Specified Electives	6
		Öpen Electives	9
Total Credits		31	

#### Total Credits

#### **GRADUATE-LEVEL STUDIES**

Course	Title	Credits
HFS 510	Research Design and Analysis I	3
HFS 610	Research Design and Analysis II	3
HFS 615	Sensation and Perception	3
	Thesis	
HFS	Graduate Elective***	12
Total Credits		
TOTAL DEGREE CREDITS		

General Education Requirement

- \*\* Degree Core Requirement
- \*\*\* Please refer to the Graduate Catalog for a listing of available graduate-level Electives.
- ‡ All Psychology and Human Factors courses must be passed with a "C" or better to count toward degree completion.

# Space Physics

**Bachelor of Science** 

The Bachelor of Science in Space Physics, offered at the Daytona Beach campus, is designed to produce graduates who want to pursue careers in space-related professions or who want to pursue advanced studies in diverse areas of science and engineering. This program supports the University's purpose "to provide a comprehensive education to prepare graduates for productive careers and responsible citizenship with special emphasis on the needs of aviation, aerospace engineering, and related fields."

As defined by NASA, "Space Physics is the scientific study of magnetic and electric phenomena that occur in outer space, in the upper atmosphere of planets, and on the Sun. Space physicists use ground based instruments, balloons, rockets, satellites, and deep space probes to study these phenomena where they occur." Examples of such studies include space shuttle aurora observations, groundbased solar studies, ground-based ionospheric studies, balloon flights to the edge of the atmosphere, and sounding rocket flights into near space.

The Space Physics program focuses on Space Science with emphasis on solar system physics, planetary science, and astrophysics. The program shares its facilities and coursework with the highly successful Engineering Physics program, the largest of its kind in the United States.

# Admission Requirements

To enter this program, students must have completed four years of high school science and mathematics, demonstrating a high level of competency. Successful candidates for this program will be prepared to enter Calculus I and Chemistry for Engineers.

# DEGREE REQUIREMENTS

The Bachelor of Science in Space Physics degree program requires 120 credit hours. The program can be completed in eight semesters. The courses necessary to earn this degree are listed below. Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing. A grade of C or better is required in MA 241, MA 242, MA 243, PS 208, PS 215, and PS 219.

#### FRESHMAN YEAR

Course	Title	Credits
EP 101	Current Topics in Space Sciences	1
	Communication Theory and Skills*	6
	Lower-Level Humanities*	
	Lower-Level Social Sciences*	3
MA 241	Calculus & Analytic Geometry I	4
MA 242	Calculus & Analytic Geometry II	4
PS 140	Chemistry for Engineers	4
PS 141	Chemistry for Engineers Laboratory.	1
PS 215	Physics I	3
PS 216	Physics Laboratory I	1
Total Cre	dits	30

#### SOPHOMORE YEAR

Cour	se	Title	Credits
		Communication Theory and Skills*	3
		Upper-Level Humanities*	3
EGR	115	Introduction to Computing	
		for Engineers	3
MA	243	Calculus & Analytic Geometry III	
MA	345	Differential Equations and	
		Matrix Methods	4
PS	208	Physics II	3
PS		Physics III.	
PS		Physics Laboratory III	
		Open Electives.	6
Total Credits		30	

#### JUNIOR YEAR

Cour	se	Title	Credits
		Technical Elective	3
EP	393	Spaceflight Dynamics	2
EP		Thermodynamics and Statistical Mecl	
MA	441	Advanced Engineering Mathematics	[3
MA	442	Advanced Engineering Mathematics	II 3
		Upper-Level Social Sciences*	3
PS	303	Modern Physics	3
PS	305	Modern Physics Laboratory	1
PS	320	Classical Mechanics	3
PS	401	Astrophysics	3
		Open Elective	3
Total	Cre	dits	30

# **Total Credits**

#### SENIOR YEAR

Course Title			Credits
		Technical Electives	6
EP	410	Space Physics	
EP	420	Planetary Science	3
EP	440	Engineering Electricity and Magnetisi	n 3
EP	455	Quantum Physics	3
PS	400	Senior Physics Laboratory	3
PS		Atomic/Nuclear Physics	
PS	408	Astrophysics II	3
		Open Elective	3
Total Credits			30
TOTAL DEGREE CREDITS			120

\* Embry-Riddle courses in the general education categories of Communication Theory and Skills, Humanities and Social Sciences, and the Technical Electives may be chosen from those listed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified in the Space Physics vertical outline.

COMMUNICATION THEORY AND SKILLS COM 122, 219, 221, 222, 351, 360
HUMANITIES
LOWER-LEVEL:
HU 140-146, 250
UPPER-LEVEL:
HU 300-400 level
SOCIAL SCIENCES
LOWER-LEVEL:
EC 200,
PSY 220, SS 110, 120, 130, 204, 210
UPPER-LEVEL:
HF 300
PSY 350,
SS 302, 305, 310, 320, 325, 331, 335, 340, 350, 352, 360
TECHNICAL ELECTIVES
AE/CEC/CIV/CS/EP/MA/PS 300-400 level

Students may take other HU/SS courses with the approval of the department chair/program coordinator.

# College of Aviation

# Dr. Tim Brady, Dean

The College of Aviation integrates into one unit the departments of Aeronautical Science, Aviation Maintenance Science, Applied Aviation Sciences, and the Flight Training Department, which is the flight laboratory component for the Aeronautical Science degree. This cohesive unit takes advantage of the various talents and expertise of faculty and staff in these related programs. By having these programs in one complex composed of the Aviation Building, the Simulation Center, the Flight Laboratory, and the Maintenance complex, the College provides an atmosphere in which students are able to immerse themselves in an environment designed to provide them with the best resources available for the highest quality degree possible.

The Aviation Building, a strikingly beautiful state-of-the-art facility that opened in 2002, houses the academic departments, classrooms, and laboratories, including the Air Traffic Simulation laboratory, which provides a unique experience for students in various curricula. The Simulation Center contains the most advanced ab-initio aircraft simulation devices on the planet: aircraft-specific Cessna 172 Diamond Twinstar and Piper Seminole flight training devices (FTD), plus a CRJ FTD. Each of these devices exactly simulates the aircraft, including the flying qualities, sounds, etc., and each has powerful, realistic visuals.

The College of Aviation complex also serves as a living laboratory that can research all elements of an air transportation system, including dynamic modeling of air traffic control interfaces, security systems, and safety systems through its highly sophisticated aircraft and air traffic simulation laboratories. These simulations can then be incorporated into the real world, where a fleet of airplanes can bring the simulation scenarios to life in an actual in-flight laboratory.

Academic degree programs offered through the College of Aviation include the following undergraduate degrees:

- Aeronautical Science (Professional Pilot)
- Aeronautics
- Aviation Maintenance Science
- Aerospace Electronics
- Applied Meteorology
- Air Traffic Management
- Homeland Security
- Safety Science

In addition, the College offers the Master of Science degree in Aeronautics with specializations in Aerospace Education, Aerospace Management, Aviation Operations, Aviation Safety Systems, and Human Factors.

The College of Aviation has an enrollment of approximately 2,100 students, many of whom are in the Aeronautical Science degree, which has the largest enrollment of any similar undergraduate degree program in the nation. The College has a fleet of 61 aircraft, including Cessna C-172s, Piper PA-28R Arrows, PA-42 Diamond Twinstars, and Piper PA-44 Seminoles.

Embry-Riddle has positioned the College of Aviation to serve its students with distinction while investigating and developing new education and programs for pilots, air traffic managers, meteorologists, and safety and security professionals of the new century.

# Aeronautical Science (Professional Pilot)

**Bachelor of Science** Specialties: Airline Pilot, Commercial Pilot, Military Pilot

The Aeronautical Science degree program blends flight training with rigorous academic study in a unique manner that provides a strong foundation for a career as a leader in the aviation industry, including airlines, corporate and commercial aviation, or the military. This approach to aviation education gives the student added value over traditional flight training programs by focusing on the skills and knowledge required by today's industry. The curriculum provides skills in mathematics, physics, communications, and aeronautics, including FAA certification as a multi-engine instrument rated commercial pilot. The last two years of matriculation include extensive professional-level Aeronautical Science and flight courses that prepare the graduate for a career as a professional pilot, including airline flight crew operations in multi-crewmember jet transport aircraft. Critical thinking and problem-solving skills are developed via computer simulations in aircraft performance, navigation, and aircraft systems operation. Effective resource management, human factors, and safety awareness are constantly emphasized throughout the curriculum.

# DEGREE REQUIREMENTS

The Bachelor of Science degree in Aeronautical Science may be attained in eight semesters. To earn the degree, successful completion of a minimum of 120 credit hours is required. The purpose of the Aeronautical Science degree program is to prepare the graduate for a productive career as a professional pilot and for responsible citizenship in support of aviation and aerospace industries. Upon completion of the curriculum, the student will possess an FAA Commercial Pilot Certificate with multi-engine and instrument ratings. Optional advanced flight training includes upset training, certification as a flight instructor and instrument flight instructor, and training as a flight crewmember in a jet transport aircraft.

Students pursuing the Aeronautical Science degree will select one of three specializations after matriculation. Students entering under this catalog may select from the Airline Pilot, Commercial Pilot, or Military Pilot specialization. Please see the section concerning the restrictions imposed by the Aviation Transportation and Security Act. All students must complete the general education courses, the Aeronautical Science core courses, the flight core courses, and the courses required to complete one specialization in order to complete the requirements for the Aeronautical Science degree.

# **BACHELOR OF SCIENCE DEGREE** IN AERONAUTICAL SCIENCE

	Credits
General Education	39
Aeronautical Science Core	
Flight Core	4
Specialty Courses	26
TOTAL DEGREE CREDITS	120

## UNIVERSITY GENERAL EDUCATION

Cour	se	Title	Credits
		Communication Theory and Skills*	9
		Lower-Level Humanities*	
		Lower-Level Social Sciences*	6
		Upper-Level Humanities -OR-	
		Social Sciences*	3
		Computer Science Elective*	3
		Management Elective*	3
MA	111	College Mathematics for Aviation I	3
MA	112	College Mathematics for Aviation II.	3
PS	103	Technical Physics I with Laboratory .	3
PS	104	Technical Physics II with Laboratory.	3
Total	Cree	dits	39

# AERONAUTICAL SCIENCE CORE COURSES

AS	121	Private Pilot Operations.	5
ASC	101	Aeronautical Science Success	1
AS	221	Instrument Pilot Operations	3
AS	321	Commercial Pilot Operations	3
AS	309	Aerodynamics	3
AS		Aircraft Performance	
AS	311	Aircraft Engines-Turbine	3
AS	340	Instructional Design in Aviation -OR-	
FA	417	Flight Instructor Rating**	3
AS	350	Domestic and International Navigation	3
AS	356	Systems and Components	3
AS	357	Flight Physiology	3
AS	358	Advanced Avionics	3
AS	387	Crew Resource Management	3
AS	408	Flight Safety	3
AS	420	Flight Technique Analysis	3
WX	201	Survey of Meteorology	3
WX	301	Aviation Weather	3
Total	Cre	dits 5	1

# FLIGHT CORE COURSES\*\*

#### SINGLE-ENGINE FLIGHT TRACK

#### Course Title Credits FA 121 Private Single Flight.....1 221 Instrument Single Flight321 Commercial Single Flight1 FA FA FA 323 Commercial Multi Add On .....1

#### -OR-

#### MULTI-ENGINE FLIGHT TRACK

#### Course Title Credits FA 121 Private Single Flight.....1 122 Private Multi Flight with Laboratory ....1 FA FA 222 Instrument Multi Flight.....1 FA 322 Commercial Multi Flight ......1

#### **Total Credits**

# AIRLINE PILOT SPECIALTY

#### Course Title AS 254 Aviation Legislation -OR-AS 380 Pilot Career Planning and Interviewing . . 1 AS 402 Airline Operations - ÖR-AS 410 Airline Dispatch Operations......3 AS AS 435 Electronic Flight Management Systems ...3 AS FA 420 Airline Flight Crew Techniques and **Total Credits** 26

# COMMERCIAL PILOT SPECIALTY

Course	Title	Credits
AS 254	Aviation Legislation -OR-	
	Aviation Law	3
AS 380	Pilot Career Planning and Interview	ing 1
BA/AES	300/400 level	3
	Minor	9-18
	Electives	1-10
Total Cre	dits	26

#### Credits

4

# MILITARY PILOT SPECIALTY

AS 435 Electronic Flight Systems	3	
SS 340 American Foreign Policy	3	
ROTC		
Electives	4	
Total Credits		
Total Degree Credits		

# AERONAUTICAL SCIENCE NOTES

\*Embry-Riddle courses in the general education categories of Communication Theory and Skills, Computer Science, Humanities, Social Sciences, and Management may be chosen from those listed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified in the Aeronautical Science vertical outline.

COMMUNICATION THEORY AND SKILLS: COM 122, 219, and 221, 222, or 410 COMPUTER SCIENCE: IT 109 or CS 117 or 118 HUMANITIES/SOCIAL SCIENCES: LOWER-LEVEL: HU 140, 141, 142, 143, 144, 145, 146 LOWER-LEVEL: PSY 101 and EC 200, SS 110, 120, 130, 204 or 210 (Military Pilot Specialty may take only PSY 101 and SS 110, 120, or 130.) UPPER-LEVEL: HU/SS 300-400 level or PSY 350 MANAGEMENT:

# BA 201

\*\*El:~b.

\*\*Flight:

Students have a choice of either the Single-Engine Flight Track or Multi-Engine Flight Track. Both result in certification as a Commercial Pilot with Multi-Engine and Instrument ratings. The Single-Engine Flight Track is selected by most students. In this track, single-engine aircraft and flight training devices are used for the majority of training. Students who select this track do so primarily because it will allow certification as a flight instructor sooner, allowing for the opportunity to flight instruct part time while completing their degree. The single-engine track also provides an opportunity to complete the required flight education with reduced flight fees when compared to the Multi-Engine Flight Track.

The Multi-Engine Flight Track emphasizes multi engine aircraft operations. This track is selected by students who do not necessarily desire to attain their flight instructor certificate and prefer to complete their flight education with more multiengine flight time. Students who are in the Multi-Engine Flight Track who wish to attain their Certified Flight Instructor certificate must complete their single-engine add-on to their commercial multi certificate before they can be certified to instruct in single engine-aircraft.

Flight education is a continuous process that normally begins sometime during the student's first year of attendance and will progress until culminating in a multi-engine commercial certificate with an instrument rating. The curriculum is designed to allow students to meet core objectives in a reasonable amount of time.

Various factors influence students' progress. These factors include student academic preparation, student availability, student determination and dedication, the availability of aircraft and instructor pilots, and the cooperation of the weather. Consequently, some students will finish before others. After completing the core curriculum, students may take an additional semester or more to acquire additional advanced certificates and ratings, including those for single-engine commercial, certified flight instructor airplane and instrument and/or they may enroll in the Airline Flight Crew Simulation course.

Refer to page 36 for credit for flight training at other institutions.

Cooperative Education credits may be used as open electives.

# AIRCRAFT DISPATCHER CERTIFICATION PROGRAM

For the student interested in airline flight operations management, Embry-Riddle offers a program to prepare the student for Aircraft Dispatcher certification testing. The FAA awards the Aircraft Dispatcher Airman Certificate to graduates of the approved program after the successful completion of a standardized written examination and a practical test.

Licensed dispatchers are employed by airlines to manage the ground-based tasks vital to a successful airline flight. Dispatchers share responsibility with the captain for preflight planning and preparation of the dispatch release, and they are included in the decision loop on equipment failures, weather variations, or traffic delays for monitoring the progress of the flight, issuing safety-of-flight information to the crew, and canceling or redispatching the flight.

To carry out these tasks properly, dispatchers must be knowledgeable in aircraft performance capabilities, meteorology, operating regulations, air traffic control, and instrument flight procedures. They must also be able to make sound decisions that incorporate the company's economic and scheduling considerations.

# CERTIFICATION REQUIREMENTS

The Aircraft Dispatcher Certification program is available at the Daytona Beach campus. Dispatcher preparation is based on the successful completion of the following Aeronautical Science courses and the applicable prerequisites.

Cour	rse	Title	Credits
AS	221	Instrument Pilot Operations	3
AS	321	Commercial Pilot Operations	3
AS	310	Aircraft Performance	3
AS	410	Airline Dispatch Operations*	3
AT	300	ATC in the National Aerospace Syste	m3
WX	201	Survey of Meteorology	3
WX	301	Aviation Weather	3
Tota	l Cre	dits	21

\* AS 410 serves as the capstone course for the Aircraft Dispatcher program. Students cannot enroll in this class until they have completed and passed all other required Aeronautical Science courses for the Aircraft Dispatcher Program. Students must be 21 years of age to take this examination.

This program is offered in the pursuit of a degree and not as separate training. Qualification for FAA testing normally requires a minimum of six semesters of instruction. To receive credit for any of the courses listed above toward the Aircraft Dispatcher certification program, the student must sign up in each required course, maintain a record of 100 percent attendance throughout each course, and obtain a grade of at least 70 percent. For more information, contact the Aeronautical Science Department.

# Aeronautics

**Bachelor of Science** 

The Aeronautics degree is designed specifically for students who work, have worked, or desire to work in aviation-related careers. For students with existing aviation-related knowledge and skills, this degree acknowledges a student's valuable acquired experience through the award of advance standing priorlearning credit. The curriculum then builds on those skills and knowledge. The program also provides an opportunity for those students new to aviation to acquire aviationspecific knowledge through aviation-related coursework. This combination of a student's aviation learning, aviation courses, business, computer science, economics, humanities, communications, social sciences, mathematics, and physical sciences, along with professional development elective courses and a minor course of study will prepare graduates for a career in an aviation-related field.

# AVIATION AREA OF CONCENTRATION

The Aviation Area of Concentration is the degree component that lets students select courses from various aviation-related fields. In addition, the AOC portion of the degree is where credit for prior aviation learning is applied. Thirty-six hours of credit are needed to satisfy the requirements of this portion of the Aeronautics degree. All or part of the credit needed for this degree requirement may be awarded based on prior aviation training or experience. To complete the AOC, in addition to any prior learning credit, students may select from courses in Aeronautical Science,

Flight, Air Traffic Management, Safety (aviation-related), Aerospace Electronics, Applied Meteorology (aviation-related), Aviation Maintenance Science, Space Studies, or Homeland Security.

# EVIDENCE OF PRIOR AVIATION LEARNING

Applicants who qualify for admission to and matriculate in the degree program may be eligible for credit for prior learning. Applicants must be able to prove competence in an aviation occupation with authentic documentary evidence. Training and experience in closely related occupations can be combined.

Just as official transcripts are required to transfer credit from one university to another, original or authenticated documentation of prior learning from professional training and experience must be presented to qualify for award of Aviation Area of Concentration credit. Documentary evidence must be from objective third-party sources and must clearly describe the applicant's professional training, duties, and achievements in detail. Advanced standing credit will be awarded in accordance with the applicable Embry-Riddle Aeronautical University Curriculum Manual.

# DUPLICATE CREDIT

Many Embry-Riddle courses are designed to teach the same skills and knowledge that Aeronautics students have acquired through experience and training. Students who com-

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# Academic Programs at the Daytona Beach Campus

plete courses in the same aviation specialty for which they were granted Aviation Area of Concentration credit would be duplicating coverage of the same subject matter. Credit for completion of such courses will not be applied to degree requirements. Credit for prior learning granted in the Aeronautics degree program may not be transferable to any other Embry-Riddle degree program.

# Minor

Students must select and complete one minor field of study. Total credits within the minor will vary depending on which minor is chosen. Students typically select a minor that will enhance their aviation career. Courses required for the minor field of study may be used to fill Area of Concentration, Professional Development, or Open Elective degree requirements. See Minor Courses of Study in this catalog.

# AERONAUTICS CURRICULUM

The curriculum to be followed by each student will vary depending on any AOC prior learning or transfer credits granted.

# CURRICULUM

Course Title	Credits
Aviation Area of Concentration	36
Advance standing credit and/or nonduplicating	5
credit from AEL, AMS, AS, AT, FA, SF, SP, or	
WX courses.	
Communication Theory and Skills*	9
Humanities/Social Sciences*	12
Lower-Level Humanities Elective	3
Lower-Level Social Sciences Elective	
(PSY 220 and/or Lower-Level SS)	6
Upper-Level HU or SS Elective	3
Computer Science Elective	
Mathematics**	6

		lgebra or Higher-Level Mathematics3 College Mathematics for Aviation II -OR-
MA 2		Business Statistics -OR-
		Higher-Level Mathematics
Physi	ical S	Sciences**6
2		Physical and Life Sciences Elective
		One course must include a laboratory.
Progr	am S	Support
AS	254	Aviation Legislation
AS	405	Aviation Law
		Principles of Management -OR-
		Financial Accounting
		An Economic Survey -OR-
		Microeconomics -OR-
EC	211	Macroeconomics
Profe	ssio	nal Development Electives
Select	fror	n Upper-Division (300-400) courses in AEL,
		AT, BA, CS, EC, HS, IT, LÉT, SF, SP, STG, WX
Open	Ele	ctives

#### TOTAL DEGREE CREDITS

\* Embry-Riddle courses in the general education categories of Communication Theory and Skills, Humanities, and Social Sciences may be chosen from those listed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified in the Aeronautics vertical outline. Other courses may also be used with permission of the undergraduate program coordinator.

## COMMUNICATION THEORY AND SKILLS

COM 122, 219, 221, 222
Humanities
HU 140 to HU 146
Social Sciences
LOWER-LEVEL: 100-200 Lev

LOWER-LEVEL: 100-200 Level UPPER-LEVEL: 300-400 Level HF 300, PSY 350

Dependent on the amount of upper-level Aviation Area of Concentration credit applied, some of the open or Communication/Humanities/Social Sciences electives in the B.S. degree may have to be 300-400 level courses to satisfy the graduation requirement of 39 credits of upper-level courses.

Cooperative Education credits may be used as open electives; however, assignments may not be in the student's occupational specialty.

\*\* Students need to ascertain Mathematics and Physical Science pre/corequisites that are required for other courses. For example, PS 103/4 and MA 112 are required for many upper-division AS and WX courses.

# Aerospace Electronics

**Bachelor of Science** 

The Aerospace Electronics degree program is designed to provide the requisite knowledge required to excel in the field of aerospace electronics in support of aerospace vehicles and systems. The general education requirements include mathematics, science, communications, and other applicable subjects. This balanced approach to education enables the graduate to apply techniques of critical thinking and problem-solving to a logical result in challenging situations. The primary focus of the degree program is entry positions in Commercial Off-The-Shelf Systems (COTS) development, Test and Evaluation, and Integrated Logistics Support (ILS) with aerospace electronics manufacturers, aircraft manufacturers, and related space industries.

# Admissions Requirements

Students entering this program should have a basic background in math, physics, and chemistry. College Algebra and Trigonometry are the entry-level math courses. Students wishing to strengthen their background in math and the basic sciences before enrolling in the prescribed courses should contact the department chairman or the program coordinator for guidance.

Several courses in each academic year have prerequisites and/or corequisites. Check the course description section at the back of this catalog before registering for classes to ensure requisite sequencing.

# DEGREE REQUIREMENTS

The Bachelor of Science in Aerospace Electronics requires successful completion of 120 credits as outlined in the following course list. A minimum cumulative grade point average of 2.00 is required of all aerospace electronic related courses.

# Suggested Program of Study

#### **FRESHMAN YEAR**

Cour	se	Title	Credits
COM	[122	English Composition and Literature.	3
DET	111	Engineering Drawing	2
EC	200	An Economic Survey	3
EL		Direct and Alternating Current	
		Fundamentals and Circuit Analysis	4
EL	108	Direct and Alternating Current	
		Laboratory	1
HU		Lower-Level Humanities*	
MA	145	College Algebra and Trigonometry	5
MA	241	Calculus and Analytic Geometry	4
PS		Basic Chemistry.	
PS	150	Physics I for Engineers	3
Total	Cre	dits	31

#### SOPHOMORE YEAR

Title Course

Cour	se	Title	Credits
CS	223	Scientific Programming in C	3
EL		Microelectronics Fundamentals	
		and Circuit Analysis	4
EL	204	Microelectronics Laboratory	1
EL	212	Digital Circuit Systems Analysis	4
EL	213	Digital Circuits Laboratory	1
EL	307	Microprocessor Systems	3
EL	308	Microprocessor Systems Laboratory .	1
MA	242	Calculus and Analytic Geometry	4
MA	245	Applied Differential Equations	3
PS	160	Physics II for Engineers	3
PS	250	Physics III for Engineers	3
PS	253	Physics Laboratory for Engineers	1
Total	Cree	dits	31

#### JUNIOR YEAR

Course	Title	Credits
AEL 315	Linear Systems and Signals Analysis	3
AEL 316	Elements of Engineering Design and	
	Laboratory Procedures	3
AEL 321	Advanced Communications	
	Systems Analysis	4
AEL 322	Advanced Communications,	
	Microwave and Control Laboratory	
	Systems Analysis.	1
	Applied Control System Analysis	2
AEL 324	Microwave and Radar System	
	Analysis	2
	Speech	
COM 221	Technical Report Writing	3
HF 300	Human Factors I:	
	Principles and Fundamentals	3
HU/SS	Upper-Level Elective	3
MET 200	Machine Shop Laboratory	1
PSY 220	Introduction to Psychology	3
Total Cre	dits	31

## SENIOR YEAR

Course	Title	Credits
	Open Elective (Upper Level)	3
AEL 411	Communications and Navigation	
	Systems	3
AEL 412	Surveillance and Control Systems	3
AEL 413	Satellite Communications and	
	Navigation Systems	4
	System Test Evaluation Laboratory	
AEL 421	Aerospace Electronic System	
	Integration and Design	
AEL 422	Integrated Logistics Support	3
	Test System Development Laboratory	
AEL 424	Senior Project	3
MA 412	Probability and Statistics	3
Total Cre	dits	27
TOTAL DE	gree Credits	120

#### \* HUMANITIES

HU: 140, 141, 142, 143, 144, 145, 146

# Air Traffic Management

**Bachelor of Science** 

The Applied Aviation Sciences Department offers a Bachelor of Science degree in Air Traffic Management (ATM). This degree is designed for students whose goal is to become an air traffic controller or seek employment in a related industry. The academic courses are designed to provide exposure to procedures and operations consistent with those found in Federal Aviation Administration (FAA) air traffic control facilities. The ATM curriculum provides the knowledge and foundation designated by the FAA for eventual student entry into the FAA Academy where they will be integrated with graduates of other Collegiate Training Initiative (CTI) schools for additional air traffic control training.

# DEGREE REQUIREMENTS

The Bachelor of Science degree in Air Traffic Management requires successful completion of a minimum of 120 credit hours, normally completed in eight semesters. This includes a minor course of study as approved by the Applied Aviation Sciences Department.

# SUGGESTED PROGRAM OF STUDY

Students should be aware that several courses in each academic year might have prerequisites and/or corequisites. Please check the course descriptions in this catalog before registering for classes to ensure requisite sequencing.

#### FRESHMAN YEAR

Cour	rse	Title	Credits
		Communication Theory and Skills	6
		Computer Science Elective*	3
		Physical Science with Laboratory	3
		Lower-Level Humanities	3
AS	120	Principles of Aeronautical Science - OR-	
AS	121	Private Pilot Operations	5
MA	111	College Mathematics for Aviation I	3
MA	112	College Mathematics for Aviation II.	3
WX	201		3
		Open Elective	3
Tota	l Cre	dits	32
SOPHOMORE YEAR			
Cou	rse	Title	Credits
Cou	rse	Communication Theory and Skills	3
Cou	rse	Communication Theory and Skills Physical Science*	3
		Communication Theory and Skills Physical Science*	3 3 3
AT	300	Communication Theory and Skills Physical Science <sup>*</sup> Lower-Level Humanities Air Traffic Management I	· · · · 3 · · · · 3 · · · · 3 · · · · 3
AT AT	300 302	Communication Theory and Skills Physical Science*	3 3 3 3 3
AT AT BA	300 302 201	Communication Theory and Skills Physical Science*	· · · · 3 · · · · 3 · · · · 3 · · · · 3 · · · ·
AT AT BA EC	300 302 201 200	Communication Theory and Skills Physical Science*	· · · · 3 · · · · 3 · · · · 3 · · · · 3 · · · ·
AT AT BA EC PSY	300 302 201 200 220	Communication Theory and Skills Physical Science* Lower-Level Humanities Air Traffic Management I Air Traffic Management II Principles of Management An Economic Survey Introduction to Psychology	3 3 3 3 3 3 3 3 3
AT AT BA EC	300 302 201 200 220	Communication Theory and Skills Physical Science* Lower-Level Humanities Air Traffic Management I Air Traffic Management II Principles of Management An Economic Survey Introduction to Psychology Introduction to Health, Occupational	3 3 3 3 3 3 3 3 3
AT AT BA EC PSY	300 302 201 200 220	Communication Theory and Skills Physical Science* Lower-Level Humanities Air Traffic Management I Air Traffic Management II Principles of Management An Economic Survey Introduction to Psychology	3 3 3 3 3 3 3 3 3
AT AT BA EC PSY	300 302 201 200 220 201	Communication Theory and Skills Physical Science* Lower-Level Humanities Air Traffic Management I Air Traffic Management II Principles of Management An Economic Survey Introduction to Psychology Introduction to Health, Occupational Safety, and Transportation -OR-	····3 ···3 ···3 ···3 ···3 ···3 ···3 ··
AT AT BA EC PSY SF	300 302 201 200 220 201 210	Communication Theory and Skills Physical Science* Lower-Level Humanities Air Traffic Management I Air Traffic Management II Principles of Management An Economic Survey Introduction to Psychology Introduction to Health, Occupational Safety, and Transportation	·····3 ····3 ····3 ····3 ····3 ····3 ····3 ····3 ····3 ····3

#### JUNIOR YEAR

Cour	se	Title	Credits
AT	305	Air Traffic Management III	3
		VFR Control Tower	
AT	401	Air Traffic Management IV	3
BA	314	Human Resource Management	3
		300-400 Level Elective	
		Upper-Level Open Elective	6
SF	462	Health, Safety, and Aviation Law	
		Aviation Weather	
		Open Elective	3
Total	Cre	dits	30

#### SENIOR YEAR

Course	Title	Credits
AT 405	Air Traffic Management V	3
AT 406	Non Radar Air Traffic Control	3
	courses necessary to complete one	
minor cou	urse of study approved by the	
Applied A	Aviation Sciences Department	15-21
Open Ele	ctives to meet the requirement of	
40 hours	of upper-level courses and 120 total	
hours to a	complete the degree	. 9-15

#### TOTAL DEGREE CREDITS

120

\* Embry-Riddle courses in the general education categories of Communication Theory and Skills, Computer Science, Humanities, Social Sciences, Mathematics, and Physical Science may be chosen from those listed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified in the Air Traffic Management vertical outline.

<u>COMMUNICATION THEORY AND SKILLS:</u> COM: 122, 219, 221, 222, 410

Humanities:

140, 141, 142, 143, 144, 145, 362

SOCIAL SCIENCES:

**UPPER-LEVEL** 

SS: 310, 325, 350, 351, 352

#### **PHYSICAL SCIENCE:**

PS: 101, 102, 103, 104, 105, 106, 107, 108, 111, 112, 142, 208, 215, 219, 240, 301, 302, 303, 304, 306, 308, 309, 310, 411, 312, 313, 320, 400, 401, 403, 405, 408, 410, 412, 414 (1 laboratory)

**MATHEMATICS** 

MA: 111, 112, 140, 142, 241; MA 145, 241

Students enrolled in the Army, Navy, or Air Force ROTC program may substitute MY, NSC, or AF courses for open elective courses.

# Applied Meteorology

**Bachelor of Science** 

The Applied Aviation Sciences Department offers a Bachelor of Science degree in Applied Meteorology. This program offers those students with a passion for weather the opportunity to study, observe, and explore atmospheric phenomena ranging from global climate to tornadoes in our new state-of-theart Weather Center and computer-equipped classrooms. Besides mastering the essentials of meteorology, students will acquire the communication skills necessary to translate information about complex atmospheric features into the practical language of operational decision makers. The program aims to produce graduates with the necessary knowledge, analytical skills, and operational expertise to add value to any decision impacted by the weather. Graduates will be competitive for jobs ranging from the aviation and aerospace industry to radio and television to business and government/military operations of the 21st century.

# DEGREE REQUIREMENTS

The Bachelor of Science degree in Applied Meteorology requires successful completion of a minimum of 120 credit hours and can be attained in eight semesters. Students pursuing the Applied Meteorology degree will select one of four areas of concentration (AOC) from among Flight Weather, Media Weather, Commercial Weather, or the calculus-based Research AOC, generally by the end of their fourth semester. All students must complete the general education courses, Applied Meteorology core courses, and the required courses for one AOC in order to graduate with a Bachelor of Science in Applied Meteorology. Students wishing to become eligible for employment with the U.S. government as a meteorologist must complete the Research AOC in order to meet U.S. Office of Personnel Management Qualification Standards. All students entering the Applied Meteorology program must take a math placement test or show suitable advanced placement. Because many courses have prerequisites or corequisites, students in the Research AOC should prepare to begin the required calculus sequence as soon as they are eligible.

# BACHELOR OF SCIENCE DEGREE IN APPLIED METEOROLOGY

	Hours
General Education	36
(37 Research AOC)	
Applied Meteorology Core	46
Area of Concentration	30
Open Electives	8
TOTAL DEGREE CREDITS	120

# UNIVERSITY GENERAL EDUCATION

Course	Title	Credits
	Communication Theory and Skills .	9
	Computer Science Elective	3
	Lower-Level Humanities (HU)	3
	Lower-Level Social Sciences (SS)	6
	Upper-Level HU/SS Elective	3
Course	Title	Credits
	Math (see specific AOC)	6 or 7
	Physics (see specific AOC)	6
Total Credits 36		5 or 37

# APPLIED METEOROLOGY CORE

Cou	rse	Title	Credits
UNI	V 101	College Success	1
CE A	AS	Co-op/Internship or	
		Approved Electives	6
PS	105	General Chemistry	4
WX	201	Survey of Meteorology	3
WX	261	Applied Climatology	3
WX		Weather Information Systems	
WX	353	Thermodynamics of the Atmosphere	3
WX	354	Dynamics of the Atmosphere	3
WX	355	Weather Analysis	5
WX	365	Satellite & Radar Weather	
		Interpretation	3
WX	390	Atmospheric Physics	3
WX	427	Forecasting Techniques	3
WX		Statistical Applications for	
		Meteorological Data Analysis	3
WX	457	Weather Operations Seminar	3
Total Cre		dits	46

# FLIGHT WEATHER AREA OF CONCENTRATION

Cou	rse	Title	Credits
AS	121	Private Pilot Operations	5
AS	221	Instrument Pilot Operations*	3
AS	321	Commercial Pilot Óperations*	3
AS	272	Advanced Aeronautics*	3
AS	309	Aerodynamics	3
AS	310	Aircraft Performance *	3
AS	410	Air Dispatch Operations*	3
AT	300	Air Traffic Management I*	3
WX	364	Weather for Aircrews	3
		Applied Meteorology Elective	2
Tota	l Cre	dits	30

#### Total Credits

Indicates courses in the Aircraft Dispatcher Certification Program.

# MEDIA WEATHER AREA OF CONCENTRATION

Course	Title	Credits
AS 120	Principles of Aviation Science	3
COM 225	Science & Technology Communication	ıs3
	Introduction to Media	
COM 265	Introduction to News Writing	3
COM 320	Communications Law & Ethics	3
COM 330	Environmental Communications	3
HU 330	Values and Ethics -OR-	
COM 360	Media Relations I	3
WX 202	Current Weather Discussion	1
WX 280	Introduction to TV Weathercasting	3
	Applied Meteorology Electives	5
Total Cree	dits	30

# COMMERCIAL WEATHER AREA OF CONCENTRATION

Cour	se	Title	Credits
AS	120	Principles of Aviation Science	3
BA		Advanced Computer Based Systems.	
BA	311	Marketing	3
BA	325	Social Responsibility and	
		Ethics Management	3
EC	210	Microeconomics	
EC	420	Economics of Air Transportation	3
		Applied Meteorology Electives	
		Business Electives	6
Total	Cre	dits	30

# RESEARCH AREA OF CONCENTRATION

Cour	se	Title	Credits
AS	120	Principles of Aviation Science	3
CS	225	Computer Science II	4
MA	242	Calculus and Analytic Geometry II	4
MA		Calculus and Analytic Geometry III .	
MA	245	Applied Differential Equations	3
PS	216	Physics I Laboratory -OR-	
PS		Physics III Laboratory	1
PS	219	Physics III.	3
WX	420	Advanced Atmospheric Thermodyna	mics3
WX	490	Advanced Dynamic Meteorology I	3
WX	491	Advanced Dynamic Meteorology II .	3
Total	Cree	dits	31

# SUGGESTED PROGRAM OF STUDY

A word about math and physics requirements: meteorology is an application of math and physics to the sea of air in which we live. Students who wish to pursue graduate studies in the atmospheric sciences or who want to work for the federal government or who are on U.S. Air Force ROTC scholarship should enroll in the Research AOC and complete the math sequence MA 140, MA 241, MA 242, MA 243, and MA 245 by their junior year. Those students should also enroll in the physics sequence PS 215, PS 216, and PS 208. Students pursuing other AOCs should complete MA 111 and MA 112, and PS 103 and PS 104 with labs. Students who are undecided about their futures should begin with MA 140 and PS 215.

# FLIGHT WEATHER AREA OF CONCENTRATION

Students interested in providing weather services to the aviation/aerospace industry should follow this course of study during their last two years. The mix of courses will enhance the student's ability to communicate with people who build, fly, and control airplanes and flight activities. Courses designated with (\*) are required for the Aircraft Dispatcher Certification Program.

#### FRESHMAN YEAR

Cours	se	Title	Credit
UNIV	/ 101	College Success	1
AS	121	Private Pilot Operations.	5
		English Composition and Literature.	
		Speech	
HU	14X	Lower-Level Humanities	3
		College Mathematics for Aviation I	
MA	112	College Mathematics for Aviation II	3
PS	103	Technical Physics I	3
PS	103L	Technical Physics I Laboratory	0
SS		Lower-Level Social Sciences Élective.	3
WX	201	Survey of Meteorology	3
Total	Cree	dits	30

# SOPHOMORE YEAR

Cour	se	Title	Credits
AS	221	Instrument Pilot Operations	3
COM	[221	Technical Report Writing	
EGR	115	Introduction to Computing	
		for Engineers	
SS		Social Sciences Elective	
PS	104	Technical Physics II.	3
PS	104L	Technical Physics II Laboratory	0
WX	202	Current Weather Discussion	1
WX	261	Applied Climatology	3
WX	270	Weather Information Systems	3
WX	301	Aviation Weather	3
WX	353	Thermodynamics of the Atmosphere .	3
WX	354	Dynamics of the Atmosphere	3
Total Credits			31

#### JUNIOR YEAR

Cour	se	Title	Credits
AS	309	Basic Aerodynamics	3
AS	321	Commercial Pilot Operations	3
AT	300	Air Traffic Management.	3
PS	105	General Chemistry	4
WX	355	Weather Analysis	5
WX		Satellite and Kadar Weather	
		Interpretation	3
WX	390	Atmospheric Physics	3
WX	422	Statistical Application for Meteorolog	y3
		Open Electives	
Total	Cre	dits	30

#### SENIOR YEAR

Credits

Course	5	Title	Credit
AS 3	510	Aircraft Performance*	3
		Air Dispatch Operations*	
CE AA	S	Co-op/Internship	6
HU/SS	5	Upper-Level Humanities or	
		Social Sciences Elective	3
WX 3	64	Weather for Aircrews	3
WX 4	27	Forecasting Techniques	3
WX 4	57	Weather Operations Seminar	3
		Open Electives	6
Total C	Cree	dits	30

# COMMERCIAL WEATHER AREA OF CONCENTRATION

To meet the growing demand for meteorologists by the private sector, students who select this option will be prepared to provide meteorological expertise to a wide range of weather-dependent industries. By selecting appropriate courses in this highly flexible AOC, students can also complete a Minor in Business Administration.

## FRESHMAN YEAR

Course	Title	Credits
UNIV101	College Success	1
AS 120	Principles of Aeronautical Science	3
COM122	English Composition and Literature.	3
COM 219	Speech	3
HU 14X	Lower-Level Humanities	3
MA 111	College Mathematics for Aviation I	3
MA 112	College Mathematics for Aviation II .	3

PS SS WX	103L 201	Technical Physics I Technical Physics I Laboratory Lower-Level Social Sciences Elective. Survey of Meteorology Applied Climatology	0 3 3
Total	Cre	dits	31
SOPI	HON	IORE YEAR	
Cour	se	Title	Credits

BA	221	Advanced Computer Based Systems3	
COM	221	Technical Report Writing	
EC	210	Microeconomics (COM AOC) -OR-	
SS		Social Sciences Elective	
EGR	115	Introduction to Computing for Engineers 3	
PS		Technical Physics II	
PS	104L	Technical Physics II Laboratory0	
		General Chemistry4	
WX	270	Weather Information Systems	
WX	353	Thermodynamics of the Atmosphere3	
WX	365	Satellite and Radar Weather	
		Interpretation	
			_

#### **Total Credits**

#### JUNIOR YEAR

Cour	se	Title	Credits
BA	311	Marketing	3
		Upper-Level Humanities -OR-	
		Social Sciences Elective	3
WX	202	Current Weather Discussion	1
WX	355	Weather Analysis	5
		Atmospheric Physics	
WX	354	Dynamics of the Atmosphere	3
WX	422	Statistical Applications for Meteorolog	y3
		Applied Meteorology Electives	6
		Business Elective	3
Total	Cree	dits	30

## SENIOR YEAR

Cour	se	Title	Credits
BA	325	Social Responsibility and Ethics	
		in Management	
CE	AA	5 Co-op/Ĭnternship	6
EC	420	Economics of Air Transportation	3
WX	427	Forecasting Techniques	3
WX	457	Weather Operations Seminar	3
		Applied Meteorology Electives	6
		Business Elective	3
		Open Electives	4
Total Credits			31

28

# MEDIA WEATHER AREA OF CONCENTRATION

Students interested in journalism, radio, and television will combine meteorology with studies in verbal and written communications. Internships may be conducted with newspapers, radio stations, or network/cable television channels.

#### FRESHMAN YEAR

Cour	se	Title	Credit
UNIV	/101	College Success	1
		Principles of Aeronautical Science	
COM	122	English Composition and Literature	3
COM	219	Speech	3
HU	14X	Lower-Level Humanities	3
MA	111	College Mathematics for Aviation I	3
		College Mathematics for Aviation II	
PS	103	Technical Physics I	3
PS	103I	L Technical Physics I Laboratory	0
SS		Lower-Level Social Sciences Elective	3
WX	201	Survey of Meteorology	3
		Applied Climatology	
Total	Cree	dits	31

#### SOPHOMORE YEAR

Cour	se	Title	Credits
COM	221	Technical Report Writing	3
COM	260	Introduction to Media	3
		Microeconomics (COM AOC) -OR-	
SS		Social Sciences Elective	3
EGR	115	Introduction to Computing	
		for Engineers	3
PS	104	Technical Physics II.	3
PS	104I	Technical Physics II Laboratory	0
PS	105	General Chemistry	4
WX	270	Weather Information Systems	3
WX	353	Thermodynamics of the Atmosphere .	3
WX		Satellite and Radar Weather	
		Interpretation	3
WX	422	Statistical Applications for Meteorolog	
Total	Cree	dits	31

## JUNIOR YEAR

Cour	se	Title	Credits
COM	1265	Introduction to News Writing	3
		Media Relations I	
HU	330	Values and Ethics	3
SS		Social Science Elective	3
WX	202	Current Weather Discussion	1
WX	280	Introduction to TV Weathercasting	3
		Dynamics of the Atmosphere	

WX355Weather Analysis5WX390Atmospheric Physics3Open Electives3
Total Credits 30
SENIOR YEAR
Course Title Credits
CE AAS Co-op/Internship6
COM225 Science and Technology
Communications3
COM 330 Environmental Communications3
WX 422 Statistical Applications for Meteorology3
WX 427 Forecasting Techniques
WX 457 Weather Operations Seminar
Applied Meteorology Electives4
Open Elective
Total Credits 30

RESEARCH AREA OF CONCENTRATION

Students wishing to go to graduate school in Meteorology, or wishing to become eligible for Meteorology employment with the U.S. government, or who are on ROTC Meteorology scholarships should choose the Research Area of Concentration. Students who choose the Research Area of Concentration should follow the four-year plan outlined below:

#### FRESHMAN YEAR

Cour	se	Title	Credits
UNI	/ 101	College Success Seminar	1
AS	120	Principles of Aeronautical Science	3
COM	122	English Composition and Literature.	3
MA	142	Trigonometry	3
MA	241	Calculus and Analytical Geometry	4
MA	242	Calculus and Analytical Geometry II	4
PS	105	General Chemistry	4
PS		Physics I	
PS	216	Physics I Laboratory	1
WX	201	Survey of Meteorology	3
WX		Applied Climatology	
Total	Cree	dits	29

#### SOPHOMORE YEAR

Cour	se	Title	Credits
COM	219	Speech	3
COM	221	Technical Report Writing	3
EGR	115	Introduction to Computing	
		for Engineers	3
HU	14X	Lower-Level Humanities	3
SS		Social Sciences Elective	3
MA	243	Calculus and Analytical Geometry III	4
		Physics II	

PS WX WX	353	Physics III Thermodynamics of the Atmosphere Dynamics of the Atmosphere	3
Total	Cree	dits	31
JUNI	OR <sup>·</sup>	YEAR	
Cours	se	Title	Credits
CS MA SS WX WX	<ul> <li>225</li> <li>245</li> <li>270</li> <li>420</li> <li>355</li> </ul>	Co-op/Internship Computer Science II Applied Differential Equations Social Sciences Elective Weather Information Systems Advanced Atmospheric Thermodynamics Weather Analysis Satellite and Radar Weather Interpretation	4 3 3 3 3
Total	Cree	dits	30
SENI	OR	YEAR	
Cours	se	Title	Credits
WX WX	Low 390 422 427 457 490	Upper-Level Elective ver-Level Elective Atmospheric Physics Statistical Applications for Meteorolog Forecasting Techniques Weather Operations Seminar Dynamic Meteorology I Open Electives.	3 3 gy3 3 3 3

#### **Total Credits**

#### TOTAL DEGREE CREDITS

30

120

# Aviation Maintenance Science

**Bachelor of Science** 

At the heart of every flight of every commercial, private, or military aircraft is the work of the professional aviation maintenance expert. Without the devotion of these very special people, the air travel system would cease to function. The demand for degreed aircraft maintenance specialists in the aviation/aerospace world has never been greater than it is today. The Aviation Maintenance Science (AMS) program at Embry-Riddle produces these aviation professionals, the best in the world.

The Aviation Maintenance Science degree is composed of 120 credit hours, which includes credit for the Airframe and Powerplant (A&P) certification. The degree has several options called areas of concentration (AOC). You can choose AOCs in Maintenance Management, Aerospace Electronics, Flight, or Information Technology. The chart below shows a distribution of the

credits for each of those AOCs.

The Maintenance Management AOC is optimized for those who wish to use their maintenance skills as a platform for advancing into a management position in one of the many aviation maintenance environments. The Flight AOC is for those students who wish to combine a maintenance background with the qualifications of a commercial pilot. The Information Technology AOC is designed for the student who is interested in the application of computer technology to aviation technical support operations. The Aerospace Electronics AOC is for students who have an interest in combining their aerospace electronics skills with the A&P certificate or a minor course of study that supports their career objectives. The Maintenance Management area of concentration and the Aerospace Electronics area of concentration are accredited by Aviation Accreditation Board

	Maintenance Management	Aerospace Electronics	Flight	Information Technology
General Education Core	36	36	36	36
Common Core	12	12	12	12
Area of Concentration	42	47	42	42
A&P Certification <sup>1</sup>	24	*	24	24
Open Electives <sup>2</sup>	6	*	6	6
Total	120	120	120	120

<sup>1</sup> Forty-eight hours of credit will be awarded for the A&P certification and entered on the student's transcript. Up to 24 of those credit hours may be applied toward this degree. <sup>2</sup> Open electives must be taken at the 300-400 level for some AOCs to meet the upper-level requirement.

\* Any minor or the A&P certification can be used to satisfy this requirement for the Aerospace Electronics track only. The balance of the credit hours are to be used as electives. A total of 40 upper-level credits are required to meet graduation requirements.

International (AABI, formerly Council on Aviation Accreditation), 3410 Skyway Drive, Auburn, AL 86830, telephone: (334)-844-2431.

The A&P certification is required for graduation from the program in all the areas of concentration except Aerospace Electronics. The Aerospace Electronics AOC allows the student to complete a minor course of study in place of the A&P certification.

The courses taken in the Aviation Maintenance Science Department lead to a student being approved for the A&P certification exams. Credit will be granted for any student who enters the University already in possession of the A&P certification.

International certification, which may be equivalent to the Airframe and Powerplant certification, will be evaluated on a case-bycase basis and, if approved, may be used for academic credit.

# GENERAL EDUCATION CORE

Course COM 122 COM XXX	Title     Creation       English Composition & Literature     K*	3
	Introduction to Computers and Application - OR -	
EGR 115	Introduction to Computing for Engineers* - OR -	*
CS 223 HU	Scientific Programming in C**	3 3
HU/SS	Upper-Level Humanities or Social Sciences	3
MA 111	College Mathematics for Aviation I	
MA 112	College Mathematics for Aviation II	3
PS 103	Technical Physics I	3
PS 104	Technical Physics II	3
PSY 220	Intro to Psychology Lower-Level SS Elective	3
Total Cre		-
Iotal Cle	uits 5	U

\* The recommended courses are COM 219 and COM 221

\*\* The Aerospace Electronics AOC requires EGR 115 or CS 223

# COMMON CORE CURRICULUM

# CourseTitleCreditsBA201Principles of Management......3

Students must also choose two courses from the following list, adding up to at least six credits.

AMS	380	Rad	io C	om	nm	uı	nic	at	ic	n	Τ	h	ec	ory	y a	an	d				
		App	olica	tio	n									•				• •	 • •		2
AMS	384	Gen	eral	Av	ia	tic	n	A	vi	01	ni	cs	S	ys	ste	en	۱S				
		Inte	grat	ion	ι.														 		4
AMS	388	Air	Tran	sp	or	t A	wi	01	ni	cs	S	y	ste	en	ns						
		Line	e Ma	int	er	nar	nce	2.											 		6
AS	3XX	OR	4XX																 		3
AT	3XX	OR	4XX																 		3
BA	3XX	OR	4XX																 		3
FA	3XX	OR	4XX																 		3
HF	3XX	OR	4XX																 		3
SF	3XX	OR	4XX																 		3
WX	3XX																				
Total	Cred	lits																		1	2

# AVIATION MAINTENANCE SCIENCE COURSES (LEADING TO A&P CERTIFICATION)

Course	Title	Credits
AMS 101	Maintenance Mathematics & Physics .	2
	Aircraft Familiarization	
	Tools, Materials, and Processes	
AMS 111	Regulations, Documentation, & Drawin	ng .3
AMS 112	Fundamentals of Electricity	3
AMS 121	Electrical Power Systems I	2
	Metallic Structures	
	Instruments and Avionics	
AMS 131	Composite Materials and Processes	2
AMS 132	Aircraft Systems I	2
AMS 133	Aircraft Systems II	2
AMS 241	Classic Structures	2
	Airframe Maintenance Practices	
AMS 243	Electrical Power Systems II	2
AMS 251	Introduction to Powerplants	2
AMS 252	Fuel, Air, and Exhaust Systems	2
AMS 253	Powerplant Electrical Systems	2
AMS 361	Turbine Engines	3
	Propeller Systems	

AMS 371 I AMS 372 I	Powerplant Inspection and Line Maint Engine Maintenance, Repair,	3
â	and Overhaul	3
Total Cred	its	48
TOTAL CREE	DITS TOWARD DEGREE	24

The courses listed are required in order to qualify for the FAA Airframe and Powerplant certification. The A&P certification is a requirement for degree completion. A total of 24 credit hours will be granted toward the degree program. All 48 credit hours will appear on the student's transcript. Tuition for the AMS courses is less than for the other courses in the degree, and is billed separately from the University block tuition. Contact the AMS program coordinator for additional information.

# MAINTENANCE MANAGEMENT AREA OF CONCENTRATION

Cou	rse	Title	Credits
BA	210	Financial Accounting	3
BA	221	Advanced Computer Based Systems.	3
BA	311	Marketing	3
BA	312	Managerial Accounting	3
BA	317	Organizational Behavior	3
BA	320	Business Information Systems	3
BA	324	Aviation Labor Relations	3
BA	325	Social Responsibility and Ethics in	
		Management	3
BA	390	Business Law	3
BA	419	Aviation Maintenance Management .	3
BA	420	Management of Production	
		and Operations	3
BA	422	Life Cycle Analysis for Systems and	
		Programs in Aviation/Aerospace	
BA		Project Management in Aviation Ops	
MA	222	Business Statistics	3
		Open Electives	6
Tota	l Cre	dits	48

# AEROSPACE ELECTRONICS AREA OF CONCENTRATION

Course	Title	Credits
AEL 311	Airborne Pulse Systems	3
AEL 312	Airborne Communications and	
	Navigation Systems	3
AEL 313	Airborne Electronics Maintenance	
	Operations	2
AEL 401	Airborne Surveillance Systems	3

		Airborne Electronics Systems Integration 3 Advanced Space and Airborne
		Electronics Systems
AEL	404	Airborne Electronics Maintenance
		Operations II2
EGR	120	Engineering Drawing2
EL	107	Direct and Alternating Current
		Fundamentals and Circuit Analysis4
EL	108	Direct and Alternating Current
		Laboratory1
EL	203	Microelectronics Fundamentals and
		Circuit Analysis4
EL	204	Microelectronics Laboratory1
EL	212	Digital Circuit and Systems Analysis4
EL		Digital Circuits Laboratory1
EL	301	Electronic Communication Systems3
EL		Electronic Communications Laboratory 1
EL	303	Pulse Components and
		Circuit Applications2
EL	304	Pulse Circuits Laboratory1
EL		Microprocessor Systems
EL	308	Microprocessor Systems Laboratory1
Open	1 Eleo	ctives
		ng on whether A&P certification track is chosen
or an	othe	r minor course of study)
	-	

## **Total Credits**

48-57

# FLIGHT AREA OF CONCENTRATION

Cou	rse	Title	Credits
AS	121	Private Pilot Operations.	5
AS	221	Instrument Pilot Operations	3
AS	321	Commercial Pilot Ôperations	3
AS	309	Aerodynamics	3
AS	310	Aircraft Performance	3
AS	357	Flight Physiology	3
AS	387	Crew Resource Management	3
AS	402	Airline Operations	3
AS	408	Flight Safety	3
FA	132	Commercial Pilot Flight I	1
FA	133	Commercial Pilot Flight II	1
FA	232	Commercial Pilot Flight III	1
FA	272	Commercial Pilot Flight IV	1
WX	201	Survey of Meteorology	3
ANI	<b>)</b> any	two of the following:	
AS	358	Advanced Avionics	3
AS	350	Domestic and International Navigation	on 3

#### 

# Daytona Beach Campus Academic Programs

# INFORMATION TECHNOLOGY AREA OF CONCENTRATION

Cour	se	Title	Credits
BA	221	Advanced Computer Based Systems.	3
BA		Organizational Behavior	
BA	320	Business Information Systems	3
COM	1411	Publishing on the Internet	3
CS	118	Fundamentals of Computer	
		Programming	3
CS	223	Scientific Programming in C	3
HF		Human-Computer Interaction	
IT	210	Web Page Authoring and Design	3
IT	220	Introduction to Networking	3
IT	310	Web Site Management	3
IT	320	Network Configurations	3
IT	330	Programming for the Web	3
IT	340	WAN Theory and Design	3
		Upper-Division Elective	3
		Open Electives at 300-400 level	6
Total Cre		dits	48

## Homeland Security

**Bachelor of Science** 

Daytona Beach Campus Academic Programs

The Applied Aviation Sciences Department offers a Bachelor of Science degree in Homeland Security that is based on the needs of the United States and its citizens. It combines the University's General Education requirements with a solid core of security courses. This degree allows the student to take maximum advantage of transfer credits and University course offerings to create areas of specialization in which the student has an interest and in which there is a demonstrated need by industry.

The Homeland Security degree is designed for students who have an interest in obtaining a strong foundation in security and safety-related subjects. The goal of the degree is to produce graduates with entry-level skills who can provide security expertise in a variety of transportation and industrial settings, with an emphasis on those entities involved with aviation and aerospace. This program will produce security professionals who are skilled at securing and protecting the critical infrastructure of our nation, states, cities, and municipalities, and protection of the lives and property of its citizens. Graduates of this program will be able to secure industry infrastructure and provide effective planning and response to, and emergency management of, events resulting from acts of terrorism or natural and man-made disasters.

## DEGREE REQUIREMENTS

The Bachelor of Science degree in Homeland Security requires successful completion of a minimum of 120 credit hours and is normally completed in eight semesters.

Students are required to complete 39 hours of General Education courses, 21 credit hours of core security courses, 9 hours of specified electives, 37 credit hours of supporting courses, and 14 hours of general/open electives.

Students transferring into the program who have earned academic credits in criminal justice or who hold law enforcement certification or emergency medical technician (EMT) certification can be granted up to 23 credit hours from the specified elective and general/open elective areas.

Students enrolled in the Air Force, Army, or Navy ROTC program may substitute AF, MY, or NSC courses for open elective courses.

	Hours
General Education	36
Homeland Security Core	21
Specified Electives	9
Supporting Courses	40
General/Ŏpen Electives	14
Total Degree Credits	120

## GENERAL EDUCATION

Cour	se Title	Credits
COM	Communication Skills (122, 219, 221, 222,	410,
	HU 362, 420)	9
	Computer Science Elective	
EC	200 Ân Economic Survey	3
HU	English II (141, 142, 142, 144, 145)	3
HU/S	SS Ŭpper-Level Elective	
	(HU 330:Values and Ethics recommende	d)3
MA	Math Sequence (MA 111 & 112 or 140 & 14	2)6
PS	Physics Sequence (One laboratory required	d)6
PSY	220 Introduction to Psychology	3
Total	Credits	36

## HOMELAND SECURITY CORE COURSES

Cours	se	Title Cre	edits
HS	201	Introduction to Homeland Security	.3
HS	301	Fundamentals of Transportation Security	3
HS	302	Fundamentals of Occupational Security.	. 3
HS	306	Legal and Investigative Issues of Security	73
HS	307	Law Enforcement in Security	. 3
HS	401	Emergency Planning, Response, and	
		Security Management	
HS	402	Security and Risk Analysis	. 3
Total	Cree	dits	21

## SUPPORTING COURSES

Course	Title	Credits
UNIV 10	1 College Success	1
AS 120	Principles of Aeronautical Science	3
BA 201	Principles of Management	3
	Human Factors I: Principles	
	and Fundamentals	3
	Current Issues in America	3
HU 345	Comparative Religions -OR-	
SS 325	International Studies	3
MA 222	Business Statistics	3
PS 101	Chemistry	3
PS 101	LChemistry Lab	0
PS 107	Elements of Biological Science	3
PSY 325	Group Structure and Process	3
SF 201	Introduction to Health, Occupational,	
	and Transportation Safety	3
SF 355	Industrial Hygiene & Toxicology	3
SS 310	Personality Development	3
SS 340	American Foreign Policy	3
Total Cre	dits	40

## SPECIFIED ELECTIVES

BA	408	Airport Management
BA	410	Management of Air Cargo
BA	115	Airline Management
	405	Tran do and Carmon t Ducklama in
BA	425	Trends and Current Problems in
		Air Transportation
SF	210	Introduction to Aerospace Safety3
SF	315	Environmental Compliance and Safety3
SF		Safety Program Management
SF	350	Aircraft Crash and Emergency
		Management
SF	410	Design of Engineering Hazard Controls3
STG	312	Global Crime and Criminal
		Justice Systems
STG	315	Studies in Global Intelligence
STG		Security and Globalization
STG		Studies in Global Intelligence II
SIS	XXX	Choice of any Global Security and
		Intelligence Studies Course
Total	Cre	dits 9

#### Other courses appropriate to the specified elective listing may be authorized by the Program Coordinator of the Homeland Security degree program.

Open Electives	• • • •	•••	•••	••	••	•	••	•	• •	•	•	••	•	••	•	14	
Total Credit Hours																120	

## Suggested Program of Study

#### FRESHMAN YEAR

Cour	se	Title	Credits
		Communication Theory and Skills	3
		Lower-Level Humanities	3
AAS	101	Student Success	1
AS	120	Principles of Aeronautical Science	3
CS		Elective	3
EC	200	An Economic Survey	3
MA	111	College Mathematics for Aviation I	
		-OR-	
MA	140	College Algebra	3
MA	112	College Mathematics for Aviation II	
		-OR-	
MA	140	Trigonometry	3
PS		Chemistry	
PS		Technical Physics I	
Total	Cre	dits	28

#### SOPHOMORE YEAR

001			
Cour	se	Title	Credits
BA	201	Principles of Management	3
COM	[219	Speech	3
		Technical Report Writing	
		Introduction to Homeland Security.	
HS	301	Fundamentals of	
		Transportation Security	3
MA	222	Business Statistics	3
PS	107	Elements of Biological Science	3
PS	104	Technical Physics II.	3
PSY	220	Introduction to Psychology	3
SF		Introduction to Health, Occupational,	
		and Transportation Safety	3
Total	Cre	dits	30
JUNI	OR	YEAR	
~			

Cours	se	Title	Credits
HU/S	SS	Upper-Level Elective (HU 330:	
		Values and Ethics recommended)	3
		Comparative Religions -OR-	
HF	300	Human Factors I: Principles	
		and Fundamentals	3
HS	302	Fundamentals of Occupational Securit	y3
HS	306	Legal and Investigative Issues of Secu	rity 3
HS	307	Law Enforcement in Security	3
		Group Structure and Process	
SF	355	Industrial Hygiene and Toxicology	3
SS	325	International Studies	3
SS	340	American Foreign Policy	3
		Personality Development	
Total	Cree	dits	30

### SENIOR YEAR

Cour	se	Title	Credits
HS	401	Emergency Planning, Response, and	
		Security Management	3
HS	402	Security and Risk Analysis	3
		Specified Electives	9
		General/Open Electives	14
SS	331	Current Issues in America	
Total	Cre	dits	32
Тота	l De	gree Credits	120

## Safety Science

**Bachelor of Science** 

The Applied Aviation Sciences Department offers a Bachelor of Science degree in Safety Science that is based on the needs of the marketplace. It combines a solid core designed to meet the Aviation Accreditation Board International (AABI) standards and the University's General Education requirements. With a complete offering of Safety Science courses through two areas of concentration (AOCs), students can prepare to work in the aerospace industry as well as in nonaerospace industries.

The Safety Science degree is designed for students interested in obtaining a strong safety foundation. The goal of the degree is to produce graduates who are skilled in providing safety expertise in a variety of aviation, aerospace, and other industrial settings. This program will produce safety professionals who are skilled in providing safety management expertise and who can provide technical guidance in compliance issues involving FAA, EPA, OSHA, DOT, and state health, hygiene, and workplace standards.

### DEGREE REQUIREMENTS

The Bachelor of Science degree in Safety Science requires successful completion of a minimum of 120 credit hours and is normally completed in eight semesters.

Students are required to complete 36 hours of General Education courses as well as 46 hours of a Safety Science core curriculum. The Transportation AOC and Occupational Safety AOC each require 24 hours of AOC related safety courses with the final 14 hours available as open electives. There are numerous minor fields of study for the student to choose from in order to meet specific desires.

Students enrolled in the Air Force, Army, or Naval ROTC program may substitute AF, MY, or NSC courses for open elective courses. Hours

General Education
Safety Science Core46
Area of Concentration
(Air Transportation/Occupational)24/24
Open Electives
(Air Transportation/Occupational)14/14
TOTAL DEGREE CREDITS 120

#### GENERAL EDUCATION

Course	Title	Credits
COM	Communications Skills	
	(COM 122, 219, 221)	9
CS	Computer Science Elective	
EC 200	An Economic Survey	3
HU	Humanities (HU 140-146)	3
HU/SS	Upper-Level Elective	
MA	Math Sequence (MA 111, 112)	6
PS	Physics Sequence	
	(one laboratory required)	6
PSY 101	Introduction to Psychology	3
Total Cre	dits	36

### SAFETY SCIENCE CORE

#### Course Title Credits AS AT BA HF PS SF 201 Introduction to Health, Occupational, SF 315 Environmental Compliance and Safety...3

		Safety Program Management Industrial Hygiene and Toxicology	
SF		Fire Protection	
SF	410	Design of Engineering Hazard Control	s3
SF	445	System Safety in Aviation	3
SF	462	Health, Safety, and Aviation Law	3
NX	201	Survey of Meteorology	3
Fotal	Cre	dits	46

## TRANSPORTATION SAFETY (AIR) AREA OF CONCENTRATION

Course		Title	Credits
AS	309	Aerodynamics	3
AS		Aircraft Performance -OR-	
SF	350	Air Crash and Emergency Manageme	nt 3
AS		Aircraft Systems and Components	
SF		Human Factors in Aviation	
SF	330	Aircraft Accident Investigation	3
SF	335	Mechanical and Structural Factors	
		in Aviation	3
SF	375	Propulsion Plant Investigation	3
SF	435	Aircraft Crash Survival Analysis	
		and Design	3
		Open Electives	
Total Credits		38	
TOTAL DEGREE CREDITS		120	

## Suggested Program of Study

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Please check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

#### **FRESHMAN YEAR**

Course		Title	Credits
AAS	101	Applied Aviation Science College	
		Success Seminar	1
AS	120	Principle of Aeronautical Science	3
COM	122	English Composition and Literature.	3
		Lower-Level Humanities	
IT	109	Introduction to Computers and	
		Applications	3
MA	111	College Math for Aviation I	3
		College Math for Aviation II	
PS	101	Basic Chemistry	3

PS PSY SF	<ul><li>103 Technical Physics I</li><li>101 Introduction to Psychology</li><li>201 Introduction to Health, Occupational</li></ul>	3
	and Transportation Safety	
Total	l Credits	31
SOP	HOMORE YEAR	
0	T'(1)	C 1''

Course		Title	Credits
AT	300	Air Traffic Management I	3
BA	201	Principles of Management	3
COM	[219	Speech	3
COM	[221	Technical Report Writing	3
EC	200	An Economic Survey	3
		Introduction to Human Factors	
MA	222	Business Statistics	3
PS	104	Technical Physics II.	3
SF	315	Environmental Compliance and Safet	y3
WX		Survey of Meteorology	
Total Cre		dits	30

#### **Total Credits**

#### JUNIOR YEAR

Cour	se	Title	Credits
AS AS		Aerodynamics Aircraft Systems and Components	
SF	320	Human Factors in Aviation	3
SF		Aircraft Accident Investigation	
SF		Safety Program Management	
SF	355	Industry Hygiene and Toxicology	3
SF		Fire Protection	
		Open Electives	9
Total Credits		30	

## SENIOR YEAR

#### Course Title

AS	310	Aircraft Performance -OR-
SF	350	Aircraft Crash and Emergency
		Management
HU/	SS	Upper-Level Elective*
SF	335	Mechanical and Structural Factors
		in Aviation
SF	375	Propulsion Plant Investigation
SF	410	Design of Engineering Hazard Controls3
SF	435	Aircraft Crash Survival Analysis
		and Design
SF	445	System Safety in Aviation3
SF	462	Health, Safety, and Aviation Law3
		Open Electives5
Total	Cre	dits 29

\*The recommended elective is HU 330 Values and Ethics.

#### dits

Credits

## OCCUPATIONAL SAFETY AREA OF CONCENTRATION

Course		Title	Credits
BA	420	Management of Production and	
		Operations	3
HS	302	Fundamentals of Occupational Securit	ty3
PS	107	Elements of Biological Science	3
SF		Industrial Security - OR-	
SF	316	Workers' Compensation and Rsk	
		Management	3
SF	380	Internship I -OR-	
SF	350	Aircraft Crash and Emergency	
		Management	3
SF	405	Applications in Industrial Hygiene	3
SF	440	Design of Engineering Hazard Conrol	s II 3
SF	450	Internship II -OR-	
SF	330	Aircraft Accident Investigation	3
		Open Electives	14
Total	Cre	dits	38
TOTAL DEGREE CREDITS		120	

## Suggested Program of Study

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Please check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

#### FRESHMAN YEAR

Course		Title	Credits
AAS	101	Applied Aviation Science College Suc	cess
		Seminar	1
AS	120	Principles of Aeronautical Science	3
COM	122	English Composition and Literature*	3
HU	14X	Lower-Level Humanities*	3
IT	109	Introduction to Computers and	
		Applications	3
MA		College Math for Aviation I	
MA	112	College Math for Aviation II	3
PS		Basic Chemistry	
PS	103	Technical Physics I	3
PSY	101	Introduction to Psychology	3
SF	201	Introduction to Health, Occupational	
		and Transportation Safety	3
Total Cre		dits	31

#### SOPHOMORE YEAR

Course		Title	Credits
AT	300	Air Traffic Management I	3
BA	201	Principles of Management.	3
		Speech	
COM	221	Technical Report Writing	3
EC	200	An Economic Survey	3
MA	222	Business Statistics	3
PS	104	Technical Physics II.	3
PS	107	Elements of Biological Science	3
SF	315	Environmental Compliance and Safet	y3
WX	201	Survey of Meteorology	3
Total Credits		30	

#### JUNIOR YEAR

Course		Title 0	Credits
HF	201	Introduction to Human Factors	3
SF	311	Industrial Security -OR-	
		Fundamentals of Occupational Security	y3
		Workers' Compensation, Insurance, an	
		Risk Management	3
SF	345	Safety Program Management	3
		Industrial Hygiene and Toxicology	
SF	365	Fire Protection	3
		Internship I -OR-	
SF	350	Aircraft Crash and Emergency	
		Management	3
Open	Elec	ctives	

#### **Total Credits**

SENIOR YE	EAR
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Course		Title	Credits
BA	420	Management of Production and	
		Operations	3
HU/	SS	Upper Level Elective*	
SF		Applications in Industrial Hygiene	
SF		Design and Engineering Hazard	
		Controls	3
SF	440	Design and Engineering Hazard	
		Controls II	3
SF	445	System Safety in Aviation	
SF		Internship II -OR-	
SF	330	Aircraft Accident Investigation	3
SF		Health, Safety, and Aviation Law	
		Open Electives	
Total Cre		dits	29

\*\* The recommended elective is HU 330 Values and Ethics.

30

## College of Business Dr. Daniel Petree, Dean

Our aim is to provide a world-class business and management education in an aviation/aerospace context. That means we have assembled a community of faculty scholars with global reputations and reach. That means we have designed curricula at the graduate and undergraduate levels that set the standard in aviation/ aerospace management education. That means our faculty and students have the opportunity to focus on cutting-edge solutions to real-world problems and opportunities found in aviation, aerospace, and transportation-related industries and organizations. Our dedication to excellence is manifested by our accreditation by ACBPS (the Association of Collegiate Business Programs and Schools) for all our degree programs and by AABI (Aviation Accreditation Board International) for our undergraduate degree program in Business Administration.

The College consists of two departments: the Department of Management, Marketing, and Operations and the Department of Economics, Finance, and Information Systems. Both departments are responsible for designing and delivering our undergraduate and graduate degrees. Our undergraduate degrees include the Bachelor of Science in Business Administration. This is our largest undergraduate degree program and combines a rigorous business/management core with depth of focus through the two majors in Management and Air Transportation. This degree program offers graduates the specialized knowledge desired in the aviation industry along with the management and business general knowledge valuable to employers in any industry.

The Bachelor of Science in Aviation Management is designed to enhance the knowledge and expertise of those who have already earned the equivalent of an associate degree by providing the opportunity to add depth and breadth through upper-level business and management courses. It is a good way to lever an associate degree into a bachelor degree with the rigor and strength desired by employers in the aviation industry.

The Master in Business Administration is intended to give individuals who already hold undergraduate degrees, often in technical areas like engineering, the tools necessary to become a credible professional manager in aviation, aerospace, or related industries. The program of study combines common general management courses with specializations in Airline Management, Airport Management, Aviation Human Resources, Aviation Systems Management, and Finance.

## **Business** Administration

**Bachelor of Science** 

The Bachelor of Science degree in Business Administration requires successful completion of a minimum of 120 credit hours and is normally completed in eight semesters. Designed for students interested in obtaining a strong business foundation with emphasis on specific aviation applications, the degree lets the student select a Major in Management or Air Transportation. Students should declare their Major at the beginning of their sophomore year. Students who participate in the Cooperative Education program may substitute up to 6 credit hours, if approved, toward the specified courses required in their Major.

This program is accredited by the Aviation Accreditation Board International (AABI) and the Association of Collegiate Business Schools and Programs (ACBSP).

Students enrolled in the Air Force, Army, or Naval ROTC program may substitute AF, MY, or NSC courses for the open elective courses.

Students should be aware that several courses in each academic year may require prerequisite subject knowledge and/or class standing. Check the course descriptions at the back of this catalog before registering for classes to ensure appropriate placement.

General Education Program Support Business Core Major Open Electives	12 36
TOTAL DEGREE CREDITS	120

### **GENERAL EDUCATION\***

Total Credits

Embry-Riddle courses in the general education categories of Communication Theory and Skills, Mathematics, Computer Science, Physical and Life Sciences, Humanities, and Social Sciences may be chosen from those listed below; assuming prerequisite requirements are met and with the permission of the advisor. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified above in the Aviation Business Administration vertical outline. Other courses may also be used with the permission of a department chair.

## PROGRAM SUPPORT

Cour	se	Title	Credits
AS	120	Principles of Aeronautical Science Advanced Computer Based Systems.	3
BA	221	Advanced Computer Based Systems.	3
MA	222	Business Statistics	3
		Decision Math	
Total	Cre	dits	12

## BUSINESS CORE

Cour	se	Title	Credits
BA	201	Principles of Management.	3
BA	210	Financial Accounting	3
BA	311	Marketing	3
BA	312	Managerial Accounting	3
BA	317	Organizational Behavior	3
BA	320	Business Information Systems	3
BA	325	Social Responsibility and Ethics	3
BA	332	Corporate Finance	3
BA	335	International Business	3
BA	390	Business Law	3
BA	420	Management of Production	
		and Operations	3
BA	436	Strategic Management	3
Total	Cree	dits	36

## MANAGEMENT MAJOR

Cours	se	Title	Credits
BA (	314	Human Resource Management	3
BA 4	427	Management of the Multicultural	
		Workforce	3
BA 3	334	Investment Analysis	
		-OR-	
BA 3	326	Marketing Management	
		-OR-	
BA 3	327	Airline-Airport Operations	3
BA/E	С	Specified Electives (300/400 level)	
		-Including-	
EC (	315	Managerial Economics	3
		Non-Verbal Communications	
HF (	300	Human Factors I: Principles and	
		Fundamentals	9
Total Cre		dits	21

## AIR TRANSPORTATION MAJOR

_					
Cou		Title Credits			
BA	331	Transportation Principles3			
BA	408	Airport Management			
BA	415	Airline Management			
BA	426	International Aviation Management3			
		Undergraduates are required to take two			
		Business Electives			
EC	420	Economics of Air Transportation3			
Cou	rses	Available as Business Electives:			
BA	322	Aviation Insurance and			
		Risk Management			
BA		Aviation Labor Relations			
BA	405	General Aviation Marketing3			
BA	410	Management of Air Cargo			
BA	412	Airport Planning and Design Standards 3			
BA		Airport Administration and Finance3			
BA	422	Life Cycle Analysis for Systems and			
		Programs in Aviation/Aerospace3			
BA	424	Project Management in			
		Aviation Operations			
BA	425	Trends and Current Problems in			
		Air Transportation3			
BA	450	Airline/Airport Marketing3			
TOTAL DEGREE REQUIREMENTS   120					

## Suggested Program of Study

#### FRESHMAN YEAR

Course	Title	Credits
AS 12	20 Principles of Aeronautical Science	3
	Communication Theory and Skills	
	Lower-Level Humanities	3
	Lower-Level Social Sciences	
	(EC 210 Microeconomics)	3
	Computer Science	
	(IT 109 Introduction to Computers).	3
	Mathematics	6
BA 20	01 Principles of Management	3
BA 22	21 Advanced Computer Based Systems.	3
EC 21	1 Macroeconomics	3
Total C	redits	30

#### SOPHOMORE YEAR

Cours	se	Title	Credits
		Communication Theory and Skills	6
		Physical and Life Sciences	3
BA	210	Financial Accounting	3

BA	311	Marketing		
BA	320	Business Information Systems		
		Business Statistics		
MA	320	Decision Mathematics		
		Open Elective		
Management Major:				
ВА	390	Business Law		
Air Transportation Major:				
BA	331	Transportation Principles		
Tota	Total Credits 30			

### JUNIOR YEAR

-			
Course		Title	Credits
		Upper-Level Humanities -OR-	
		Social Sciences*	3
		Physical Sciences	3
BA	312	Managerial Accounting	3
BA	317	Organizational Behavior	3
BA		Corporate Finance I	
		Open Elective	3
Mar	nage	ment Major:	
BA		Human Resource Management	3
BA	427	Management of the	
		Multicultural Workforce	3
BA	334	Investment Analysis	
		-OR-	
BA	326	Marketing Management	
		-OR-	
BA	327	Airline-Airport Operations	3
EC	315	Managerial Economics	3
Air	Tran	sportation Major:	
BA	390	Business Law	3
BA		Airport Management	
BA	415	Airline Management	3
EC	420	Economics of Air Transportation	3

Total Credits				
SENIOR	YEAR			
Course	Title	Credits		
BA 325	Social Responsibility and Ethics	3		
BA 335	International Business	3		
BA 420	Production and Operations	3		
BA 436	Strategic Management	3		
	Open Electives	9		
Management Major: Specified Electives				
Air Transportation Major:				
BA 426	International Aviation Management . Specified Electives			
Total Cree	30			
TOTAL DEGREE CREDITS				

\*See general education on page 115

## Aviation Management

**Bachelor of Science** 

### DEGREE REQUIREMENTS

The Bachelor of Science degree in Aviation Management requires successful completion of a minimum of 120 credit hours and is normally completed in four semesters, depending on total credits transferred into the University. This degree is designed to accommodate the transfer student who has either completed an appropriate associate degree at an accredited regional college or university (generally 60 semester credit hours) or a minimum of 60 credit hours, which must be composed of courses from the following broad areas: Communication Skills, Mathematics, Physical Sciences, Computers, Business, Economics, Management, Humanities, and/or Social Sciences. In the business core courses, prerequisites not previously met may be taken from open elective credit hours. The curriculum for the degree provides a sound business foundation in all disciplines of business, enhanced by aviation business applications. Courses include accounting and finance, law, ethics, human resources, production, and strategic management.

Associate Degree Credit ++

-OR-	
Minimum of 60 Credit Hours in Coursework	60
Business Core.	36
Aviation Management Core	15
Open Electives	
TOTAL DEGREE REQUIREMENTS	120

++ Assumes University general education requirements have been met and no further credit hours are required in this area. Associate Degree Credit.....60

#### -OR -

Minimum of 60 credit hours in coursework that must be composed of courses from the following broad areas: Communication Skills, Mathematics, Physical Sciences, Computers, Business, Economics, Management, Humanities, and/or Social Sciences.

#### **Business Core**

BA	311	Marketing	3
BA	312	Managerial Accounting	3
BA		Human Resource Management	
BA	317	Organizational Behavior	3
BA	320	Business Information Systems	3
BA	325	Social Responsibility and Ethics	
		in Management	3
BA	332	Corporate Finance I	3
BA	335	International Business	3
BA	390	Business Law	3
BA	420	Management of Production	
		and Operations	3
BA	436	Strategic Management	3
EC	315	Managerial Economics	3
			36
		Aviation Management Core Five BA 300-400 business elective cour	15 ses
		Open Electives	
Тота	l De	GREE REQUIREMENTS	120

#### **Courses Available as BA 300-400 Business Electives:**

- BA 308 Public Administration
- BA 322 Aviation Insurance
- BA 324 Aviation Labor Relations
- BA 326 Marketing Management
- BA 331 Transportation Principles
- BA 405 General Aviation Marketing
- BA 408 Airport Management
- BA 410 Management of Air Cargo
- BA 412 Airport Planning and Design Standards
- BA 415 Airline Management
- BA 418 Airport Administration and Finance
- BA 419 Aviation Maintenance Management
- BA 421 Small Business Management
- BA 424 Project Management in Aviation Operations
- BA 426 International Aviation Management
- BA 427 Management of the Multi-Cultural Work Force
- BA 430 International Trade and Regulations
- BA 450 Airline/Airport Marketing
- EC 420 Economics of Air Transportation

## Suggested Program of Study

Associate Degree or Transfer Credits......60

#### JUNIOR YEAR

#### Course Title Credits BA BA BA BA BA EC

### **Total Credits**

#### SENIOR YEAR

Cour	se	Title	Credits
BA	311	Marketing	3
BA	325	Social Responsibility and	
		Ethics in Management	3
BA	332	Corporate Finance I	3
BA	335	International Business	3
BA	420	Management of Production	
		and Operations	3
		Business Electives	9
BA	436	Strategic Management	3
		Open Electives	3
Total Credits			30

TOTAL DEGREE REQUIREMENTS 120

30

# College of Engineering

The College of Engineering at Embry-Riddle offers Bachelor of Science degrees in Aerospace Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Mechanical Engineering, and Software Engineering. Each of the degrees in the College of Engineering gives students the opportunity to acquire a depth of understanding in the degree while allowing unique aerospace strengths in each curriculum.

Embry-Riddle's Engineering program is the largest in the country and has been ranked by *U.S. News and World Report* as the # 1 program among non-Ph.D. granting institutions. The College of Engineering ranks among the top 10 best undergraduate programs among non-Ph.D. granting schools. In addition, the College of Engineering offers master degrees in Aerospace Engineering and in Software Engineering.

The College of Engineering emphasizes high-quality education and research activities that bring to the students the latest developments in the field. Students are continually encouraged and supported by faculty to strive for ingenious and creative solutions to today's technological problems through research projects on their own as well as joint projects with faculty.

Students acquire valuable hands-on experience using cutting-edge technology in the Design, Composites, Wind Tunnel, and Real Time lab among others. The College also holds many seminars and workshops for engineering students with both academic and industry speakers. This interaction with industry enables students to stay abreast of current industry conditions and advancements. College of Engineering graduates are regarded as some of the most knowledgeable and best-trained professionals entering their chosen fields.

## FRESHMAN ENGINEERING

The Freshman Engineering Program is designed to prepare students for entry into the degrees offered by the College of Engineering. The first-year curriculum allows engineering students to take coursework that is common to every engineering degree in the College, allowing students flexibility in choosing engineering degrees without affecting the progress toward graduation.

The Freshman Engineering Program is designed to introduce students to the interdisciplinary aspects of engineering. Engineering courses, mathematics, computing, and physics courses are integrated to prepare students to work in teams for solving aerospace-related problems that reach across the broad areas of engineering.

Students entering the Freshman Engineering Program should have demonstrated a competence in mathematics and science. They should be prepared to enter Calculus I, having demonstrated proficiency in algebra and trigonometry. If necessary, students can prepare for entry into the Freshman Engineering Program by taking College Algebra (MA 140) and Trigonometry (MA 142) before taking Calculus and Analytic Geometry I (MA 241).

### **GENERAL EDUCATION ELECTIVES** FOR ENGINEERS

Embry-Riddle courses in the general education categories of Humanities and Social Sciences may be chosen from those listed below, assuming prerequisite and other listed requirements are met. Courses from other institutions are acceptable if they fall into these categories and are at the level specified in the particular engineering program.

#### FRESHMAN YEAR

Cour	se	Title C	Credit
COM	[122	English Composition and Literature I	3
COM	[219*	*Speech	3
EGR	101	Introduction to Engineering	2
EGR	115	Introduction to Computing for Enginee	rs 3
HU	14X	Humanities	3
MA	241	Calculus I	4
MA	242	Calculus II	4
PS	150	Physics I	3
PS		Physics II	
SS		Lower-Level Social Sciences Elective	3
UNIV	V	101 College Success	1
Total	Cree	dits	32

#### Total Credits

\* COM 219 is required in every degree for graduation. However, students are advised to postpone COM 219 during the first year in favor of one of the following courses based on the field of interest of the student:

Aerospace Engineering, Civil Engineering, or Mechanical Engineering: EGR 120, Graphical Communications, 3 credits.

Computer Engineering or Software Engineering: CS 225, Computer Science II, 4 credits.

Electrical Engineering: CEC 220/2, Digital Circuit Design with lab, 4 credits.

Humanities: Any HU course at the required level.

Social Sciences: Any SS, EC, or PSY course at the required level. HF 201 is also acceptable. **Exceptions:** Language courses must not be the student's native language. EC 200 is not acceptable together with EC 210 or EC 211 or their equivalent. Registering in a Special Topics course must be approved by the appropriate engineering department **before** taking the course.

# Aerospace Engineering

#### **Bachelor of Science**

The Aerospace Engineering program exists in partial fulfillment of the University's purpose "to provide a comprehensive education to prepare graduates for productive careers and responsible citizenship with special emphasis on the needs of aviation, aerospace engineering, and related fields." The program's focus is primarily on the engineering of missionoriented vehicles for atmospheric and space flight. The goal of the Aerospace Engineering program is to produce graduates who are ready for constructive roles in society, who qualify for entry-level engineering jobs in the aerospace industry or aviation-related fields, who qualify for admission to graduate programs in Aerospace Engineering (or related engineering fields), and who are prepared to continue learning throughout their lives.

In order to achieve these objectives, the following are the expected outcomes:

- Engineering responsibilities and methodology. From their first semester onward, students will be made aware of what engineering is and what will be expected of them as engineers, including a commitment to continuing education and to engineering ethics. This will be accomplished through interdisciplinary team activities and design projects, workshops, and seminars, and the consistent assignment of open-ended problems throughout the curriculum.
- Professional activity and development. Students will be encouraged throughout their Embry-Riddle careers to actively participate in professional organizations, to stay abreast of industry activity, and to

continue their professional development.

- 3. *Technical communication*. Throughout the curriculum, wherever appropriate, student teams will make professional-quality oral and written presentations.
- 4. *General education.* Students will satisfy the University's general education requirements to broaden the student's education, develop effective communication skills, and obtain awareness of social and ethical issues.
- 5. Basic science and mathematics. Students will demonstrate a knowledge of chemistry fundamentals (including oxidation/reduction, the essentials of physical chemistry, and the basics of organic compounds as related to composite materials), basic physics (mechanics, heat, sound, electricity, and optics), and mathematics (differential and integral calculus, differential equations, matrix algebra, and vector calculus) to use as tools in support of their studies of engineering topics and beyond.
- 6. Engineering mechanics. Students will demonstrate a knowledge of the fundamentals of classical engineering mechanics (as applied to rigid, elastic, and fluid media) to provide a foundation for the professional component of the curriculum as well as to become familiar with basic engineering problem-solving techniques, including team approaches.
- 7. *Aerodynamics and aeronautics*. Students will demonstrate a knowledge of topics

in aerodynamics, to include a majority of the following: the aerospace environment; applications of mass, momentum, energy, and entropy principles to oneand two-dimensional flows; potential flow; viscous flow and boundary layers; aerodynamics of airfoils in incompressible and compressible flows; steady state aircraft performance; static stability; propeller and rotary wing fundamentals; applications of the concept of panel methods; supersonic flow; and aerodynamic heating.

- 8. Thermal sciences. Students will demonstrate knowledge of a sequence of topics in thermodynamics, heat transfer, and propulsion so as to be able to assess the operational capabilities and analyze the performance of air-breathing and rocket engines.
- 9. Structures. Students will demonstrate a knowledge of topics in aerospace structures and materials, to include as a minimum the equilibrium of forces and moments in three dimensions; shear and bending moment diagrams; stresses and deflections due to elastic tension, compression, shear, and torsion on stable cross sections; compression and shear buckling; composite materials; basics of the finite element method; and vibration, fatigue, and fracture mechanics concepts.
- 10. Electronics. Students will demonstrate a knowledge of topics in electric circuits, analog and digital electronic fundamentals, electromechanical devices, and instrumentation fundamentals.
- 11. Astronautics. Students will demonstrate a knowledge of topics in orbital mechanics, gyroscopic motion, and control systems with aerospace applications.

- 12. Laboratories and data interpretation. Students will demonstrate an ability to perform laboratory work, including statistical processing of data and error analysis, in materials, structures, aerodynamics, power and energy systems, electronics, and instrumentation.
- 13. Design. Students will carry out and defend the conceptual design of an aircraft or a spacecraft in an industry-like environment, in teams, using realistic constraints and considerations of cost, safety, manufacturability and maintainability, and the needs of the public. Students will likewise also carry out the detail design of an aircraft or a spacecraft system.
- 14. Support hardware and software. The program will be supported throughout by the use of modern equipment and the most relevant modern tools and techniques of engineering analysis, design, and production, including student experience with industry-level solid modeling (CAD/CAM), finite element, and computational fluid mechanics software.

To enter this program, students should have demonstrated competence in mathematics, physics, and chemistry in high school.

The Aerospace Engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (111 Market Place, Suite 1050, Baltimore, MD 21202-4012; Telephone: (410) 347-7700; http://www.abet. org).

## Degree Requirements

The Bachelor of Science in Aerospace Engineering program requires successful completion of a minimum of 129 credit hours. The program may be completed in eight semesters assuming appropriate background and fulltime enrollment.

## FIRST-YEAR REQUIREMENT:

A student must attain a minimum cumulative grade point average of 2.25 in those courses prescribed by the College of Engineering Freshman Program (see page 121) before continuing the pursuit of an Aerospace Engineering degree.

### REMAINING ON TRACK FOR AE:

Aerospace Engineering students must complete MA 241, MA 242, PS 150, PS 160, and EGR 115 with a C or better within three attempts (including audits and withdrawals) before attending any ES courses. Students should be aware that many courses have prerequisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure required sequencing.

#### FRESHMAN YEAR

See the common Freshman Year outline on page 121.

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#### SOPHOMORE YEAR

Course	Title	Credits
COM 221	Technical Report Writing	3
COM 219	Speech -OR-	
EGR 120	Graphical Communications	3
ES 201	Statics	3

ES	202	Solid Mechanics	3
ES	204	Dynamics	3
ES		Fluid Mechanics	
MA	243	Calculus and Analytic Geometry III .	4
MA	345	Differential Equations and	
		Matrix Methods	4
PS	105	General Chemistry I	4
PS	250	Physics III for Engineers	3
PS	253	Physics Laboratory for Engineers	1
Total	Cre	dits	34
JUNI	OR	YEAR (AERONAUTICS OPTION)	
Cour		Title	Credits
AE	301	Aerodynamics I	3
AE	302	Aerodynamics II	3
AE	304	Aircraft Structures I	3
AE	313	Space Mechanics	3
AE	314	Experimental Aerodynamics I	1
AE	315	Experimental Aerodynamics Laborate	ory .1
AE	316	Aerospace Engineering Materials	3
AE		Aircraft Structures II.	
AE	413	Airplane Stability and Control	3
ES	305	Thermodynamics	3
EE	335	Electrical Engineering	2
EE	336	Electrical Engineering Laboratory	1
MA		Advanced Engineering Mathematics	<u>3</u>
Total	Cre	dits	32
JUNI	IOR	YEAR (ASTRONAUTICS OPTION)	
Cour	se	Title	Credits
AE	301	Aerodynamics I	3
			-

AE	301	Aerodynamics 1	
AE	302	Aerodynamics II	
AE	304	Aircraft Structures I	
AE	313	Space Mechanics	
AE	314	Experimental Aerodynamics I1	
AE	315	Experimental Aerodynamics Laboratory .1	
AE	316	Aerospace Engineering Materials3	
AE	404	Aircraft Structures II	
ES	305	Thermodynamics	
EE		Electrical Engineering I with Laboratory .3	
MA	441	Advanced Engineering Math I3	
		Technical Elective	
Total Credits32			
** ** **			

## JUNIOR YEAR (AEROSPACE PROPULSION OPTION)

Cour	se	Title	Credits
AE	301	Aerodynamics I	3
AE	302	Aerodynamics II	3

Total	Cre	dits 32
MA	441	Advanced Engineering Math I3
EE		Electrical Engineering I with Laboratory .3
ES	305	Thermodynamics
AE	413	Airplane Stability and Control3
AE	404	Aircraft Structures II
AE		Aerospace Engineering Materials3
AE	315	Experimental Aerodynamics Laboratory .1
AE	314	Experimental Aerodynamics I1
AE	313	Space Mechanics
AE	304	Aircraft Structures I

#### **Total Credits**

#### SENIOR YEAR (AERONAUTICS OPTION)

Cour	se	Title	Credits
AE	408	Turbine and Rocket Engines	3
AE	416	Aerospace Structures and Instrumenta	ation1
AE		Aerospace Structures and Instrumenta	
		Laboratory	
AE	420	Aircraft Preliminary Design	4
AE	421	Aircraft Detail Design	4
AE	432	Flight Dynamics and Control	3
ES	405	Electrical Engineering II	3
HU/	SS	Lower-Level Elective	3
HU/	SS	Upper-Level Elective	3
		Technical Electives	

#### **Total Credits**

#### SENIOR YEAR (ASTRONAUTICS OPTION)

Cour	se	Title	Credits
AE	408	Turbine and Rocket Engines	3
AE	416	Aerospace Structures and	
		Instrumentation	1
AE	417	Aerospace Structures and	
		Instrumentation Laboratory	1
AE	426	Spacecraft Attitude Dynamics	
		and Control	
AE	427	Spacecraft Preliminary Design	4
AE	434	Spacecraft Control.	3
AE	445	Spacecraft Detail Design	4
ES	405	Electrical Engineering II.	3
HU/S	SS	Lower-Level Elective	3
HU/S	SS	Upper-Level Elective	3
		Technical Elective	3
Total	Cree	dits	31

#### **Total Credits**

#### SENIOR YEAR (AEROSPACE PROPULSION **OPTION)**

Cour	rse	Title	Credits
AE	408	Turbine and Rocket Engines	3
		Aerospace Structures and	
		Instrumentation	1

AE	417	Aerospace Structures and	
		Instrumentation Laboratory	1
AE	432	Flight Dynamics and Control	3
AE	435	Air-Breathing Propulsion Preliminary	
		Design	4
AE	440	Air-Breathing Propulsion Component	
		Design	4
ES	405	Electrical Engineering	3
HU/		Lower-Level Elective	
HU/	SS	Upper-Level Elective	3
		Technical Elective	6
Tota	l Cre	dits	31
Тота	L DE	GREE CREDITS	129

## **TECHNICAL ELECTIVES:**

AE:	350, 395*, 399*, 401, 409, 411, 415, 425, 433, 495*
	499*, 5XXU
CEAE	: With prior approval of the Aerospace
	Engineering Department
CEC:	300, 315, 320/322**, 460
CIV:	311, 362
CS:	335, 344, 350
EGR:	305
EP:	320, 391, 394
ES:	306, 315, 395*, 399*, 403, 412, 495*, 499*
MA:	412, 432, 438, 442, 443, 5XXU
ME:	304/305** (was 300/L), 302, 303, 425
PS:	301, 303, 320
SE:	300
SYS:	301
idents	may substitute upper-level AF NSC and MY

Students may substitute upper-level AF, NSC, and MY courses or aeronautical certificates for the 6 credits of technical electives.

Students may take courses that are not listed above with prior approval of the Aerospace Engineering Department.

- Need approval of Aerospace Engineering Department \* Chairperson before enrolling.
- \*\* Lecture/Lab courses must be taken at the same time.

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## Accelerated Program in Aerospace Engineering

**Bachelor of Science** 

Master of Aerospace Engineering

The accelerated program allows students with strong academic backgrounds to complete both B.S. and M.A.E. degrees in Aerospace Engineering. The goal of the program is to produce graduates who are prepared for careers in the aerospace industry and in research and development. The program augments the students' undergraduate background with graduate-level study and with course offerings in the areas of aerodynamics, structures, propulsion, and astronautics.

### DEGREE REQUIREMENTS

Students enrolled in the Bachelor of Science program in Aerospace Engineering may apply for entry into the accelerated program when they have completed about 90 hours of coursework. Students should have a CGPA of 3.20 (out of a possible 4.00) in AE/ES courses, at a minimum, for selection. For continued enrollment, a CGPA of 3.00 must be maintained. Each student is required to conduct an independent study in a topic of current interest in aerospace engineering under the guidance of an advisor, with a formal report due at the end. Three to six graduate credits, depending on the rigor and extent of the work, are earned through this work.

#### FRESHMAN YEAR

See the common Freshman Year outline on page 121. Total Credits 32

#### SOPHOMORE YEAR

Cour	se	Title	Credits
COM	221	Technical Report Writing	3
		Speech - OR-	
EGR	120	Graphical Communications	3
		Statics	
ES	202	Solid Mechanics	3
ES	204	Dynamics	3
ES	206	Fluid Mechanics	3
MA	243	Calculus and Analytic Geometry III .	4
MA	345	Differential Equations and	
		Matrix Methods	4
PS	105	General Chemistry I	4
PS		Physics III for Engineers	
PS		Physics Laboratory for Engineers	
Total	Cro	dite	3/

#### JUNIOR YEAR (AERONAUTICS AND PROPULSION OPTIONS)

Cour	se	Title	Credits
AE	301	Aerodynamics I	3
AE	302	Aerodynamics II	3
AE		Aircraft Structures I	
AE	313	Space Mechanics	3
AE		Experimental Dynamics I	
AE	315	Experimental Dynamics I Laboratory	· 1
AE	316	Aerospace Engineering Materials	3
AE	404	Aircraft Structures II.	3
AE	413	Airplane Stability and Control	3
ES	305	Thermodynamics	3
EE	335	Electrical Engineering I	2
EE	336	Electrical Engineering I Laboratory	1
MA	441	Advanced Engineering Mathematics	I3
Total	Cre	dits	32

#### JUNIOR YEAR (ASTRONAUTICS OPTION)

Course Title Credits AE AE AE 314 Experimental Dynamics I .....1 AE AE 315 Experimental Dynamics I Laboratory ....1 316 Aerospace Engineering Materials ......3 AE AE AE

#### ES EE 335 Electrical Engineering I .....2 EE 336 Electrical Engineering I Laboratory.....1 **Total Credits** 32

#### SENIOR YEAR (AERONAUTICS OPTION)

Cour	se	Title	Credits
AE	408	Turbine and Rocket Engines	3
AE	420	Aircraft Preliminary Design	4
AE	421	Aircraft Detail Design	4
AE		Control Systems Analysis and Design	
AE	416	Aerospace Structures and	
		Instrumentation Lab	1
AE	417	Aerospace Structures and	
		Instrumentation Lab	1
ES	405	Electrical Engineering II.	3
HU/	SS	Lower-Level Elective	3
HU/	SS	Upper-Level Elective	3
		Technical Electives †	6
Total	Cre	dits	31

#### Total Credits

#### SENIOR YEAR (PROPULSION OPTION)

Cour	se	Title	Credits
AE	408	Turbine and Rocket Engines	3
AE		Aerospace Structures and	
		Instrumentation	1
AE	417	Aerospace Structures and	
		Instrumentation Laboratory	1
AE		Control Systems Analysis and Design	
AE	435	Air-Breathing Propulsion Preliminary	
		Design	
AE	440	Air-Breathing Propulsion Component	
		Design	$\dots 4$
ES	405	Electrical Engineering II	3
HU/		Lower-Level Elective	
HU/	SS	Upper-Level Elective	3
		Technical Electives <sup>†</sup>	6
Total	Cre	dits	31

#### SENIOR YEAR (ASTRONAUTICS OPTION)

Cour	se	Title	Credits
AE	408	Turbine and Rocket Engines	3
AE		Aerospace Structures and	
		Instrumentation	1
AE	417	Aerospace Structures and	
		Instrumentation Laboratory	1
AE	426	Spacecraft Attitude Dynamics	
		and Control	3
AE	427	Spacecraft Preliminary Design	4
AE		Control Systems Analysis and Design	
AE	445	Spacecraft Detail Design	4
ES	405	Electrical Engineering II.	3
HU/	SS	Lower-Level Elective	3
HU/	55	Upper-Level Elective	3
		Technical Elective +	3
Total	Cre	dits	31
Тота	l Un	DERGRADUATE CREDITS	129
GRA	DUA	ATE-LEVEL STUDY	
Cour	se	Title	Credits
		Engineering Analysis	3
AE 6	96/	0 0 9	
6	99	Special Topics Electives ±	3/6
		(at least 9 hours at 600-level)	15/12
Total	Cre	dits	21

#### **TOTAL DEGREE CREDITS** 150

+Technical Electives: Students may satisfy this requirement by selecting from the 500-level graduate courses listed in this section.

‡Electives: The following may be selected as electives at the graduate level. The elective list has been grouped into areas of concentration.

### AREAS OF CONCENTRATION

#### Structures

This area includes Structural Analysis, Vibration, Nondestructive Testing, Composite Materials, Elasticity, Flight Dynamics, Controls, and Design Optimization.

#### **Electives for Structures Concentration:**

- AE 502 Strength and Fatigue of Materials
- 506 Airplane Dynamic Stability AE
- 514 Introduction to the Finite Element Method AE
- AE 518 Acoustic Emission Nondestructive Testing
- AE 520 Perturbation Methods in Engineering

- AE 522 Analysis of Aircraft Composite Materials
- AE 612 Analysis of Aircraft Plate and Shell Structures
- AE 616 Advanced Aircraft Structural Dynamics
- AE 699 Special Topics in Aerospace Engineering

#### Aerodynamics and Propulsion

This area includes Aerodynamics, Propulsion, Computational Aero and Fluid Dynamics, Transition and Turbulence, Aeroacoustics, Heat Transfer, and Combustion.

#### Electives for Aerodynamics and Propulsion Concentration:

- AE 504 Advanced Compressible Flow
- AE 508 Heat Transfer
- AE 512 Combustion I
- AE 516 Computational Aeronautical Fluid Dynamics
- AE 528 Advanced Incompressible Aerodynamics
- AE 530 Aeroacoustics
- AE 610 Advanced Computational Fluid Dynamics
- AE 620 Boundary Layer Theory
- AE 640 Turbine Éngine Propulsion Systems
- AE 648 Thermal Stresses in Aerospace Engineering
- AE 650 Special Topics in Aerodynamics and Propulsion Engineering
- AE 652 Turbulent Flows

#### **Astronautics and Control**

This area includes Space Vehicles, Space Power, and Systems Control.

#### **Electives for Astronautics Concentration:**

- AE 508 Heat Transfer
- AE 524 Rocket Engine Propulsion Systems
- AE 526 Engineering Optimization
- AE 606 Finite Element Aerospace Applications
- AE 620 Boundary Layer Theory
- AE 646 Nonlinear Dynamical Systems and Chaos

## Civil Engineering

**Bachelor of Science** 

The demand for civil engineers educated in the fields of airports, transportation, aviation and aerospace planning, and analysis and design is strong and is expected to grow rapidly in the future. Air and ground transportation systems have substantially expanded in the last few years and are expected to continue to grow at an increasing pace. Space utilization and exploration initiatives are certain to produce further demand for civil engineers with aerospace interests. The Civil Engineering program at Embry-Riddle is uniquely designed to produce graduates with the types of skills and experiences that employers in these lucrative fields find highly desirable.

Graduates of the Civil Engineering program will leave the University with an understanding of the classical areas of civil engineering with emphasis on transportation, structural design, and materials science in aviation and aerospace fields developed through a carefully planned series of courses and laboratories. Small class size and personal attention allow the interjection of practical interdisciplinary design projects throughout the curriculum. The objectives of the program are to produce graduates who:

- Are prepared for the challenges of contemporary civil engineering practice and have the ability to adapt to changes in the civil engineering profession.
- Have developed problem-solving skills, have acquired team-building abilities, and have demonstrated leadership talent.
- Are capable of participating in interdisciplinary projects, of applying their

knowledge of engineering theory to actual problems, and have the skills to perform technical research.

- Have experienced the facilities, equipment, and academic environment necessary to encourage learning.
- Have developed a love of learning and a quest for understanding that will last throughout their professional careers.

As graduates of a program fully accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700, http://www.abet.org), students will have the necessary background to further their formal education through graduate school if desired.

### Admission Requirements

To enter this program, students should have demonstrated competence in mathematics, physics, and chemistry in high school. They should be prepared to enter Calculus I, having demonstrated proficiency in algebra and trigonometry. Students who wish to strengthen their background in mathematics and physical science should consult the program chair for guidance before enrolling in the prescribed courses.

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

## DEGREE REQUIREMENTS

The Bachelor of Science in Civil Engineering program requires successful completion of a minimum of 131 semester hours. The program may be completed in eight regular semesters, assuming appropriate background and full-time enrollment. A minimum cumulative grade point average of 2.00 is needed for all required CIV, AE, EE, EGR, and ES courses, including engineering electives.

### FIRST AND SECOND SEMESTERS

See the common Freshman Year outline on page 121. **Total Credits** 32

### THIRD SEMESTER

Cour	se	Title	Credits
CIV	311	Introduction to Transportation	
		Engineering	3
COM	219	Speech -OR-	
EGR	120	Graphical Communications	3
		Statics	
MA	243	Calculus and Analytic Geometry III .	4
PS	250	Physics III for Engineers	3
PS	253	Physics Laboratory for Engineers	1
Total	Cre	dits	17

### Total Credits

### FOURTH SEMESTER

Cour	se	Title	Credits
ES	202	Solid Mechanics	3
ES	204	Dynamics	3
MA	345	Differential Equations and	
		Matrix Methods	4
PS	105	General Chemistry I	4
		Civil Engineering Transportation	
		Elective	3
Total	Cre	dits	17

### FIFTH SEMESTER

Course	Title	Credits
COM 221	Technical Report Writing	3
CIV 140	Engineering Measurements with	
	Laboratory	2
CIV 304	Structural Analysis	3
CIV 307	Civil Engineering Materials I	
	with Laboratory	4
CIV 316	Hydraulics	
Total Cre	dits	15

### SIXTH SEMESTER

01/1110	LIVILOILLIN	
Course	Title	Credits
	Civil Engineering Materials Elective.	3
	Civil Engineering Structures Elective	3
	Soil Mechanics.	4
CIV 370	Computational Methods in	2
EE 206	Civil Engineering Introduction to Electrical Systems	3
EE 306 ES 305	Thermodynamics	2
	•	
Total Cre	dits	18
SEVENT	H SEMESTER	
SE LI LI LI	II SEIVIESTEK	
	Title	Credits
	<b>Title</b> Civil Engineering Geotechnical Electi	ve3
Course	Title Civil Engineering Geotechnical Electi Civil Engineering/Technical Elective	ve3
Course	<b>Title</b> Civil Engineering Geotechnical Electi Civil Engineering/Technical Elective Computer Applications in	ve3
Course	Title Civil Engineering Geotechnical Electi Civil Engineering/Technical Elective Computer Applications in Transportation	ve3 3
Course CIV 330 HU/SS	Title Civil Engineering Geotechnical Electi Civil Engineering/Technical Elective Computer Applications in Transportation Upper-Level Elective	ve3 3 2 3
Course CIV 330 HU/SS HU/SS	TitleCivil Engineering Geotechnical ElecticCivil Engineering/Technical ElectiveComputer Applications inTransportationUpper-Level ElectiveLower-Level Elective	ve3 3 3 3
Course CIV 330 HU/SS HU/SS MA 412	Title Civil Engineering Geotechnical Electic Civil Engineering/Technical Elective Computer Applications in Transportation Upper-Level Elective Lower-Level Elective Probability and Statistics	ve3 3 3 3 3
Course CIV 330 HU/SS HU/SS	Title Civil Engineering Geotechnical Electic Civil Engineering/Technical Elective Computer Applications in Transportation Upper-Level Elective Lower-Level Elective Probability and Statistics	ve3 3 3 3
Course CIV 330 HU/SS HU/SS MA 412 Total Cre	Title Civil Engineering Geotechnical Electic Civil Engineering/Technical Elective Computer Applications in Transportation Upper-Level Elective Lower-Level Elective Probability and Statistics	ve3 3 3 3 3

Course	Title	Credits
CIV 460	Senior Design Project	3
HU/SS	Upper-Level Elective	3
	Civil Engineering/Technical Electives	6
	Open Elective	
Total Cre	dits	15
TOTAL DE	GREE CREDITS	131

## **CIVIL ENGINEERING ELECTIVES**

Course		Title	Credits
CIV	340	Construction Engineering	3
		Engineering and Construction	
		Operations in Space	3
CIV	421	Geotechnical and Foundation	
		Engineering	3
CIV	422	Design of Pavement Structures	3
CIV	424	Rehabilitation of Pavement Structures	3
CIV	431	Reinforced Concrete Design	3
CIV	432	Structural Steel Design.	3
CIV	441	Civil Engineering Materials II	3
CIV	447	Airport Design I	3
CIV	457	Airport Design II	3
CIV	490	The Civil Engineering Profession	1
CIV		Directed Design Project	. 1-3
CIV	199,	, 299, 399	
		Special Topics in Civil Engineering	. 1-3

## **Computer Engineering**

**Bachelor of Science** 

The Bachelor of Science in Computer Engineering degree gives the student the opportunity to acquire a broad background in computer design, including embedded control systems, real-time systems, telecommunication systems, and software engineering. The curriculum includes courses in general education, computer science, software engineering, and electrical engineering, and features a capstone senior design. The program's emphasis on real-time embedded control systems and hardware/software interfaces provides program graduates employment opportunities beyond graduates of traditional computer engineering programs, including positions in the aerospace and defense industries.

The goal of the Computer Engineering program is to produce graduates who are successful practitioners of computer engineering. The detailed objectives of the program are that our graduates:

- Effectively analyze, design, and implement computer systems, including embedded, real-time, and safety-critical computer systems.
- Demonstrate professionalism in their work and grow professionally through continued learning and involvement in professional activities.
- Contribute to society by behaving ethically and responsibly.
- Communicate effectively in oral, written, and newly developing modes and media.
- Assume a variety of roles in teams of diverse membership.

The program curriculum is designed to facilitate accomplishment of these objectives by program graduates. The program includes significant project work designed to prepare students to work as part of a team on the development of complex systems involving both software and hardware. It allows the student opportunities to develop capabilities in teamwork, designing to requirements, and quality assurance techniques. The Computer Engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (111 Market Place, Suite 1050, Baltimore, MD 21202-4012; Telephone: (410) 347-7700, http://www.abet.org).

### DEGREE REQUIREMENTS

The Bachelor of Science in Computer Engineering can be earned in eight semesters assuming appropriate background and fulltime enrollment. Successful completion of a minimum of 127 credit hours is required. To enter this program, students should have demonstrated competence in mathematics, physics, and computer programming in high school, and they should be prepared to enter Calculus and Analytical Geometry I and Computer Science I. If necessary, students can prepare for the program by taking College Algebra (MA 140) and/or Trigonometry (MA 142) before taking Calculus and Analytic Geometry (MA 241). Students should check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

#### FIRST YEAR

See Common Freshman Year outline on page 121.

#### **Total Credits**

2	2
	١Z

#### SECOND YEAR

Cour	se	Title	Credits
CEC	220	Digital Circuit Design	3
CEC	222	Digital Circuit Design Laboratory	1
		Microprocessor Systems	
CEC	322	Microprocessor Systems Laboratory .	1
COM	221	Technical Report Writing	3
		Introduction to Discrete Structures	
CS	225	Computer Science II*	
		(3 credits lecture, 1 credit lab) –OR– .	4
COM	219	Speech*	3
EE	223	Linear Circuit Analysis I	3
EE	224	Electrical Engineering Laboratory I	1
MA	243	Calculus and Analytic Geometry III .	4
MA	345	Differential Equations and	
		Matrix Methods	4
PS	250	Physics III for Engineers	3
PS	253	Physics Laboratory for Engineers	1
Total	Cree	dits	34/33

#### Total Credits

\* Students in the Computer Engineering program are encouraged to take CS 225 during the first year, postponing COM 219 until the second year.

#### THIRD YEAR

Cours	se	Title	Credits
CEC	300	Computing in Aerospace and Aviation	ı3
CEC	330	Digital System Design with	
		Aerospace Applications	
CEC	315	Signals and Systems	3
CS	420	Operating Systems	3
EC	225	Engineering Economics	3
EE	302	Electronic Devices and Circuits	3
EE	304	Electronic Circuits Laboratory	1
HU/S	SS	Humanities/Social Sciences Élective.	3
MA	412	Probability and Statistics	3
SE	300	Software Engineering Practices	
		(3 credits lecture, 1 credit lab)	4
CEC	450	Real Time Systems	3
Total	Cree	dits	33

#### FOURTH YEAR

Course	Title	Credits
CEC 420	Computer Systems Design I	
	(2 credits lecture, 1 credit lab)	3
CEC 421	Computer Systems Design II	
	(1 credit lecture, 2 credit lab)	3
	Telecommunication Systems	
CEC 470	Computer Architecture	3
CEC/EE	3/4 Élective *	
	(3 credit lecture, 1 credit lab)	4
	HU/SS 3/4XX Humanities or Social	
	Sciences Elective (upper division)	3
	Specified Electives **	9
Total Credits		28
TOTAL DE	GREE CREDITS	127

\*EE 401/402, CEC 410/411, EE 410/412, other CEC/EE (300/400) with the approval of the program coordinator.

\*\*Specified electives are courses to be selected, with the approval of the program coordinator, to support acquiring a minor, an identified concentration of domain knowledge (for example, aerospace, aviation, business, communications, human factors, mathematics, etc.) or further depth in computer engineering or related disciplines.

32/33

# Computer Engineering/Master of Software Engineering

Bachelor of Science Master of Software Engineering

This is a five-year program that allows exceptional students to complete both a B.S. in Computer Engineering and a Master of Software Engineering degree. The objective of this five-year program, in addition to the objective for the Computer Engineering program, is to produce professional software engineers with advanced knowledge and skill in:

- Fundamentals of computing (discrete mathematics, programming languages, operating systems, computer architecture, and so on)
- Software systems development for realtime embedded applications
- Use of personal and team software processes
- Understanding the breadth of software engineering's terminology, tools, and techniques
- Use of requirements engineering and software architecture and design
- Use of modern software development methodologies (for example, object-oriented analysis and design)
- Software development in "real" work environments

## DEGREE REQUIREMENTS

Students interested in pursuing this program must meet the following requirements:

- Maintain at least a 3.2 cumulative GPA throughout the academic program.
- Maintain at least a 3.0 cumulative GPA for

the graduate credits.

- Complete a total of 151 credit hours (listed in a subsequent section). There will be 124 credit hours of undergraduate requirements (equivalent to the B.S. in Computer Engineering) and 27 credit hours of graduate requirements (equivalent to a Master of Software Engineering degree).
- The program includes a requirement for two summer internships in the industry. Credit at the undergraduate and graduate level will be awarded for approved and successful work.

#### YEAR 1

See common Freshman Year outline on page 121.

#### **Total Credits**

#### YEAR 2

Cours	se	Title	Credits
CEC	220	Digital Circuit Design	3
CEC	222	Digital Circuit Design Laboratory	1
CEC	320	Microprocessor Systems	3
CEC	322	Microprocessor Systems Laboratory .	1
		Technical Report Writing	
		Introduction to Discrete Structures	
		Linear Circuit Analysis I	
EE	224	Electrical Engineering Laboratory I	1
		Calculus and Analytic Geometry III .	4
MA	345	Differential Equations and	
		Matrix Methods	4
PS	250	Physics III for Engineers	3
PS	253	Physics Laboratory for Engineers	1
CS	225	Computer Science II*	
		(3 credits lecture, 1 credit lab) -OR	4
COM	219	Speech*	3
Total	Cree	dits	34/33

\* Students in the Computer Engineering program are encouraged to take CS 225 during the first year, postponing COM 219 until the second year.

#### YEAR 3

1 L/11			
Cour	se	Title	Credits
CEC	300	Computing in Aerospace and Aviation	n3
CEC	315	Signals and Systems	3
		Digital System Design with	
		Aerospace Applications	4
CEC	450	Real Time Systems	3
CS		Operating Systems	
EC	225	Engineering Economics	3
EE		Electronic Devices and Circuits	
EE		Electronics Circuits Laboratory	
		Humanities/Social Sciences Elective.	
MA		Probability and Statistics	3
SE	300	Software Engineering Practices	
		(3 credits lecture, 1 credit lab)	4
Total	Cre	dits	32
SUM	MEI	R TERM (BETWEEN YEAR 3 AND Y	EAR 4)
Cour	se	Title	Credits
CESE	4XX	Cooperative Education	3

#### Total Credits

The student must spend the term performing a co-op in a software industry and be engaged in a software engineering activity (such as analysis, design, code, or test).

#### YEAR 4

Cours	se Title	Credits
CEC	420 Computer Systems Design I	
	(2 credit lecture, 1 credit lab)	3
CEC	421 Computer Systems Design II	
	(1 credit lecture, 2 credits lab)	3
CEC	460 Telecommunication Systems	
CEC	470 Computer Architecture	3
CEC/	'EE 3/4 Elective *	
	(3 credit lecture, 1 credit lab)	4
HU/S	SS 3/4XX Humanities or Social Sciences	
	Elective (upper division)	
SE	500 Software Engineering Concepts	3
SE	510 Software Project Management	3
SE	530 Software Requirements Engineering.	3
Total	Credits	28

#### FIVE-YEAR CE/MSE CURRICULUM

#### Summer Term (between YEAR 4 and YEAR 5)

Course Title	Credits
CESE 5XX Cooperative Education	
Total Credits	3

The student must spend the term performing a co-op in a software industry and be engaged in a software engineering activity (for example, analysis, design, code, or test).

#### YEAR 5

3

SE SE	555	<b>Object-Oriented Software Construction</b>	n 3
SE	610	Object-Oriented Software Construction Software Architecture and Design	3
SE		Elective**	
Total	Cre	dits	18
5 YEAR TOTAL			151

#### \*CEC/EE 300/400 Level Elective

\* EE 401/402, CEC 410/411, EE 410/412, other CEC/EE (300/400) with the approval of the program coordinator.

#### <u>\*\* Software Engineering 500/600 Level</u> Elective

SE	520	Formal Methods for Software
		Engineering
SE	535	GUI Design and Evaluation
SE	545	Specification and Design of Real-Time
		Systems
SE	625	Quality Engineering and Assurance3
SE	565	Concurrent and Distributed Systems3
SE	575	Software Safety
SE	655	Performance Ánalysis of Real-Time
		Systems
SE	585	Metrics and Statistical Methods of
		Software Engineering
SE	660	Formal Methods for Concurrent and Real-
		Time Systems
While other elective courses may be selected, the		

student's advisor and the program coordinator must approve the selection.

# **Computer Science**

**Bachelor of Science** 

The curriculum for the Bachelor of Science degree in Computer Science includes courses in software development, computer organization, database systems, and software engineering. The program provides a blend of theory and applications that prepares students for a variety of computer science and software engineering positions in scientific and business fields, and lays the foundation for graduate studies in computer science and software engineering. Upper-level courses involve students in team projects that emphasize industrial processes and practices. The courses in the Area of Concentration (AOC) allow students to broaden their general education or pursue specific interests.

### APPLIED MATHEMATICS AREA OF CONCENTRATION

A Computer Science degree with an area of concentration in Applied Mathematics is designed to produce graduates who can operate at the intersection of applied mathematics, computer science, and a science application area. This degree program integrates computing, mathematical modeling and visualization to solve complex problems that arise in the physical, natural, and behavioral sciences as well as engineering. Students will have a very strong core of computing, as well as an exposure in depth to numerical methods, modeling and visualization. This background is synthesized and applied to computational models that arise in such areas as atmospheric physics, structural dynamics, or computational fluid dynamics in the capstone course.

Because of the strong emphasis on applied mathematics, computing tools, and science applications, this program provides an excellent background for graduates to work in a variety of aviation/aerospace or homeland security industries.

### DEGREE REQUIREMENTS

The Bachelor of Science degree can be earned in eight semesters assuming appropriate background and full-time enrollment. Successful completion of a minimum of 121 credit hours is required.

Students entering this program should have demonstrated a competence in mathematics and science (preferably physics). They should be prepared to enter Calculus I, having demonstrated proficiency in algebra and trigonometry. Students can prepare for this program by taking MA 140, College Algebra, and MA 142, Trigonometry, prior to taking MA 241. For those students who have not taken physics in high school, it is recommended that PS 103, Technical Physics I, be taken prior to PS 150.

The Computer Science program is designed to prepare students to work as part of a team on the development of software systems. Software engineering concepts are integrated through the curriculum. The curriculum includes courses in general education, math science, and computing. The latter is divided into computing fundamentals, advanced concepts, applied computing, and software engineering. In addition, a student are required to select an area of concentration in a domain area of interest.

Students should be aware that several courses in each academic year may have pre-requisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

#### **FRESHMAN YEAR**

Course	Title	Credits
COM 122	English Composition & Literature	3
CS 225	Computer Science II	4
EGR 101	Introduction to Engineering	2
EGR 115	Introduction to Computing for Engine	eers 3
HU 14X	Humanities	3
MA 241	Calculus I	4
MA 242	Calculus II	4
PS 150	Physics I	3
PS 160	Physics II	3
UNIV 101	College Success	1
Total Cre	dits	30

#### Total Credits

#### SOPHOMORE YEAR

Cours	se	Title	Credits
CEC	220	Digital Circuit Design	3
COM	219	Speech	3
CS	222	Discrete Math	3
		HU/SS Elective	3
		Calculus III.	
MA	345	Differential Equations	4
		Physics III for Engineers	
PS	253	Physics Laboratory for Engineers	1
SE	300	Software Engineering	4
WX	201	Survey of Meteorology	3
Total Credits		31	

#### JUNIOR YEAR

Course	Title Credit	S
CEC 300	Computing in Aerospace and Aviation3	
COM 221	Technical Report Writing3	
CS 315	Data Structure	
CS 344	C Programming and Unix3	

CS	375	Algorithms	3
		Energy Transfer Fundamentals	3
		HU/ŠS 3/4XX Elective	3
MA	350	Partial Differential Equations	
MA	412	Probability and Statistics	3
MA	432	Linear Algebra	3
Total Credits			30
SENIOD VEAD			

#### SENIOR YEAR

Cour	se	Title	Credits
CS	317	Files and Database Systems	3
CS		Programming Languages	
CS		Operating Systems	
		Open Elective	
HU/S	SS	3/4XX Upper-Level Humanities	6
		High Performance Scientific Computin	
MA	488	Numerical Methods in Fluids	3
MA	490	Capstone Project	3
		Scientific Visualization	
Total	Cre	dits	30
TOTAL DEGREE CREDITS		121	

#### <u>Applied Mathematics Area of Concentration</u>

Course		se	Title	Credits
	CS	375	Algorithms	3
	ES	312	Energy Transfer Fund	3
			Calculus III.	
	MA	345	Differential Equations	4
	MA	350	Partial Differential Equations	3
	MA	432	Linear Algebra	3
			Scientific Visualization	
	MA	453	High Performance Scientific Computin	ig .3
	MA	488	Numerical Methods in Fluids	3
	MA	490	Capstone Project	3
	WX	201	Survey of Meteorology	3
	Total	Cre	dits	35

## **Electrical Engineering**

**Bachelor of Science** 

The Bachelor of Science degree in Electrical Engineering provides the student with the opportunity to acquire a broad background in circuit theory, communication systems, computers, control systems, electromagnetic fields, energy sources and systems, and electronic devices. Emphasis on design places the Embry-Riddle Electrical Engineering student in a unique position to increase employment opportunities after graduation.

Two tracks are available in the Electrical Engineering program: Telecommunications and Systems. The first two years are common, so students do not need to make a track decision until the beginning of their third year.

### DEGREE REQUIREMENTS

The Bachelor of Science in Electrical Engineering requires the successful completion of a minimum of 129 credit hours.

#### FRESHMAN YEAR

See the common Freshman Year outline on page	2121
Total Credits	32/33

#### SOPHOMORE YEAR

Course	Title
Course	Title

CEC CEC	222 320	Digital Circuit Design (or COM 219)3 Digital Circuit Design Laboratory1 Microprocessor
CEC	322	Microprocessor Laboratory1
COM	221	Technical Report Writing
		-OR-
CS	225	Computer Science II4
EE	223	Linear Circuit Analysis
EE	224	Electrical Engineering Laboratory1

MA	243	Calculus and Analytic Geometry III4
MA	345	Differential Equations and
		Matrix Methods4
PS	250	Physics III for Engineers
PS	253	Physics Laboratory for Engineers1
SYS	301	Introduction to Systems Engineering3
Total Credits 33/34		

## AEROSPACE SYSTEMS TRACK

The modern aircraft is an assembly of a wide spectrum of components all operating together in a large and complex system. The aircraft then operates in the National Airspace System where it must operate in harmony with other aircraft, air traffic management, navigation, and safety systems all at a reasonable cost. This example shows the importance of systems engineering and the broad range of subjects covered.

#### JUNIOR YEAR

Cour	se	Title	Credits
CEC	315	Signals and Systems	3
EE	300	Linear Circuits II	3
EE	301	Linear Circuits Laboratory	1
EE	302	Electronic Devices	3
EE	304	Electronic Devices Lab	1
EE	308	Introduction to Electrical	
		Communications	
HU/	SS 1,	/2XX HU/SS	3
HU/	SS 2,	/3XX HU/SS	3
MA	441	Advanced Engineering Mathematics	3
SYS	302	System Engineering Design	
		Considerations	3
SYS		Optimization in Systems Engineering	
SYS	304	Systems Engineering in Management,	,
		Risk, and Decision Making	3
Total Credits		32	

Credits

#### SENIOR YEAR

Course	Title	Credits
EC 225	Engineering Economics	3
EE 3/42	XX EE Upper Level	3
EE 401	Control Systems Analysis & Design .	3
EE 402	Control Systems Laboratory	1
	Tech. Electives 3/400	3
HU/SS 3/	/400 HU/SS Upper Level	3
HU/SSXX	X HU/SS Elective	3
SYS 405	Aerospace Systems Guidance and Con	ntrol3
SYS 417	Senior Systems Engineering Project	3
SYS 403	Systems Engineering Life Cycle Costin	ng .3
SYS 410	Space Systems and Mission Analysis	3
Total Cree	dits	31
TOTAL DEC	GREE CREDITS	129

## TELECOMMUNICATIONS TRACK

The Telecommunications track of the Electrical Engineering program provides preparation for students interested in the all-important communications field. Aerospace applications abound, including extensive networks for air traffic management, airline operations, and space communications. Wired and wireless communications systems are covered.

#### JUNIOR YEAR

Cour	se	Title	Credits
CEC/	'EE/	MA/PS/SE 3/4XX Upper-Level Electi	ve 3
CEC	315	Signals and Systems	3
EE	300	Linear Circuits II	3
EE	301	Linear Circuits Lab	1
EE	302	Electronic Devices	3
EE	304	Electronic Devices Lab	1
EE	308	Introduction to Electrical	
		Communications	
EE	340	Electrostatics and Magnetic Fields	3
ES	ХХХ	CEngineering Sciences Elective	3
HU/S	SS 1/	2XX Humanities/Social Sciences	
		Elective	3
HU/S	SS 2/	/3XX Humanities/Social Sciences	
		Elective	
MA	441	Advanced Engineering Mathematics	3
Total	Cree	dits	32

#### SENIOR YEAR

Course	Title	Credits	
CEC 410	Digital Signal Processing	3	
CEC 411	Digital Signal Processing Lab	1	
EC 225	Engineering Economics	3	
EE 3/4	XX EE Elective (upper division)**	3	
EE 401	Control Systems	3	
EE 402	Control Systems Lab	1	
EE 417	Digital Communications	3	
EE 422	Wired and Fiber Optics Communicati	ons 3	
EE 424	Wireless Communications	3	
EE 425	Wireless Communications Lab	1	
EE 475	Senior Telecommunications Project	3	
HU/SS 3	/4XX Humanities/Social Sciences		
	Elective (upper division)	3	
HU/SS XXX Humanities/Social Sciences Elective 3			
Total Credits		33	
TOTAL DEGREE CREDITS		131	

\*\* Advanced EE electives are selected from a list provided by the department chair.

# Mechanical Engineering

**Bachelor of Science** 

Mechanical Engineering is a well-established engineering discipline that involves the stateof-the-art of engineering analysis, design, and research. Mechanical engineers have been in demand for literally hundreds of years and remain one of the more sought-after degree holders.

The common freshman year is the first year of the Mechanical Engineering program. The second year is the same as Aerospace Engineering, which gives the student great flexibility when deciding his or her major field of study.

The Mechanical Engineering program offers two areas of emphasis, or tracks, in High Performance Vehicle and Robotic Systems, which add to the breadth of topics in Mechanical Engineering such as machine design, heat transfer, and vibrations. The Robotic Systems track prepares students for the rapidly expanding robotics field, including applications to the aerospace industry. Attention is paid to the systems nature of robotics to include the integration of mechanics and electronics. The High Performance Vehicle track prepares students for employment in vehicle design and manufacturing, from competition vehicles to fuel-efficient and environmentally friendly vehicles. Subjects include aerodynamics, structures, and safety.

The objectives of the Mechanical Engineering degree are to produce graduates who:

• Are prepared to be immediately productive as well-rounded mechanical engineers in aerospace, aviation, and related fields

- Are able to systematically apply the fundamental principles of science and mathematics to solve engineering problems.
- Are effective at both oral and written communications.
- Work effectively within a team, in both supporting and leadership roles.
- Have exceptional backgrounds in engineering design that meet system, component, or process requirements and comply with health and environmental requirements.
- Are able to apply their knowledge to realworld multidisciplinary challenges facing society.
- Are able to apply the latest tools and technology to engineering problems.
- Understand the impact of engineering solutions in a global, economic, environmental, political, social, and ethical context.
- Understand the importance of life-long learning and pursue professional development, including advanced degrees and professional registration.

The curriculum is designed to accomplish the objectives with a base of engineering, math, and sciences that includes probability and statistics or numerical methods; engineering economics; advanced mathematics; electrical engineering; and engineering design. The culmination of the program is a two-semester design project that prepares the students for working in a team environment on projects involving mechanical engineering.

#### FRESHMAN YEAR

See the common Freshman Year outline on page 121. Total Credits 32

#### SOPHOMORE YEAR

Cour	se	Title	Credits
COM	221	Technical Report Writing	3
COM	[219	Speech -OR-	
EGR	120	Engineering Graphics	3
ES	201	Statics	3
ES	202	Solid Mechanics	3
ES	204	Dynamics	3
ES	206	Fluid Mechanics	3
MA	243	Calculus III.	4
MA	345	Differential Equations & Matrix Meth	ods 4
PS	105	General Chemistry	4
PS	250	Physics III for Engineers	3
PS	253	Physics Laboratory for Engineers	1
Tatal	Cro	dita	24

#### Total Credits

#### JUNIOR YEAR

Cour	se	Title	Credits
EE	335	Electrical Engineering	2
EE	336	Electrical Engineering Laboratory	1
ES	305	Thermodynamics	3
ES	320	Engineering Materials	2
ES	321	Engineering Materials Laboratory	1
MA	412	Probability and Statistics	
		-OR-	
MA	438	Numerical Analysis I	3
ME	304	Introduction to Machine Design	3
ME		Machine Design Laboratory	1
ME	303	Vehicle Dynamics (HPV)	
		-OR-	
ME	306	Robotic Mechanisms (RS)	3
ME	401	Advanced Fluid Dynamics	3
ME	3/42	XX Mechanical Engineering Elective	3
ME		Vibrations and Acoustics	
ME	410	Advanced Machine Design	2
Total	Cre	dits	30

#### SENIOR YEAR (HIGH PERFORMANCE VEHICLES)

Course		Title	Credits
EC	225	Engineering Economics	3
EE	401	Control Systems	3
ES	403	Heat Transfer	3
HU		Upper-Level Humanities	
ME	405	Vehicle Power Systems	3
ME	409	Vehicle Aerodynamics	3
ME	413	Preliminary Design of High Performa	nce
		Vehicles w/Laboratory	4
ME	423	Senior Design of High Performance	
		Vehicles	3
ME/	EE//	AE Technical Elective	3
ME/EE/AE Technical Elective			3
Total Credits		31	

#### SENIOR YEAR (ROBOTICS SYSTEMS)

Course		Title	Credits
EC	225	Engineering Economics	3
EE	401	Control Systems	3
ES	403	Heat Transfer	3
HU	Upp	per-Level Humanities	3
ME	402	Robot Arms	3
ME	404	Mechatronics	3
ME	407	Preliminary Robotic Systems	
		Design with Laboratory	4
ME	427	Senior Robotic Systems Design	3
ME/	EE//	AE Technical Elective	3
ME/EE/AE Technical Elective		3	
Total Credits		31	
TOTAL DEGREE CREDITS			127

## Software Engineering

**Bachelor of Science** 

The Bachelor of Science degree in Software Engineering is designed to prepare students for an entry-level software engineering position in industry that supports the design and implementation of software systems with the focus on real-time, embedded, and safetycritical applications. Such systems are critical in aviation, space, medicine, and other disciplines that rely on high-quality, dependable software. The objectives of the Software Engineering program are that our graduates:

- Effectively analyze, design, and implement software systems, including embedded, real-time, and safety-critical systems.
- Demonstrate professionalism in their work and grow professionally through continued learning and involvement in professional activities.
- Contribute to society by behaving ethically and responsibly.
- Communicate effectively in oral, written, and newly developing modes and media.
- Successfully assume a variety of roles in teams of diverse membership.

The curriculum is designed to facilitate accomplishment of these objectives by program graduates. It provides a broad education, including fundamental knowledge about computer software and hardware. It also allows graduates to work in a team environment and to recognize the value of collaborative effort. The program lays a foundation for lifelong learning, professional growth, and ethical and responsible behavior in society.

### DEGREE REQUIREMENTS

The Bachelor of Science degree can be earned in eight semesters assuming appropriate background and full-time enrollment. Successful completion of a minimum of 127 credit hours is required.

Students entering this program should have demonstrated a competence in mathematics and science (preferably physics). They should be prepared to enter Calculus I, having demonstrated proficiency in algebra and trigonometry. Students can prepare for this program by taking MA 140, College Algebra, and MA 142, Trigonometry, prior to taking MA 241. For those students who have not taken physics in high school, it is recommended that PS 103, Technical Physics I, be taken prior to PS 150.

The Software Engineering program is designed to prepare students to work as part of a team on the development of software systems. Software engineering concepts, methods, and techniques are integrated through the curriculum. The curriculum includes courses in general education, math and science, and computing. The latter is divided into computing fundamentals, advanced concepts, applied computing, and software engineering. In addition, a student can acquire a minor or a concentration in a domain area of interest. Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

The Software Engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering Technology (111 Market Place, Suite 1050, Baltimore, MD 21202-4012,

Telephone: (410) 347-7700, http://www. abet.org).

#### FIRST YEAR

See common Freshman Year outline on page 121. **Total Credits** 32/33

#### SECOND YEAR

#### Course Title

Credits

Course	-	THE	Cicuito
AS 1	20	Principles of Aeronautical Science	3
CEC 2	220	Digital Circuit Design	3
CEC 2	222	Digital Circuit Design Laboratory	1
CEC 3	320	Microprocessor Systems	3
CEC 3	322	Microprocessor Systems Laboratory .	1
COM2	221	Technical Report Writing	3
CS 2	222	Introduction to Discrete Structures	3
CS 2	225	Computer Science II*	
		(3 credits lecture, 1 credit lab) -OR	4
COM2	219	Speech*	3
		Data Structures and Algorithms	
PS 2	250	Physics III for Engineers	3
PS 2	253	Physics Laboratory for Engineers	1
SE 3	300	Software Engineering Practices	
		(3 credits lecture, 1 credit lab)	4
Total Cre		dits	32/31

#### **Total Credits**

\* Students in the Software Engineering program are encouraged to take CS 225 during the first year, postponing COM 219 until the second year.

#### THIRD YEAR

#### Course Title

Credits

CEC	470	Computer Architecture	3
CS	317	Files and Database Systems	3
CS	332	Organization of Programming Languag	es3
CS	420	Operating Systems	3
EC	225	Engineering Economics	3
HU/S	SS X	XX Humanities/Social Sciences Elective	3
		X Math Elective **	
MA	412	Probability and Statistics	3
SE	310	Analysis & Design of Software Systems	3
SE	320	Software Construction	3
CEC	450	Real Time Systems	3
Total	Cree	dits	33

#### FOURTH YEAR

Course	Title	Credits
CEC/CS	/SE 3/4XX Elective	3
	3/4XX Humanities/Social Sciences Elec	
	(upper division)	3
	Open Elective	3
SE 410	) Formal Software Modeling	3
	) Software Quality Assurance & Testing	
	) Software Team Project I	•
	(2 credits lecture, 1 credit lab)	3
SE 45	Software Team Project II	
	(1 credit lecture, 2 credits lab)	3
	Specified Electives***	9
Total Cr	edits	30
TOTAL D	EGREE CREDITS	127

\*\* Math elective to be selected from an approved list of courses maintained by the program coordinator.

\*\*\* Courses to be selected, with the approval of the program coordinator, to support acquiring a minor, an identified concentration of domain knowledge (aerospace, aviation, business, communications, human factors, mathematics, etc.), or further depth in software engineering or related disciplines.

32/33

# Software Engineering/Master of Software Engineering

**Bachelor of Science** Master of Software Engineering

This is a five-year program that allows exceptional students to complete both the Bachelor of Science in Software Engineering (BSSE) and Master of Software Engineering (MSE) degrees.

The objective of this five-year program is to produce professional software engineers with advanced knowledge and skill in:

- Fundamentals of computing (discrete mathematics, programming languages, operating systems, computer architecture, and so on)
- Software systems development for realtime embedded applications
- Use of personal and team software processes
- Understanding the breadth of software engineering terminology, tools, and techniques
- Use of requirements engineering and software architecture and design
- Use of modern software development methodologies (such as object-oriented analysis and design)
- Software development in "real" work environments.

Students interested in pursuing this program must meet the following requirements:

- Maintain at least a 3.2 cumulative GPA throughout the academic program.
- Maintain at least a 3.0 cumulative GPA for the graduate credits.

- Complete a total of 151 credit hours (listed in a subsequent section). There will be 124 credit hours of undergraduate requirements (equivalent to the B.S. in Software Engineering) and 27 credit hours of graduate requirements (equivalent to a Master of Software Engineering degree).
- The program includes a requirement for two summer internships in the industry. Credit at the undergraduate and graduate level will be awarded for approved and successful work.

#### YEAR 1

See common Freshman Year outline on page 121.

#### **Total Credits**

#### YEAR 2

Cour	se	Title	Credits
AS	120	Principles of Aeronautical Science	3
CEC	220	Digital Circuit Design	3
CEC	222	Digital Circuit Design Laboratory	1
CEC	320	Microprocessor Systems	3
CEC	322	Microprocessor Systems Laboratory .	1
COM	221	Technical Report Writing	3
CS	222	Introduction to Discrete Structures	3
CS	315	Data Structures and Algorithms	3
PS	250	Physics III for Engineers	3
PS	253	Physics Laboratory for Engineers	1
SE	300	Software Engineering Practices	
	(3 ci	redits lecture, 1 credit lab)	4
CS	225	Computer Science II*	
	(3 ci	redits lecture, 1 credit lab) -OR	4
COM	219	Speech	3
Total	Cree	dits	32/31

#### Total Credits

\* Students in the Software Engineering program are encouraged to take CS 225 during the first year, postponing COM 219 until the second year.

## Academic Programs at the Daytona Beach Campus

## YEAR 3

Title	Credits
Real Time Systems	3
Computer Architecture	3
Files and Database Systems	3
Organization of Programming Langu	ages3
Operating Systems	3
Engineering Economics	3
XX Humanities/Social Sciences Electiv	/e 3
X Math Elective*	3
Probability and Statistics	3
dits	33
	Title         Real Time Systems         Computer Architecture         Files and Database Systems         Organization of Programming Langu         Operating Systems         Operating Systems         Engineering Economics         XX Humanities/Social Sciences Electiv         X Math Elective*         Probability and Statistics         Analysis and Design of Software Syst         Software Construction         dits

\* Math elective to be selected from an approved list of courses maintained by the program coordinator.

#### SUMMER TERM (BETWEEN YEAR 3 AND YEAR 4)

Course Title	Credits
CESE 4XX Cooperative Education	3
Total Credits	3

The student must spend the term performing a co-op in a software industry and be engaged in a software engineering activity such as analysis, design, code, or test.

#### YEAR 4

Cour	se	Title	Credits
CEC/	CS/	SE 3/4XX Elective	6
HU/S	SS 3/	4XX Humanities/Social Sciences Elec	tive
		(Upper Level)	3
SE	500	Software Engineering Concepts	3
SE	530	Software Requirements Engineering.	3
SE	625	Quality Engineering and Assurance .	3
		Open Elective	3
SE	410	Formal Software Modeling	3
SE	450	Software Team Project I	
		(2 credits lecture, 1 credit lab)	3
SE	451	Software Team Project II	
		(1 credit lecture, 2 credits lab)	3
Total	Cree	dits	30

## Summer Term (between YEAR 4 and YEAR 5)

Course Title	Credits
CESE 5XX Cooperative Education	3
Total Credits	3

The student must spend the term performing a co-op in a software industry and be engaged in a software engineering activity such as analysis, design, code, or test.

## YEAR 5

## Software Engineering 500-600 Level Elective\*\*

Cou	rse	Title	Credits
SE	510	Software Project Management	3
SE		Software Architecture and Design	
SE		Elective**	12
Tota	l Cre	dits	18
5 Ye	AR TC	DTAL	151
<u>**</u> E	lecti	ves	
SE	520	Formal Methods for Software	
		Engineering	3
SE	535	GUI Design and Evaluation	3
SE	545	Specification and Design of Real-Tim	e
		Systems	3
SE	565	Concurrent and Distributed Systems	
SE	575	Software Safety	3
SE	655	Performance Analysis of Real-Time	
		Systems	3
SE	585	Metrics and Statistical Methods of	
		Software Engineering	3
SE	660	Formal Methods for Concurrent and	
		Real-Time Systems	3
Whil	e othe	er elective courses may be selected, the stud	lent's

While other elective courses may be selected, the student's advisor and the program coordinator must approve the selection.

## Academic Programs at the Prescott Campus

## College of Arts and Sciences

Dr. Richard Bloom, Dean

Welcome. Our programs and curricula encompass the humanities, communication, the physical and life sciences, the social and psychological sciences, mathematics, economics, business, management, security and intelligence studies, and military science. In essence, our wide variety of offerings signifies that our College puts the universe in university. Through our academic experience we offer mental, physical, and spiritual enrichment so that our students can succeed in all areas of life from the professional to the personal. The College of Arts and Sciences, Prescott campus, is dedicated to providing stateof-the-art (1) general education, (2) degree programs centered on challenges facing today's era of globalization, (3) Reserve Officer Training commissioning (ROTC) programs under the auspices of the U.S. Army and U.S. Air Force, (4) Federal TRIO programs encompassing the Math Science Regional Center, Upward Bound, and the Ronald E. McNair Scholars Program, (5) international education and exchange programs, (6) professional consultation supporting the needs of government and industry, and (7) scholarly accomplishment creating knowledge for the benefit of humanity. Cherished pursuits of the College are developing leaders, inculcating moral and ethical integrity, resolving world issues, and maintaining the unquenchable passion of the human soul.

**General Education.** The College offers courses in math, the physical and life sciences, the social and psychological sciences, humanities, communication,

economics, business, management, and security and intelligence studies. These courses provide essential knowledge supporting all University degree programs. They also provide an intellectual grounding necessary for 21st century success on the student's terms. Finally, they shape the priceless skills of speech, writing, quantitative analysis, and critical thinking. General education is founded on wisdom accumulated from the beginnings of intellectual history to the present and is culled from a rich selection of eras, epochs, cultures, and historical moments. It is the general education contribution that makes Embry-Riddle a truly outstanding university with a timeless heart and soul.

**Degree Programs.** The College offers five degree programs: Aviation Environmental Science; Global Security and Intelligence Studies; Aerospace Studies; Space Physics; and Aviation Business Administration.

U.S. Army Air and U.S. Air Force ROTC. ROTC activities are administratively situated in the College to ensure the highest quality educational experience for all ROTC cadets. Please refer to the Special Academic Programs and Opportunities section of the catalog for more information.

Federal TRIO Programs. The Math Science Regional Center and Upward Bound provide special services and programs for college-bound students from disadvantaged backgrounds as described in the Higher Education Act of 1965, Title IV, Part A, Subpart 2. The prestigious Ronald E. McNair Scholars Program offers financial aid, academic, and other professional support to eligible underserved (low income/first generation) or under-represented (minorities and women in certain degree programs), upper-division students who desire to pursue graduate studies after graduation from Embry-Riddle. Please refer to the Financial Assistance section of the catalog for more information.

National Aeronautics and Space Administration (NASA) Resource Center. Our math and science faculty are engaged in developing and implementing novel education and training opportunities for students and teachers from kindergarten through high school. This engagement is possible through the support of and in coordination with NASA and is unique with its outcome assessment foundation.

**Foreign Language Institute.** The Institute provides intensive education and training in Arabic and Chinese languages and cultures during the summer months for undergraduate students. This opportunity will be broadened to include personnel in the business, education, and law enforcement communities.

International Education. All students have the option of receiving a portion of their undergraduate education at selected universities in Europe, Asia, Latin America, Africa, and the Middle East. Other international education experiences include co-ops and internships. The College matches the needs of each student with prospective academic institutions.

**Professional Consultation.** Faculty work on grants, contracts, and consultancies with federal, state, and local governments. These faculty members also set world standards in partnership with corporations and other business and industrial entities. Finally, they shape public opinion through extensive mass media communication. Of special note are the College's Global Security and Intelligence Studies (GSIS) faculty, who continue to break new ground in aviation security, homeland security and defense, antiterrorist and counterterrorist policy, and international risk and threat assessment. A unique GSIS asset is the Global Intelligence Monitoring Center (GIMC), which is corporately funded, staffed by faculty and students, and dedicated to state-of-theart training in intelligence analysis. The GIMC produces daily intelligence products that are transmitted to clients worldwide. Students have the opportunity to work closely with the faculty and have gone on to successful careers in government, the military, and business. This is also the case for students in the Aviation Business Administration program, who participate in faculty-led teams providing security management and environmental management consulting for airports and other transportation sites.

Scholarly Accomplishment. All faculty are engaged in creating knowledge for the benefit of humanity. Knowledge may be basic or applied and covers all the arts and sciences. Students often work closely with faculty on grants, contracts, and other scholarship pursuits. These opportunities most often occur at the national laboratories.

**Conclusion.** At the Prescott campus, the College of Arts and Sciences works closely with the Colleges of Aviation and Engineering. The result is a seamless and unsurpassed educational experience that places the student on the road to professional, social, and personal success. The College of Arts and Sciences also is fully engaged with the rest of the world to further knowledge, resolve problems, and help chart the future.

## Aerospace Studies

**Bachelor of Science** 

## PROGRAM PLAN OF STUDY AND REQUIREMENTS

The Aerospace Studies program consists of core requirements and three minors. The core requirements in this program help make our students worldly thinkers who understand that information and skills gleaned from one area of life can be applied to other areas. The program's core requirements respond directly to calls by American corporate leaders for graduates who understand both technology and human beings. To that end, students choose from courses in the humanities, geography, international studies, philosophy and ethics, and psychology. The core prepares students to connect their three minor fields of study meaningfully and usefully. In the capstone experience, the student chooses a senior thesis or a co-op in industry.

By combining three minors, students design their own degree programs. Such combinations as security/psychology/safety or space studies/computer science/psychology offer combinations of fields that the aerospace industry should find useful. A minor in Asian Studies or Security will add an international component to the degree. Minors in the business areas give students practical knowledge that combines well with the more technical areas, while a minor in Helicopter Flight remains a popular aviation related choice. The element of choice in the program gives students experience in planning their own futures. The program seeks to produce students with an entrepreneurial spirit who

will cross boundaries, make creative connections, and become leaders in aviation and aerospace.

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

## DEGREE REQUIREMENTS

The Bachelor of Science degree in Aerospace Studies requires successful completion of a minimum of 120 credit hours. Included in the 120 credit hours must be 40 credit hours of upper-division courses (300-400 level).

## GENERAL EDUCATION

Courses	Credits
Communication Theory and Skills*	9
Computer Science	3
Lower-Level Humanities*	3
Mathematics	6
Physical and Life Sciences	
(One course must include a laboratory)	
Lower-Level Social Sciences*	
HU/SS 300-400 level*	3
Total Credits	36

\* Embry-Riddle courses in the general education categories of Communication Theory and Skills, Humanities, and Social Sciences may be chosen from those listed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories.

## **Communication Theory and Skills**

COM: 122, 219, 221, 222, 260, 351, 360, 364, 410, 411, 420 HU: 319, 355, 361, 362, 363, 399, 499

**Humanities** 

LOWER-LEVEL: HU 140-146 UPPER-LEVEL: HU 300-400 level

## Social Sciences

LOWER-LEVEL: EC 200, 210, 211 (EC 200 is not acceptable together with EC 210 or EC 211 or their equivalent.) PSY 220 SS 110, 120, 130, 204, 210 UPPER-LEVEL:

- HF 300
- PSY 350
- SS 302, 305, 310, 320, 325, 326, 331, 340, 350, 352, 360, 399, 499

## CORE REQUIREMENTS

Course	Title	Credits
AS 120	Principles of Aeronautical Science -C	R-
	Introduction to Space Flight -OR-	I.
FAA	Private Pilot Certificate	
	American Business Enterprise -OR-	
BA 201	Principles of Management.	
ES 100	Engineering and Society	3
HU	*One course from the Humanities	
	Series (HU 140-HU 146) -OR-	
SS 204	Introduction to Geography	3
HU/SS		6
	(Selected from BA 335, HU 335, SS 30	)7,
	SS 325, SS 326, SS 331, or SS 340)	
HU 330	Values and Ethics -OR-	
HU 341	World Philosophy (if not taken for	
	general education credit)	3
MA 222	Business Statistics (if not taken for	
	general education credit)	3
PSY 220	Introduction to Psychology (if not	
	taken for general education credit).	3
CE 396,		
397	Cooperative Education -OR	3-6
	Senior Thesis Research	
HU 485	Senior Thesis Writing	2
Total Cre	dits	21-33
*Must be	chosen from one of the courses above	not

\*Must be chosen from one of the courses above not used to satisfy general education credit.

## **MINORS**

Students must select three minor fields of study. At least one of these must be aviation/aerospace related. Total credits in the minors will vary, depending on the minors chosen. See Minor Courses of Study in this catalog.

Open Electives	• •	•	•	•	• •	•	•	•	•	•	•	 •	•	•	•	 •	•	•	 0	)-2	1	
																			_			1

TOTAL DEGREE CREDITS	120-132
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## Aviation Business and Management Program

## Aviation Business Administration

The Aviation Business Administration degree program, offered by the Department of Business, reflects the ever-changing and demanding environment of business, government, and the aviation industry. The curriculum is designed to provide graduates with the knowledge and skills essential to their successful entry into business and society. Emphasis is placed on effective communications, quantitative skills, global awareness, social responsibility, information technology, critical thinking skills, teamwork, business functional skills, aviation/aerospace industry familiarity, and a commitment to lifelong learning.

This degree program offers a unique educational experience for the business-focused student. It is the appropriate foundation for entry into career opportunities in business, management, airport management, finance, or flight operations. Course requirements include computer applications, group/individual projects and presentations, and a blend of theory and applications to best prepare students for a variety of positions in the workplace. Colloquia, forums, visiting speakers, interesting field trip experiences, and interdisciplinary opportunities/activities serve to enrich the curriculum.

Diverse elective courses allow students to broaden their general education interests or pursue specific interests in many specialized areas, including the following: international commerce, economics/finance, aviation/ aerospace, security and intelligence, the environment, aviation safety, and culture and language. A variety of unique "minors" (minor programs of study) are available for interested students wishing to supplement their formal academic preparation with specialized coursework in more than 20 additional areas of study. Active business/aviation related clubs on campus include *Phi Beta Lambda* (a business-focused organization providing students an opportunity to travel to state and national leadership conferences for participation in competitive events) and the *American Association of Airport Executives* (an aviation management-focused association, with prior travel to China, New York City, Las Vegas, Houston, Seattle, and San Francisco).

Our students are encouraged to think beyond traditional academic boundaries and seek workplace and cultural experiences that will enrich and enlighten them on the evolving workplace and the global business environment. Unique internships and cooperative educational experiences are available and encouraged, with staff assigned to assist students in position identification and placement. Numerous summer-abroad experiences are available for students wishing to increase their international perspectives. Previous summer-abroad academic programs have been offered in Paris, London, Italy, Poland, China, Germany, Ecuador, Chile, and Mexico.

A Business Industrial Advisory Board provides guidance on the needs of business, government, and the aviation industry. The ABA program is accredited by the Council on Aviation Accreditation. Department-sponsored tutoring and labs are available.

Dedicated faculty advisors assist ABA students in evaluating the many opportunities available to them in this program. Some courses may require prerequisite subject knowledge or particular class standing. Course descriptions, included in this catalog, should be reviewed prior to registering for classes, to ensure proper placement.

## Aviation Business Administration

**Bachelor of Science** 

## DEGREE REQUIREMENTS

PROGRAM SUPPORT

The Bachelor of Science degree in Aviation Business Administration requires successful completion of a minimum of 120 credit hours, and is normally completed in eight semesters. Designed for students interested in obtaining a strong business foundation with emphasis on specific aviation applications, the student may select an Area of Concentration in Management, Finance, Flight Operations, or Airport Management.

Students should declare their Area of Concentration at the beginning of their junior year. Students who want to specialize in more than one Area of Concentration may transfer up to 6 credit hours toward the second area of concentration. Students who participate in the Cooperative Education program may substitute up to 6 credit hours, if approved, toward the specified courses required in their Area of Concentration.

Students enrolled in the Air Force or Army ROTC program may substitute AF or MY

courses for the open elective courses.

General Education	
Program Support.	12
Business Core.	45
Area of Concentration	15
Open Electives	15
TOTAL DEGREE CREDITS	120

## GENERAL EDUCATION

Communication Theory and Skills*	9
Mathematics*	6
Computer Science*	3
Physical and Life Sciences*	
(One course must include a laboratory.)	6
Humanities Lower-Level course*	3
Social Sciences Lower-Level course*	3
Humanities/Social Sciences Upper-Level course	3
Total Credits	33

Cour	se	Title	Credits
AS	120	Principles of Aeronautical Science	3
EC	210	Microeconomics	3
		Macroeconomics	
MA	222	Business Statistics	3
Total	Cree	dits	12

## **BUSINESS CORE**

Course		Title	Credits
BA	201	Principles of Management	3
BA	210	Financial Accounting	3
BA	221	Advanced Computer Based Systems.	3
BA	311	Marketing	3
BA	312	Managerial Accounting	3
BA	314	Human Resource Management	3
BA	317	Organizational Behavior	3
BA	320	Business Information Systems	3
BA	325	Social Responsibility and Ethics	
		in Management	3
BA	332	Corporate Finance I	3
BA	335	International Business	3
BA	390	Business Law	3
BA	420	Management of Production	
		and Operations	3
BA	436	Strategic Management	3
EC	315	Managerial Economics	3
Total Credits			45

## AREAS OF CONCENTRATION

## Airport Management:

BA 412 BA 418	Title Airport Management	rds3 **3
Total Cre	dits	15
<b>Finance</b> :		
Course	Title	Credits
BA 334	Title         Investment Analysis         International Finance	3
BA 334 BA 342 BA 434	Investment Analysis International Finance Corporate Finance II**	3 3 3
BA 334 BA 342 BA 434 EC 312	Investment Analysis International Finance Corporate Finance II** Money and Banking	·····3 ·····3 ·····3
BA 334 BA 342 BA 434 EC 312	Investment Analysis International Finance Corporate Finance II**	·····3 ·····3 ·····3

## Flight Operations:

Course		Title	Credits
AS	121	Private Pilot Operations	5
		Instrument Pilot Operations	
AS	321	Commercial Pilot Operations**	3
FA	121	Private Single Flight	1
FA	221	Instrument Single Flight	1
FA		Commercial Single Flight	
FA	322	Commercial Multi Flight	
		-OR-	
FA	323	Commercial Multi Add On	1
Total	Cree	dits	15

Note: Students selecting this option need to begin the coursework as soon as possible. Please see the Advance Standing section under University Academic Regulations and Procedures and the Aeronautical Science notes under the Aeronautical Science degree in this catalog for information relating to these courses.

## Management:

The focus is to produce an aviation management generalist. The culminating focus course is BA 436.\*\* Select any five BA/EC 300-400 level courses.....15

#### Courses Available as BA/EC 300-400 Business Electives

#### Course Title

Credits

120

- BA 308 Public Administration
- BA 324 Aviation Labor Relations
- BA 333 Personal Financial Planning
- BA 334 Investment Analysis
- BA 342 International Finance
- BA 408 Airport Management
- BA 410 Management of Air Cargo
- BA 412 Airport Planning and Design Standards
- BA 415 Airline Management
- BA 418 Airport Administration and Finance
- BA 421 Small Business Management
- BA 425 Trends and Current Problems in Air Transportation
- BA 427 Management of the Multicultural Workforce
- BA 434 Corporate Finance II
- BA 399, 499 Special Topics in Business
- EC 312 Money and Banking
- EC 420 Economics of Air Transportation
- EC 399, 499 Special Topics in Economics

## Open Electives 15

#### TOTAL DEGREE REQUIREMENTS

\*\*These classes are considered the capstone class for the area of concentration.

## GENERAL EDUCATION

\* Embry-Riddle courses in the general education categories of Communication Theory and Skills, Mathematics, Computer Science, Physical and Life Sciences, Humanities, and Social Sciences may be chosen from those listed below, assuming prerequisite requirements are met with permission of advisor. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified above in the Aviation Business Administration vertical outline. Other courses may also be used with permission of the Undergraduate Program Coordinator.

## **Communication Theory and Skills**

COM 122, 219, and 221 -OR- 222

## Computer Science

BA 120 -OR- IT 109

#### **Humanities**

LOWER-LEVEL: HU 140 series UPPER-LEVEL: HU 300-400 level

## **Mathematics**

College Algebra or higher and MA 320

## **Physical and Life Sciences**

PS 101-109, PS 111, PS 142, PS 302, PS 304, PS 308, PS 309, PS 310, PS 312, PS 313, PS 403, WX 201

## Social Sciences

LOWER-LEVEL: PSY 220 SS 110-130, 204, 210 UPPER-LEVEL: HF 300, PSY 350, SS 302-360

## Suggested Program of Study

#### FRESHMAN YEAR

#### Course Title Credits Communication Theory and Skills\*.....3 Physical and Life Sciences\*.....3 BA BA 221 Advanced Computer Based Systems.....3 EC **Total Credits** 30

+ Meets open elective or credit in excess of degree requirements.

## Academic Programs at the Prescott Campus

## SOPHOMORE YEAR

## odits

Course		Title	Credit
		Communication Theory and Skills*	6
		Physical and Life Sciences*	
AS	120	Principles of Aeronautical Science	3
BA	210	Financial Accounting	3
BA	311	Marketing	3
EC		Macroeconomics	
MA	222	Business Statistics	3
MA	320	Decision Mathematics	3
		Open Elective	
Total Cre		dits	30

#### JUNIOR YEAR

Course		Title	Credits
		Upper-Level Humanities	
		-OR- Social Sciences*	3
BA	312	Managerial Accounting	3
BA	314	Human Resource Management	3
BA	317	Organizational Behavior	3
BA	320	Business Information Systems	3
		Corporate Finance I	
BA	335	International Business	3
EC	315	Managerial Economics	3
		Concentration Courses	3
		Open Elective	
Total	Cree	dits	30

## SENIOR YEAR

Course		Title	Credits	
BA	325	Social Responsibility and Ethics		
		in Management	3	
BA	390	Business Law		
BA	420	Management of Production		
		and Operations	3	
BA	436	Strategic Management		
		Concentration Courses	12	
		Open Electives	6	
Total Credits			30	
Тота	TOTAL DEGREE CREDITS			

## Aviation Environmental Science

**Bachelor of Science** 

The Bachelor of Science degree in Aviation Environmental Science (AES) is designed to develop leaders and global citizens for the 21st century by providing students with a multidisciplinary education including both theoretical and applied knowledge in the field of aviation environmental science. This degree gives students precisely the knowledge and technical skills needed to tackle the environmental and safety problems found in the aviation and aerospace industry.

Our graduates will be uniquely prepared to understand and function effectively in the complex and varied world of aviation environmental science. Our graduates will be able to secure positions in the fields of environmental consulting, aviation regulation, and consultation to industry and government, such as environmental Protection specialist for FAA, EPA, and OSHA, compliance officers in business and industry, federal and state air quality specialist, airports and municipalities environmental specialist. AES students will specialize in one of two career tracks: Applied Environmental Science or Environmental Management.

## DEGREE REQUIREMENTS

The AES program consists of several components: general education, AES core, advanced AES areas of concentration, electives, and a co-op experience. The general education element provides the fundamentals in math, social sciences, computers, and communication. The AES core is designed to give the student basic science knowledge and demonstrate the ways in which business, economics, geography, and policy studies integrate with environmental aspects of their future careers. AES students are also required to complete a co-op experience prior to graduation. This experience will link their AES academic work with their professional future. The Bachelor of Science degree in Aviation Environmental Science (AES) requires successful completion of a minimum of 120 credit hours.

## **AVIATION ENVIRONMENTAL SCIENCE** CORE COURSES

Course		Title	Credits
AES	330	Environmental Consulting	3
BA	201	Principles of Management	3
EC		Microeconomics	
		-OR-	
EC	211	Macroeconomics	3
PS	105	Chemistry I	4
PS	111	Plant Biology	4
PS	112	Animal Biology	4
PS	142	Introduction to Environmental Science	es3
PS	309	Principles of Ecology	3
PS	403	Wildlife and Airports	3
SS	204	Introduction to Geography	3
SS	302	Evolution of Scientific Thought	3
SS	305	Global Policy Studies	3
SS		Environmental Law	
WX	210	Introduction to GIS	3
Total Cre		dits	45

## Total Credits

AES students must take all required courses from their selected Area of Concentration (AOC).

## Areas of Concentration

## Applied Environmental Science

We have designed this Area of Concentration like no other environmental program in the

world. We are focused on making our students professionally successful and personally fulfilled while working in association with the aviation and aerospace industries, which are among the largest employers in North America and are burgeoning with exciting environment-related opportunities for our graduates. While helping these industries become environmentally aware and compliant, our students already advise businesses and local government agencies on crucial environmental issues through co-ops, internships, one-year jobs, and consulting projects that are part of our curriculum. The environmental problems in aviation and aerospace are not easy to solve. They require a great deal of talent and creativity by managers, consultants, and experts such as the ones graduating from our program. AES graduates will provide unique solutions so the natural environment and industry can coexist. Our unique science courses and faculty give students precisely the knowledge and skills that they need to become environmental problem solvers. Designated electives in this area of concentration focus on environmental and biological issues

Course		Title	Credits
PS	106	General Chemistry II	4
		Environmental Chemistry	
PS	310	Air Quality and Sound Pollution	3
SF	315	Environmental Compliance and Safety	73
		Designated Electives	
Total	Cree	dits	27

## **Total Credits**

## Possible Designated Electives (choose 4)

#### Course Title

## Credits

cour	UC	11000	cicult
PS	240	Natural History of the Region	4
PS	306	Consumer and Hazardous Waste	3
PS		Atmospheric Environmental Studies	
PS	311	Water Quality	3
PS	312	Plant Identification	3
PS	313	Riparian Ecology	3
WX	201	Meteorology I	3
WX	261	Applied Climatology	3

## ENVIRONMENTAL MANAGEMENT

The Environmental Management area of the AES program prepares students for entry into environmentally oriented positions (as an employee or a consultant) in government or in industry. For example, a student with this area of concentration might seek environmental-oriented employment with an airport, an airline, a state department of environmental quality, or a high-tech business. Students who choose this option will be well equipped to understand how public sector or private sector entities operate and gain specific technical, human relations, and conceptual skills and abilities needed for career success in this everevolving field of study. The Environmental Management area core courses provide students with timely knowledge, regulatory awareness, and critical thinking skills in public administration, airport management, environmental management, and environmental compliance and safety. Designated electives allow students to further tailor their interests with rigorous academic preparation in their choice of the following areas: marketing, human resource management, international business, environmental law, small business management, consumer and hazardous waste, and air quality and sound pollution. Student field trips and guest speakers provide the student with a unique opportunity to gain industry awareness.

Course		Title	Credits
BA	308	Public Administration	3
BA	408	Airport Management	3
PS	406	Environmental Management	3
SF	315	Environmental Compliance and Safe	ty3
		Designated Electives	
Total Credits		24	

## **Possible Designated Electives (choose 4)**

Course		Title	Credits
BA	311	Marketing	3
BA	314	Human Resource Management	3
		International Business	
BA	421	Small Business Management	3
SS	360	Environmental Law	3
PS	306	Consumer and Hazardous Waste	3
PS	310	Air Quality and Sound Pollution	3

## Suggested Program of Study

## FRESHMAN YEAR

Course		Title	Credits
COM	1122	English Composition and Literature.	3
COM	1219	Speech	3
HU		Humanities	
IT	109	Introduction to Computers	
		and Applications	3
MA	120	Quantitative Methods I	3
MA	222	Business Statistics	3
PS	111	Plant Biology	4
PS	112	Animal Biology	4
PS	142	Introduction to Environmental Science	e3
Total Cre		dits	29

## SOPHOMORE YEAR

Course		Title	Credits
BA	201	Principles of Management.	3
		Technical Report Writing	
		-OR-	
COM	222	Business Communication	3
PS	105	General Chemistry I	4
PS	309	Principles of Ecology	3
SS	204	Introduction to Geography	3
SS		Evolution of Scientific Thought	
WX	210	Introduction to Geographic	
		Information Systems	3
		Lower-Level Humanities	3
		Upper-Level Humanities	3
		Area of Concentration	3-4
Total	Cre	dits	31-32

## JUNIOR YEAR

Course	Title	Credits
EC 210	Microeconomics	
	-OR-	
EC 211	Macroeconomics	3
SS 360	Environmental Law	3
AES 330	Environmental Consulting	3
	Upper-Level Humanities	
	Designated Electives	
	Area of Concentration	
	Open Electives	6
Total Cre	dits	30

## SENIOR YEAR

Course SS 305 AES 403	TitleGlobal Policy StudiesWildlife and AirportsArea of ConcentrationDesignated ElectivesOpen Electives	3 6 3-4
SUMME	R	
Course	Title	Credits
CEAES	396	3
Total Cre	dits	28-31
TOTAL DEGREE CREDITS		120

## **Communication Theory and Skills (9 credits)**

COM 122, 219, 221, 222

Humanities (9 credits)

Lower-Level: HU 100-200, 140-146 Upper-Level: HU 300-400

## Social Sciences (3 credits)

Lower-Level

Computer Science (3 credits) IT 109

## Mathematics (6 credits)

MA 120, 222

## **Computer Science**

**Bachelor of Science** 

The curriculum for the Bachelor of Science degree in Computer Science is designed to provide a state-of-the-art blend of theory and application, preparing students for successful careers in a variety of aerospace or commercial settings while also providing a rigorous foundation for further studies at the graduate level in computer science or related disciplines.

The degree combines both depth and breadth, emphasizing a broad and interdisciplinary approach to learning while providing the significant depth in Computer Science required to meet the ambitious goals of the ACM/IEEE Computing Curricula 2001 for Computer Science. Because industry places a premium on the ability to work productively as a member of an engineering team, the curriculum here includes team projects from the very beginning, starting with EGR 101 in the first semester of the freshman year, and concluding with the "Capstone" SE 450 Software Team Project in the last semester of the senior year.

In addition to taking the extensive, detailed coursework in engineering, computer science, computer engineering, and software engineering shown below, Computer Science students must work with their academic advisors to develop an appropriately individualized approach, within the structural guidelines described below, for the study of the broader aspects of human knowledge across the multiple disciplines necessary for productive citizenship in a diverse and dynamic civilization. The available tracks are:

#### **BUSINESS TRACK**

- BA 201 Principles of Management
- BA 210 Financial Accounting
- BA 311 Marketing
- BA 421 Small Business Management
- EC 210 Microeconomics

#### DEFENSE STUDIES TRACK (Available to ROTC cadets only)

- AF 301 Air Force Leadership Studies
- AF 302 Air Force Leadership Studies
- AF 401 Preparation for Active Duty
- AF 402 Preparation for Active Duty
- SIS 315 Studies in Global Intelligence -OR-
- MSL 301 Officership I
- MSL 302 Officership II
- MSL 401 Advanced Military Leadership I
- MSL 401 Advanced Military Leadership II
- SIS 315 Studies in Global Intelligence

#### INTELLIGENCE AND SECURITY TRACK

- SIS 315 Studies in Global Intelligence
- SIS 323 Intelligence and Technology
- SIS 405 Environment and Security
- SIS 415 Studies in Global Intelligence II
- SIS 425 Personnel Security

#### SPACE PHYSICS TRACK ++

MA 345 Differential Equations and Matrix Methods

- PS 303 Modern Physics
- PS 401 Astrophysics

With the permission of his or her advisor, a student may propose a custom track to satisfy particular intellectual interests or may substitute any technical minor from the catalog. A minor may increase the number of credits required to complete the degree from the 121 minimum.

Our course recommendations for the first two years are structured to fully prepare students to take advantage of an early industrial experience. These courses are designed to maximize the utility to students of an industrial internship after their sophomore year. Such an early internship is not a degree requirement, but it is strongly recommended. Early exposure to the actual practice of computer science helps our students better understand the context and motivation for advanced courses. Our faculty and professional Career Services staff maintain extensive contact with industrial partners throughout the United States and abroad in order to help our students pick internship positions that best suit their interests and needs.

## DEGREE REQUIREMENTS

The Bachelor of Science in Computer Science degree requires a total of 121 semester units and is designed to be completed in four years with a normal undergraduate workload. In addition to the specific 54 units of coursework required to meet the ACM/IEEE Computing Curricula 2001 goals, the Bachelor of Science degree in Computer Science requires 9-12 additional upperlevel elective units of specialized Computer Science, Computer Engineering, or Electrical Engineering courses to be chosen by students in conjunction with their advisor. Students should be aware that most courses have prerequisites and \or corequisites. Check the course descriptions in the back of the catalog before registering to ensure requisite sequencing.

## GENERAL EDUCATION

Communication Theory and Skills	9
Humanities 140 Series	3
Lower-Level Economics	3
Lower-Level Social Sciences	6
Upper-Level Humanities	3
Total Credits	24

## Suggested Program of Study

## FRESHMAN YEAR

Cours	e	Title	Credits
COM1	122	English Composition and Literature.	3
CS 1	125	Computer Science I	4
CS 2	222	Introduction to Discrete Structures	3
CS 2	225	Computer Science II	4
EGR 1	101	Introduction to Engineering	2
		Humanities	
UNIV	101	College Success	1
		Track Dependent Mathematics	6/8
		Track Dependent Physical Science	
Total (	Crea	dits	29/31

## SOPHOMORE YEAR

#### Course Title Credits CEC 220 Digital Circuit Design ......3 CEC 222 Digital Circuit Design Laboratory .....1 CS 315 Data Structures and Analysis of Algorithms......3 CS 332 Organization of Programming Languages3 SE 300 Software Engineering Practices ......3 Track Dependent Physical Science.....6/7 Lower-Level Social Science Elective .....3 **Total Credits** 31/33 **JUNIOR YEAR**

#### Course Title Credits CS CS 305 Data Base Systems and Data Mining.....3 425 Net-Centric Computing......3 375 Algorithms......3 CS CS Upper-Level CS/CEC/EE Elective\* .....3 Lower-Level Social Science Elective .....3 **Total Credits** 31

## SENIOR YEAR

## Course Title

#### 

Credits

Upper-Level CS/CEC/EE Electives* Upper-Level HU Elective	6 3
Total Credits	
TOTAL DEGREE CREDITS	121

#### \*CS/CE/EE Electives

In addition to the specifically identified courses listed above, the CS degree requires three courses of upper-level CS, CE, or EE electives chosen by the student. For the Intelligence and Security Track, two of these three must be CS 303 and CS 432. Students planning to work in the aerospace industry are strongly encouraged to take CS 325 and CEC 450 as two of these three upper-level CS/CEC/EE electives.

#### Humanities

The CS degree requires a total of 15 units of Humanities, Literature, and Composition. The three COM courses, COM 122, COM 219, and COM 221, listed above are part of the these required 15 units. For the remainder, a student must take:

1. A lower-level elective from the HU 140 series or the HON 150 Honors Seminar.

2. An additional upper-level (HU 300-400 level) elective.

#### Social Science and Economics

The CS degree requires a total of 6 units of Social Science and 3 units of Economics; they may all be lower-level (100-200 level). Any PSY course or the HON 250 Honors Seminar may be used for 3 of the 6 required Social Sciences.

#### Mathematics

The CS degree requires a total of 9 units of Mathematics. MA 320 plus two other courses from MA 120 or above are required for the Business and Defense Studies Tracks. MA 241, MA 242, and MA 243 are required for the Space Physics Track. Three courses from MA 120 and above are required for the Business, Defense Studies, and Intelligence and Security Tracks. Students planning to work in the aerospace industry are strongly encouraged to take MA 241, MA 242, and either MA 243 or MA 412 for the required mathematics.

#### Physical and Life Sciences

All PS courses, WX 201, WX 261, and all WX courses 320 and above are acceptable for PS for the Business, Defense Studies, and Intelligence and Security Tracks, PS 215, PS 216, PS 208, PS 210, PS 219, and PS 220 are required for the Space Physics Track.

Students planning to work in the aerospace industry are strongly encouraged to take the physics sequence PS 150, PS 160, PS 250, and PS 253.

#### Notes:

+ Students who elect to take the MA 241/242/243 Calculus series and the third semester of Physics for Engineers may take one less track-dependent elective and still meet their 121 minimum credit requirement. A student's advisor must approve the course to be omitted from a predefined track.

++ Because the Space Physics Track requires 6 credits of extra math and physical science, the number of additional courses required to complete the track is reduced correspondingly.

## Global Security and Intelligence Studies

## **Bachelor of Science**

The Bachelor of Science degree in Global Security and Intelligence Studies (GSIS) is designed to develop future security and intelligence professionals with a broad understanding of global interrelationships in politics, economics, social change, science and technology, military developments, systems of thought, public health, the psychological dimensions of military and terrorist threats, cyber-security, environmental issues, and human cultures, and the implications of these for the security of nation-states and the future of human society in a global context. The program provides the student with the interdisciplinary skills to analyze the interactions between all these elements and to communicate their ideas effectively in both written and oral contexts. Above all, GSIS students will be able to exhibit innovative problem-solving and critical-thinking skills in issues such as terrorism and asymmetrical warfare, transportation (especially aviation and aerospace) security, threats to corporate personnel and facilities, threats to computer and telecommunications infrastructure, trafficking networks in illicit services and substances, proscribed weapons technologies such as weapons of mass destruction, international crime, population migrations, natural disasters, pandemics, and homeland security.

Global Security and Intelligence Studies students will be very competitive to begin activities (1) with federal government security and intelligence agencies and other federal agencies with security and intelligence responsibilities and needs, (2) with the military services, (3) with security and intelligence departments in business and industry (especially aviation, aerospace, and other transportation entities), (4) with state and local law enforcement agencies, (5) as students in graduate schools specializing in international security studies and regional affairs, (6) as students in law schools, (7) in politics as leaders or as staffers specializing in security issues, and (8) as entrepreneurs.

## DEGREE REQUIREMENTS

The GSIS program consists of seven interrelated components: general education, a GSIS core, area of concentration, electives, foreign languages, senior thesis, and an optional co-op or study-abroad experience. The general education requirement provides the fundamentals in the sciences, mathematics, the social sciences and liberal arts, oral and written communication, and computers. The science requirement deepens the student's knowledge and understanding of science and technology, key areas for the security/intelligence student. Together, the GSIS core is a multidisciplinary array of courses that brings a number of fields to the study of security and intelligence, including geography, the law, economics, psychology, government and foreign policy, and the history of intelligence. The GSIS core and the designated electives are designed to demonstrate the ways in which societies and cultures, economies, systems of thought, military developments, and environmental concerns are shaping the international system.

In the senior year, the GSIS major will select one of two areas of concentration: Intelligence or Security. Each area of concentration contains five courses, allowing the student to gain a deeper understanding in a more specialized field. A third option for the area of concentration is to chose a total of five courses from both Intelligence and Security, two from one and three from the other. This would be counted as an area of concentration in Intelligence and Security.

Because knowledge of a second language—or indeed multiple languages—is an essential skill for the intelligence and security professional today, GSIS students must meet a foreign language requirement by demonstrating oral and reading competency in a language other than English, or by taking 12 credits of college-level foreign language courses in one language. GSIS students also are required to complete a senior thesis prior to graduation. The thesis will encompass significant research into a topic relevant to security and intelligence studies and provide original recommendations and conclusions. The GSIS program encourages students to gain international experience through travel or study abroad. It promotes a strong grounding in history, a capacity for critical thinking, good writing and communication skills, and, in the selection of designated and open electives, a knowledge and appreciation of the arts and humanities.

The Bachelor of Science degree in Global Security and Intelligence Studies (GSIS) requires successful completion of a minimum of 120 credit hours.

## BACHELOR OF SCIENCE DEGREE IN GLOBAL SECURITY AND INTELLIGENCE STUDIES

	Credit
General Education	39
GSIS Core	
Area of Concentration	15
Foreign Language	12
GSIS Designated Electives	9
Open Electives	9
Open Electives      Senior Thesis	3

120

## TOTAL DEGREE CREDITS

## **GLOBAL STUDIES CORE COURSES**

#### Course Title

- EC 210 Microeconomics
- SIS 100 Introduction to Global Security and Intelligence Studies
- SIS 200 Introduction to the American Legal System
- SIS 312 Global Crime and International Justice Systems
- SIS 315 Studies in Global Intelligence I
- SIS 325 History of Terrorism
- SS 204 Introduction to Geography
- SS 310 Personality Development
- SS 320 American National Government
- SS 325 International Studies
- SS 340 American Foreign Policy

## GSIS Areas of Concentration

#### Course Title

#### INTELLIGENCE

- SIS 317 Political Change, Revolution, and War
- SIS 323 Intelligence and Technology
- SIS 328 Intelligence Analysis, Writing, and Briefing
- SIS 400 International Security and Globalization
- SIS 415 Studies in Global Intelligence II

#### SECURITY

- SIS 405 Environment and Security
- SIS 410 Business Security and Competitive Intelligence
- SIS 420 Aviation Security and Technology
- SIS 422 Homeland Security and Technology
- SIS 425 Personnel Security

## **GSIS** Designated Electives

#### Course Title

- BA 335 International Business
- EC 211 Macroeconomics
- HU 341 World Philosophy
- HU 345 Comparative Religions
- HU 420 Applied Cross-Cultural Communication
- PSY 350 Social Psychology
- RS 305 Asian Literature
- SIS 320 Topics in Global History, Politics, and Culture
- SS 333 UŜ-Asian Relations

## Suggested Program of Study

## FRESHMAN YEAR

Course	Title	Credits
	Communication Theory and Skills	3
	Information Technology/	
	Computer Science	3
	Lower-Level Humanities	3
	Mathematics	
	Physical Sciences *	3
SIS 100	Introduction to GSIS	3
SS 110	World History	3
	Foreign Language I	3
	Foreign Language II	3
SS 204	Introduction to Geography	3
UNIV 10	l College Success	. (1)+
Total Cre	dits	30

+ Meets open elective or credit in excess of degree requirements

## SOPHOMORE YEAR

Cours	se	Title	Credits
		Communication Theory and Skills	6
		Upper-Level HU/SS/ŔS	3
		Mathematics	
		Physical/Life Science (one lab)*	6
		Foreign Language III	3
		Foreign Language IV	
EC	210	Microeconomics	3
SIS	200	Introduction to the American	
		Legal System	3
Total	Cre	dits	30

## JUNIOR YEAR

Course		Title	Credits
		Physical/Life Sciences*	3
SIS	312	Global Crime and International	
		Justice Systems	3
SIS	315	Studies in Global Intelligence I	3
		Designated Electives	9
SIS	325	History of Terrorism	3
SS	310	Personality Development	3
SS	320	American National Government	3
SS	325	International Studies	3
Total	Cre	dits	30

#### SENIOR YEAR

Cour	se	Title	Credits
HU	480	Senior Thesis Research	1
HU	485	Senior Thesis Writing	2
SS	340	American Foreign Policy	3
		Area of Concentration	15
		Open Electives	9
Total Credits			30
TOTAL DEGREE CREDITS			120

\* Courses that satisfy the AES/GSIS science requirement:

#### **Embry-Riddle Courses**

All AE, EE, ES, HF, PSY, and PS courses, AS 309, AS 310, AS 357, WX 201, WX 352, CS 118, and CS 200 level and above courses.

#### **Other Universities**

Any college-level physical, life, geological, behavioral, engineering, computer, or environmental science.

#### Additional Embry-Riddle Science

SS 310, SS 350, and all of the above.

## Space Physics

**Bachelor of Science in Space Physics** 

The Space Physics degree program is administered by the College of Arts and Sciences. The Bachelor of Science in Space Physics, offered only on the Prescott campus, is an applied physics program designed to prepare graduates to work in space- and aerospacerelated industries. Students will explore the fundamental forces of nature through experimental investigation of atomic, nuclear, and elementary particle systems. They will study the "micro" and "macro" universe through the use of high-precision detectors. The Space Physics program currently has four areas of concentration: Astrophysics, Particle Physics, Cosmology, Remote Sensing and Exotic Propulsion Systems. Physics is the study of forces, space, and time at their most basic level and provides the foundation for all physical sciences. The combination of laboratory skills and fundamental scientific knowledge will prepare students to make discoveries that will promote the exploration of space and add to the body of knowledge in science. Because of the strong emphasis on experimental physics, the student will be well situated to enter a variety of fields including graduate programs.

## Admission Requirements

To enter this program, students must have completed four years of high school science and mathematics, demonstrating a high level of competency. Successful candidates for this program will be prepared to enter Calculus I and General Chemistry.

## DEGREE REQUIREMENTS

The Bachelor of Science in Physics is a 120 credit hour program. The degree can be completed in eight semesters. The courses necessary to earn this degree are listed below.

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure that these requirements are met.

#### FRESHMAN YEAR

Course		Title	Credits
		Communication Theory and Skills*	6
		Lower-Level Humanities*	3
		Lower-Level Social Sciences*	3
CS	223	Scientific Programming in C	3
MA	241	Calculus and Analytic Geometry I	4
MA	242	Calculus and Analytic Geometry II	4
PS	208	Physics II	3
PS	210	Physics II Laboratory	1
PS	215	Physics I	3
PS	216	Physics I Laboratory	1
UNIV 101		l College Success.	(1)+
Total Cre		dits	31

+ Meets open elective or credit in excess of degree requirements.

#### SOPHOMORE YEAR

Course Title	Credits
Communication Theory and Skills	s*3
Open Electives*	6
MA 243 Calculus and Analytic Geometry I	II 4
MA 345 Differential Equations and	
Matrix Methods	4
PS 105 General Chemistry	4
PS 219 Physics III	
PS 220 Physics III Laboratory	
PS 303 Modern Physics	
PS 305 Modern Physics Laboratory	
Total Credits	29

#### JUNIOR YEAR

Cour	se	Title	Credits
		Technical Elective*	
		Open Electives*	6
EP	440	Engineering Electricity and Magnetisn	n3
EP	455	Quantum Physics	3
MA	441	Advanced Engineering Mathematics I	3
MA	442	Advanced Engineering Mathematics II	I 3
PS	320	Classical Mechanics	3
PS	401	Astrophysics I	3
Total	Cre	dits	30

## SENIOR YEAR

#### Course Title Credits EP 400 Thermodynamics and EP Upper-Level Humanities Elective ......3 HU PS PS PS PS SS 30 **Total Credits** 120 **TOTAL DEGREE CREDITS**

\* Embry-Riddle courses in the general education categories of Communication Theory and Skills, Humanities, and Social Sciences may be chosen from those listed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified above in the Space Physics vertical outline.

## **Communication Theory and Skills**

COM 122, 219, 221, 222, 351, 360

## **Humanities**

LOWER-LEVEL: HU 140-146 UPPER-LEVEL: HU 300-400 level

## Social Sciences

LOWER	-LEVEL:
EC	200
PSY	220
SS	110, 120, 130, 204, 210
UPPER-	LEVEL:
HU	300
PSY	350
SS	302, 305, 310, 320, 325, 331, 340, 350, 360

## **Technical Electives**

EP	410
MA	412, 432, 443
Any	upper-division PS courses including:
PS	301, 308, 399, 499

Students may take other HU/SS, CS, and EE and L courses with the approval of the department chair/program coordinator.

\*\* The above vertical outline is for the Astrophysics option. Students wishing to take the Particle Physics and Cosmology option should substitute PS 412 (Particle Physics and Cosmology) for the PS 408 (Astrophysics II) course and substitute PS 414 (Senior Physics Laboratory IIb) for PS 410 (Senior Physics Laboratory IIa). Likewise, there are courses and laboratories for the Exotic Propulsion and Remote Sensing options.

## College of Aviation

Dr. Jackie Luedtke, Dean

The College of Aviation is composed of the departments of Aeronautical Science, Meteorology, and Safety Science, and of the Flight Department, the flight laboratory component for the Aeronautical Science degree.

The College offers undergraduate degree programs in Aeronautical Science, which combines flight training with academic preparation in the technical and managerial aspects of aviation, as well as Applied Meteorology. This approach to aviation education provides students an added value over traditional flight training programs by focusing on the skills and knowledge required in today's industry. Foundational skills in mathematics, physics, communications, and aeronautics, including FAA certification as a multi-engine instrument-rated pilot, make up the core of the Aeronautical Science degree. Professional-level aeronautical science and flight courses prepare the graduate for a career as a professional civil or military pilot. The program also provides a foundation for further development in aircraft safety and meteorology. The B.S. in Applied Meteorology meets all the requirements for undergraduate study in meteorology recommended by the American Meteorological Society, the National Weather Service, and the U.S. Air Force. Graduates also meet U.S. Office of Personnel Management Qualification Standards for the position of meteorologist.

The Prescott campus offers a B.S. in

Aeronautics. The curriculum is designed to build on the aviation knowledge and skills students bring with them to campus. Additionally, the Prescott campus offers a B.S. in Safety Science. The curriculum is designed to provide a broad-based foundation in industrial safety principles with areas of concentration in Aviation Safety and/or Industrial Safety.

For the graduate student, the College of Aviation offers the Master of Science in Safety Science. This degree program provides the graduate with experiences to enhance the practice of occupational health and safety. The M.S. in Safety Science degree program prepares graduates for several professional job settings, such as director of safety in industry and government, operational and maintenance safety personnel, aviation or industrial safety personnel, flight safety personnel, and aircraft accident investigation.

The College has an enrollment of approximately 700 students and a fleet of 38 aircraft, including Cessna 172s, Cessna 182s, Piper Seminoles, and American Champion Decathlons. The College also has state-of-the-art Level 6 Cessna 172 and PA-44 flight training devices, and an Airbus A-320 simulator. Embry-Riddle has positioned the College of Aviation to serve its students with distinction while investigating and developing new education and programs for pilots, meteorologists, and safety and security professionals.

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## Aeronautical Science (Professional Pilot)

Bachelor of Science Specialties: Airline Pilot, Commercial Pilot, Military Pilot

The Aeronautical Science degree program blends flight training with rigorous academic study in a unique manner that provides a strong foundation for a career as a leader in the aviation industry, including airlines, corporate and commercial aviation, or the military. This approach to aviation education gives the student an added value over traditional flight training programs by focusing on the skills and knowledge required by today's industry. The curriculum provides skills in mathematics, physics, communications, and aeronautics, including FAA certification as a multi-engine instrument-rated pilot. The last two years of matriculation include extensive professional-level Aeronautical Science and flight courses that prepare the graduate for a career as a professional pilot, including airline flight crew operations in multi-crewmember jet transport aircraft. Critical-thinking and problem-solving skills are developed via computer simulations in aircraft performance, navigation, and aircraft systems operation. Effective resource management, human factors, and safety awareness are constantly emphasized throughout the curriculum.

## DEGREE REQUIREMENTS

The Bachelor of Science degree in Aeronautical Science may be attained in eight semesters. To earn the degree, successful completion of a minimum of 120 credit hours is required. The purpose of the Aeronautical Science degree program is to prepare the graduate for a productive career as a professional pilot and responsible citizenship in support of aviation and aerospace industries. Upon completion of the curriculum, the student will possess an FAA Commercial Pilot Certificate with multi-engine and instrument ratings. Optional advanced flight training includes upset recovery training, certification as a flight instructor and instrument flight instructor, and training as a flight crewmember in a jet transport aircraft.

Students pursuing the Aeronautical Science degree will select one of three specializations after matriculation. Students entering under this catalog may select from the Airline Pilot, Commercial Pilot, or Military Pilot specializations. Please see the section concerning the restrictions imposed by the Aviation Transportation and Security Act. All students must complete the general education courses, Aeronautical Science core courses, and the courses required to complete one specialization to earn the Aeronautical Science degree.

# BACHELOR OF SCIENCE DEGREE IN AERONAUTICAL SCIENCE

	Credits
General Education	39
Aeronautical Science Core	51
Flight Core Courses	4
Specialty Courses	26
Total Degree Credits	120

## UNIVERSITY GENERAL EDUCATION

Cour	se	Title	Credits
		Communication Theory and Skills*	9
		Lower-Level Humanities*	
		Lower-Level Social Sciences*	6
		Upper-Level Humanities or	
		Social Sciences*	3
		Computer Science Elective*	
		Management Elective*	3
MA		College Mathematics for Aviation I	3
MA	112	College Mathematics for Aviation II	3
PS	103	Technical Physics I with Laboratory	3
PS	104	Technical Physics II with Laboratory.	3
Total	Cre	dits	39

## AERONAUTICAL SCIENCE CORE COURSES

Cour	se	Title	Credits
AS	121	Private Pilot Operations	5
AS	221	Instrument Pilot Operations	3
AS	309	Aerodynamics	3
AS	310	Aircraft Performance	3
AS	311	Aircraft Engines-Turbine	3
AS	321	Commercial Pilot Operations	3
AS	340	Instructional Design in Aviation -OR-	
FA	417	Flight Instructor Rating**	3
AS	350	Domestic and International Navigation	on 3
AS	356	Systems and Components	3
AS	357	Flight Physiology	3
AS	358	Advanced Avionics	3
AS	387	Crew Resource Management	3
AS	408	Flight Safety	3
AS	420	Flight Technique Analysis	3
FA	215	Upset Recovery	1
WX	201	Survey of Meteorology	3
WX	301	Aviation Weather	3
Total	Cre	dits	51

## FLIGHT CORE COURSES

## PROFESSIONAL PILOT TRACK I

Course	e Title	Credits
FA 1	21 Private Single Flight	1
FA 2	21 Instrument Single Flight	1
FA 3	21 Commercial Single Flight	1
FA 3	23 Commercial Multi-Add On	1
Total C	Credits	4
PROF	ESSIONAL PILOT TRACK II (MULTI I	ENGINE
INTEN	NSIVE)	
Course	e Title	Credits
FA 1	21 Private Single Flight	1
FA 1	22 Private Multi Flight with Laboratory	1
FA 2	22 Instrument Multi Flight	1
	322 Commercial Multi Flight	

4

#### Total Credits

## AIRLINE PILOT SPECIALTY

Cou	rse	Title	Credits
AS	254	Aviation Legislation -OR-	
AS	405	Aviation Law	3
AS	380	Pilot Career Planning and	
		Interviewing Techniques	1
AS	402	Airline Operations -ÔR-	
AS	410	Airline Dispatch Operations	3
AS		Jet Transport Systems	
AS		Electronic Flight Management System	ns3
FA	420	Airline Flight Crew Techniques and	
		Procedures	2
		Electives	11
Tota	l Cre	dits	26

## Commercial Pilot Specialty

Cour	se	Title	Credits
AS	254	Aviation Legislation -OR-	
AS	405	Aviation Law	3
AS	380	Pilot Career Planning and	
		Interviewing Techniques	1
BA/S	STG	300/400 level	3
		Minor	. 9-18
		Electives	1-9
Total	Cre	dits	26

## MILITARY PILOT SPECIALTY

Course	Title	Credits
AS 435	Electronic Flight Management System	s3 16
	Electives	
Total Credits		26
TOTAL DEC	GREE CREDITS FOR ALL SPECIALTIES	120

## Suggested Program of Study

## **Airline Pilot Specialty**

The Airline Pilot Specialty is designed for students whose goal is to fly for a scheduled airline. The academic and flight courses are designed to provide exposure to procedures and operations consistent with those found at air carriers. The upper-level AS courses are very technical and provide the foundation for the capstone flight courses that are designed to be consistent with current airline transport pilot requirements.

#### FRESHMAN YEAR

Course Title Credits Communication Theory and Skills\*.....3 AS 121 Private Pilot Operations......5 FA 121 Private Single Flight.....1 MA 111 College Mathematics for Aviation I.....3 MA 112 College Mathematics for Aviation II .....3 PS 103 Technical Physics I with Laboratory .....3 UNIV101 College Success ..... (1)+ 27 **Total Credits** <sup>+</sup> Meets open elective or credit in excess of degree requirements.

#### SOPHOMORE YEAR

Cou	rse	Title	Credits
		Communication Theory and Skills*	6
		Lower-Level Social Sciences*	6
		Management Elective*	3
AS	221	Instrument Pilot Operations	3
AS		Aerodynamics	
AS	357	Flight Physiology	3
FA	221	Instrument Single Flight	1
		-OR-	

FA	122	Private Multi Flight with Laboratory1 -AND-					
FA	222	Instrument Multi Flight					
PS	104	Technical Physics II with Laboratory3					
WX	301	Aviation Weather					
Total	Cre	dits 31/32	_				
JUN	JUNIOR YEAR						
Cour	se	Title Credit	ts				
		Upper-Level HU/SS Elective*					
AS	254	Aviation Legislation -OR-					
AS	405	Aviation Law					
AS	310	Aircraft Performance					
AS	311	Aircraft Engines - Turbine					
AS	321	Commercial Pilot Operations3					
AS		Domestic and International Navigation 3					
AS		Aircraft Systems and Components3					
AS		Advanced Avionics					
AS	380	Pilot Career Planning and					
FA	215	Interviewing Techniques					
FA	321	Upset Recovery					
IA	521	-AND-					
FA	323	Commercial Multi Add On					
FA	322	Commercial Multi Flight1					
		Electives					
Total	Cre		-				
SEN	IOR	YEAR					
Cour	se	Title Credit	ts				
AS	340	Instructional Design in Aviation -OR-					
FA	417	Flight Instructor Rating**3					
AS	387	Crew Resource Management					
AS	402	Airline Operations -OR-					
AS	408	Flight Safety3					
AS		Airline Dispatch Operations					
AS	411	Jet Transport Systems					
AS	420	Flight Technique Analysis					

#### 435 Electronic Flight Management Systems ... 3 AS 420 Airline Flight Crew Techniques and FA . . . . 8 31

## **Total Credits**

**TOTAL DEGREE CREDITS** 

## **Commercial Pilot Specialty**

The Commercial Pilot Specialty is designed for pilots with career interests requiring a more flexible degree program. The Aeronautical Science core course integrity is

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maintained, while allowing greater opportunity for the selection of courses to meet the needs of corporate and other segments of the aviation industry not specifically addressed by the Airline Pilot or Military Pilot specialties. One minor must be completed to meet the degree requirements of this specialization.

## FRESHMAN YEAR

Course		Title	Credits
		Communication Theory and Skills*	3
		Computer Science Elective*	
		Lower-Level Humanities*	3
AS	121	Private Pilot Operations	5
		Private Single Flight	
MA	111	College Mathematics for Aviation I	3
		College Mathematics for Aviation II.	
		Technical Physics I with Laboratory .	
		College Success	
WX	201	Survey of Meteorology	3
Total Cro		dita	27

#### Total Credits

<sup>+</sup>Meets open elective or credit in excess of degree requirements.

#### SOPHOMORE YEAR

Course		litle	Credits
		Communication Theory and Skills*	6
		Lower-Level Social Sciences*	6
		Management Elective*	3
AS	221	Instrument Pilot Operations	3
AS	309	Aerodynamics	3
AS		Flight Physiology	
FA		Instrument Single Flight	
		-OR-	
FA	122	Private Multi Flight with Laboratory -AND-	1
FA	222	Instrument Multi Flight	1
PS		Technical Physics II with Laboratory.	
WX		Aviation Weather	
Total	Cre	dits	31/32

#### JUNIOR YEAR

Course		Title Credits
		Upper-Level HU/SS Elective*
AS	254	Aviation Legislation
		-OR-
AS	321	Commercial Pilot Operations3
AS		Aircraft Performance
AS	311	Aircraft Engines - Turbine
AS	350	Domestic and International Navigation 3
AS	356	Aircraft Systems and Components3
AS		Advanced Avionics3
AS	380	Pilot Career Planning and

		Interviewing Techniques	1
AS	387	Crew Resource Management	3
AS	405	Aviation Law	3
FA	215	Upset Recovery	1
FA	321	Commercial Single Flight	1
FA	323	Commercial Multi Add On OR-	1
FA	322	Commercial Multi Flight	1
Tota	l Cre	dits	30/31
SEN	IOR	YEAR	
Cou	rse	Title	Credit

Cou		mue	cicuito
AS	340	Instructional Design in Aviation	
		-OR-	
FA	417	Flight Instructor Rating**	3
		Flight Safety	
AS	420	Flight Technique Analysis	3
BA/	STG	300/400 level	3
		Minor	. 9-18
		Electives	1-9
Tota	l Cre	dits	31
Тота	L DE	GREE CREDITS	120

## **Military Pilot Specialty**

The Military Pilot Specialty is designed for pilots with career interests in the military. This specialty contains the core Aeronautical Science courses and includes other courses optimized for a career as a pilot with the military. The Aeronautical Science degree, Military Pilot specialty is not a part of any ROTC program at Embry-Riddle but is designed for optimum use of the credit earned in ROTC.

#### FRESHMAN YEAR

Course		Title	Credits
		Communication Theory and Skills*	3
		Computer Science Elective*	
		Lower-Level Humanities*	3
AS	121	Private Pilot Operations	5
FA	121	Private Single Flight	1
MA	111	College Mathematics for Aviation I	3
MA	112	College Mathematics for Aviation II .	3
PS	103	Technical Physics I with Laboratory .	3
UNI	V101	College Success	. (1)+
WX	201	Survey of Meteorology	3
		ROTĆ	2
Total Cre		dits	29

+ Meets open elective or credit in excess of degree requirements.

#### SOPHOMORE YEAR

Course		Title	Credits
		Communication Theory and Skills*	6
		Lower-Level Social Sciences*	
AS	221	Instrument Pilot Operations	3
AS	309	Aerodynamics	3
AS	357	Flight Physiology	3
FA	215	Upset Recovery	1
FA	221	Instrument Single Flight	1
		-OR-	
FA	122	Private Multi Flight with Laboratory	1
		-AND-	
FA	222	Instrument Multi Flight	1
PS	104	Technical Physics II with Laboratory.	3
WX	301	Aviation Weather	3
		ROTC	2
Total Cre		dits	31/32

#### Total Credits

#### JUNIOR YEAR

Course		Title	Credits
		Management Elective*	3
AS	310	Aircraft Performance	3
AS	311	Aircraft Turbine Engines	3
AS	321	Commercial Pilot Operations	3
AS	350	Domestic and International Navigation	on 3
AS	356	Aircraft Systems and Components	3
AS		Advanced Avionics	
AS	387	Crew Resource Management	3
FA		Commercial Single Flight	
FA	323	Commercial Multi Add On OR-	1
FA	322	Commercial Multi Flight	1
		ROTC	
Total	Cre	dits	31/32

#### SENIOR YEAR

Course		Title	Credits
		Upper-Level HU/SS Elective*	3
AS	340	Instructional Design in Aviation -OR-	
FA	417	Flight Instructor Rating**	3
AS	408	Flight Safety	3
AS	420	Flight Technique Analysis	3
AS	435	Electronic Flight Management Systems	53
		Elective	
		ROTC	6
Total Credits		28	
TOTAL DE		gree Credits	120

## **AERONAUTICAL SCIENCE NOTES**

\* Embry-Riddle courses in the general education categories of Communication Theory and Skills, Computer Science, Humanities, Social Sciences, and Management may be chosen from those listed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified in the Aeronautical Science vertical outline.

## **Communication Theory and Skills**

COM: 122, 219, and 221, 222, or 410

## **Computer Science**

IT 109 or CS 117 or 118

## **Humanities/Social Sciences**

LOWER-LEVEL:
HU 140, 141, 142, 143, 144, 145, 146
PSY 220 and EC 200, SS 110, 120, 130, 204, or 210
(Military Pilot Specialty must take PSY 220 and SS
110, 120, or 130.)
UPPER-LEVEL:
HU/SS 300-400 level or
HF 300 or PSY 350

## **Management**

BA 201

\*\* Flight education is a continuous process that normally begins sometime during the student's first year of attendance and will progress until culminating in a multi-engine commercial certificate with an instrument rating. The curriculum is designed to allow students to meet core objectives in a reasonable amount of time.

Various factors influence student progress. These factors include student academic preparation, student availability, student determination and dedication, the availability of aircraft and instructor pilots, and the cooperation of the weather. Consequently, some students will finish before others. After completing the core curriculum, students may take an additional semester or more to acquire additional, advanced certificates and ratings, including those for single-engine commercial, certified flight instructor airplane and instrument, and/or they may enroll in the Airline Flight Crew Simulation course.

After matriculating, all remaining FA courses required for the Aeronautical Science degree must be completed at Embry-Riddle or at another AABI-accredited college/university. Students who have begun training on an FAA certificate course prior to enrolling at Embry-Riddle may obtain written permission to complete that

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ONE course outside Embry-Riddle. Courses for all other FAA certificates required for the Aeronautical Science degree must be completed at Embry-Riddle or at another AABI-accredited college or university. All students enrolled in the Aeronautical Science degree program must complete at least one flight course successfully at Embry-Riddle. All Embry-Riddle students must obtain written permission in advance for any flight training outside Embry-Riddle. See the Flight Department chair to obtain an Off Campus Flight Authorization Request form. All details regarding course and credit requirements and the approval process will be provided upon application. Students who have acquired FAA pilot certificates prior to enrolling at Embry-Riddle will receive credit for the appropriate courses and will be placed in the next sequential course in the degree program. See the Flight Department chair concerning exact credit.

Enrollment in AS or FA courses requires proof of U.S. citizenship or a Department of Justice background check for international students. Please see the Aviation Transportation and Security Act under the Admission to the Residential Campuses section of this catalog.

Cooperative Éducation credits may be used as open electives.

## AIRCRAFT DISPATCHER CERTIFICATION PROGRAM

For the student interested in airline flight operations management, Embry-Riddle offers a program to prepare the student for Aircraft Dispatcher certification testing. Upon successful completion of the required curriculum and the FAA Dispatcher Written Examination, the student will be eligible to take the FAA Dispatcher Practical Test.

Licensed dispatchers are employed by airlines to manage the ground-based tasks vital to a successful airline flight. Dispatchers share responsibility with the captain for preflight planning and preparation of the dispatch release, and they are included in the decision loop on equipment failures, weather variations, or traffic delays for monitoring the progress of the flight, issuing safety-of-flight information to the crew, and canceling or redispatching the flight.

To carry out these tasks properly, dispatchers must be knowledgeable in aircraft performance capabilities, meteorology, operating regulations, air traffic control, and instrument flight procedures. They must also be able to make sound decisions that incorporate the company's economic and scheduling considerations.

## CERTIFICATION REQUIREMENTS

The Aircraft Dispatcher Certification program is available at the Prescott campus. Dispatcher preparation is based on the successful completion of the following courses and the applicable prerequisites.

Course		Title	Credits
AS	232	Intermediate Aeronautics	3
		Aircraft Performance	3
AS	350	Domestic and International Navigation	on 3
AS	410	Airline Dispatch Operations*	3
AT	300	ATC in the National Aerospace Syste	m3
WX	201	Survey of Meteorology.	3
WX	301	Aviation Weather	3
Total Credits		21	

\* AS 410 serves as the capstone course for the Aircraft Dispatcher program.

This program is offered in the pursuit of a degree and not as separate training. Qualification for FAA testing normally requires a minimum of six semesters of instruction. To complete the Aircraft Dispatcher Certification program, the student must earn a "C" grade or higher in all required courses. For more information, contact the Aeronautical Science Department.

## Aeronautics

**Bachelor of Science** 

The Aeronautics degree is designed specifically for students who work, have worked, or desire to work in aviation-related careers. For students with existing aviation-related knowledge and skills, this degree acknowledges a student's valuable acquired experience through the award of advance standing prior-learning credit. The curriculum then builds on those skills and knowledge. The program also provides an opportunity for students new to aviation to acquire aviationspecific knowledge through aviation-related coursework. This combination of a student's aviation learning, aviation courses, courses in business, computer sciences, economics, humanities, communications, social sciences, mathematics, and physical sciences, along with professional development elective courses and a minor course of study, will prepare graduates for a career in an aviationrelated field.

## AVIATION AREA OF CONCENTRATION

The Aviation Area of Concentration is the degree component where students can select courses from various aviation-related fields. In addition, the AOC portion of the degree is where credit for prior aviation learning is applied. Thirty-six hours of credit are needed to satisfy the requirements of this portion of the Aeronautics degree. All or part of the credit needed for this degree requirement may be awarded based on prior aviation training or experience. To complete the AOC, in addition to any prior learning credit, students may select from courses in Aeronautical Science, Flight, Air Traffic Management, Safety (aviation-related), Aerospace Electronics, Applied Meteorology (aviation-related), Space Studies, or Security and Intelligence Studies.

# EVIDENCE OF PRIOR AVIATION LEARNING

Applicants who qualify for admission to and matriculate in the degree program may be eligible for credit for prior learning.

Applicants must be able to prove competence in an aviation occupation with authentic documentary evidence. Training and experience in closely related occupations can be combined.

Just as official transcripts are required to transfer credit from one university to another, original or authenticated documentation of prior learning from professional training and experience must be presented to qualify for Aviation Area of Concentration credit. Documentary evidence must be from objective third-party sources and clearly describe the applicant's professional training, duties, and achievements in detail. Advance standing credit will be awarded in accordance with the applicable Embry-Riddle Curriculum Manual.

## DUPLICATE CREDIT

Many Embry-Riddle courses are designed to teach the same skills and knowledge that Aeronautics students have acquired through experience and training. Students who complete courses in the same aviation specialty for which they were granted Aviation Area of Concentration credit would be duplicating coverage of the same subject matter. Credit for completion of such courses will not be applied to degree requirements.

Credit for prior learning granted in the Aeronautics degree program is not transferable to any other Embry-Riddle degree program.

## Minor

Students must select and complete one minor field of study. Total credits within the minor will vary depending on which minor is chosen. Students typically select a minor that will enhance their aviation career. Courses required for the minor field of study may be used to fill Area of Concentration, Professional Development, or Open Elective degree requirements. See Minor Courses of Study in this catalog.

## BACHELOR OF SCIENCE IN AERONAUTICS

The curriculum to be followed by each student will vary depending upon any AOC prior learning or transfer credits granted.

# Communication Theory and Skills\* 9 Humanities/Social Sciences\* 12 Lower-Level Humanities Elective 3 Lower-Level Social Sciences Elective 6 Upper-Level HU or SS Elective 3 Computer Science Elective 6 Outper-Level HU or SS Elective 3 Mathematics+ 6 College Algebra or higher-level math 3 MA 112 College Mathematics for Aviation II -OR MA 222 Business Statistics -OR

Upper-Level Mathematics		
Physical Sciences +6		
Physical and Life Sciences Elective3		
(One course must include a laboratory).		
Program Support		
AS 254 Aviation Legislation		
AS 405 Aviation Law		
BA 201 Principles of Management -OR-		
BA 210 Financial Accounting		
EC 200 An Economic Survey -OR-		
EC 210 Microeconomics -OŔ-		
EC 211 Macroeconomics		
Professional Development Electives		
Open Electives		

TOTAL DEGREE CREDITS 120

\*Embry-Riddle courses in the general education categories of Communication Theory and Skills, Humanities, and Social Sciences may be chosen from those listed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified in the Aeronautics vertical outline. Other courses may also be used with permission of the undergraduate program coordinator.

## **Communication Theory and Skills**

COM 122, 219, 221, 222

## **Humanities**

HU 140 to HU 146

## Social Sciences

LOWER-LEVEL: 100-200 level UPPER-LEVEL: 300-400 level HF 300, PSY 350

Dependent on the amount of upper-level Aviation Area of Concentration credit applied, some of the open or Communications/Humanities/Social Sciences electives in the B.S. degree may have to be 300-400 level courses to satisfy the graduation requirement of 39 credits of upper-level courses.

Cooperative Education credits may be used as open electives; however, assignments may not be in the student's occupational specialty.

Students need to ascertain Mathematics and Physical Sciences pre/corequisites that are required for other courses. For example, PS 103/4 and MA 112 are required for many upper-division AS and WX courses.

## Academic Programs at the Prescott Campus

## **Applied Meteorology**

#### **Bachelor of Science**

The Bachelor of Science degree in Applied Meteorology provides a practical understanding of the physics and dynamics of the atmosphere and prepares the graduate for a range of meteorologist positions in government or industry. Students use a state-of-the-art Weather Center and computer-equipped classrooms to understand and forecast complex atmospheric phenomena ranging from severe thunderstorms and tornadoes, to cyclones, fronts and jet streams, to global climate and how it is changing. Emphasis is placed on applying theory to operational weather forecasting and decision making for weather-sensitive industries, including possible hands-on experience as a meteorology intern. The program prepares graduating students for careers as meteorologists with the government, military, television, or the private sector, as dispatchers or for graduate studies toward a career in research or academia. All areas of concentration meet all the requirements for undergraduate study in meteorology recommended by the American Meteorological Society, the National Weather Service, and the U.S. Air Force. All graduates also meet U.S. Office of Personnel Management Qualification Standards for the position of meteorologist.

## DEGREE REQUIREMENTS

The Bachelor of Science degree in Applied Meteorology requires successful completion of a minimum of 120 credit hours and can be attained in eight semesters, as outlined below. Students must complete both general education courses and Applied Meteorology courses in order to graduate with a Bachelor of Science in Applied Meteorology. All students entering the Applied Meteorology Program should have completed four years of high school science and mathematics. Proficiency in trigonometry and pre-calculus is essential to enter this program. Students should be prepared to enter Calculus I in their first semester.

Students should be aware that several courses in each academic year may have preor co-requisites. Check the course descriptions at the back of this catalog before registering for classes to ensure that these requirements are met. In particular, many courses have math prerequisites or corequisites. Students should plan to begin the required math-calculus sequence as soon as they are eligible. Notice that students completing the Research AOC will be eligible to declare a Minor in Mathematics. Others may add MA 441 or similar upper-level math class to become eligible for the math minor.

In addition, the meteorology (WX) courses in the junior and senior years are offered only once a year. Students must adhere to the separate Fall and Spring plan given below for these years. Failure to do this will result in graduation being delayed by one year.

There are four areas of concentration. The Research Area of Concentration is for non-flying, non-military students. The Meteorology with Flying area of concentration is for nonmilitary students who wish to complete 15 credit hours of airplane (or helicopter) flying and ground schools while earning the Applied Meteorology degree. The Military Meteorologist area of concentration is for the ROTC student. The Meteorology for Aviation Operations Area of Concentration will train students for jobs as flight dispatchers. This area of concentration requires an additional 27 credit hours of classes, most of which can be satisfied using open elective slots. The area of concentration must be declared at the time of enrollment or during the first semester.

The courses necessary to earn the degree are listed below.

AREAS OF CONCENTRATION

## **RESEARCH AOC**

#### **FRESHMAN YEAR**

#### T: 1 C

Course		Title	Credits
AS	120	Principles of Aeronautical Science	3
COM	122	English Composition and Literature.	3
HU	14X	Lower-Level Humanities	3
		Business Statistics	
MA	241	Calculus and Analytical Geometry I.	4
MA	242	Calculus and Analytical Geometry II	4
PS	150	Physics I for Engineers.	3
PS	216	Physics I Laboratory	1
UNI	/ 101	College Success Seminar*	(1)
WX	252	Introduction to Meteorology	3
WX	261	Applied Climatology	3
Total	Cree	dits	31

\*Meets open elective or credit in excess of degree requirement

#### SOPHOMORE YEAR

Cour	se	Title	Credits
COM	219	Speech	3
CS	125	Computer Science I	4
MA	243	Calculus and Analytical Geometry III.	4
PS	105	General Chemistry I	4
PS	1051	General Chemistry I Laboratory	0
PS		Physics II for Engineers	
		Data Analysis and Visualization*	
WX	353	Thermodynamics of the Atmosphere*	3
WX	363	Thunderstorms	3
WX	365	Satellite and Radar Weather	
		Interpretation	3
Total	Cree	dits	30

\*Courses offered only in the Spring semester.

#### JUNIOR YEAR

Course ]	Fitle
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Credits
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## FALL

MA	Differential Equations and
	Matrix Methods4

EC/SS 1X	X/2XX Lower-Level Economics	2
WX 354	-OR- Social Sciences Dynamics of the Atmosphere	
WX 420	Advanced Atmospheric Thermodynan	nics3
	Open elective (if no Co-op)	(3)
SPRING	-	
MA 441	Advanced Engineering Mathematics .	3
WX 355	Weather Analysis	5
WX 390	Atmospheric Physics Open elective (if no Co-op)	3 (3)
SUMME	ER	
CE AAS	Co-op/Internship	
	-OR- Fall/Spring Open electives	6
Total Cre	dits	30
SENIOR	YEAR	
Course	Title	Credits
FALL		
	Business Communication	3
EC/SS 1X	X/2XX Lower-Level Economics	2
WX 270	-OR- Social Sciences	3
WX 427	Weather Information Systems Forecasting Techniques Advanced Dynamic Meteorology I	3
WX 490	Advanced Dynamic Meteorology I	3
SPRING	1	
HU/SS 32	XX/4XX Upper-Level Humanities	
	-OR- Social Sciences	
WX 457 WX 491	Weather Operations Seminar Advanced Dynamic Meteorology II	3
WX 4/1	Open electives	5
Total Cre	dits	29
TOTAL DE	GREE CREDITS	120

#### APPLIED METEOROLOGY WITH FLYING AOC

#### FRESHMAN YEAR

Cour	se	Title	Credits
AS	121	Private Pilot Operations.	5
COM	122	English Composition and Literature.	3
FA	121	Private Single Flight	1
MA	241	Calculus and Analytical Geometry I.	4
MA	242	Calculus and Analytical Geometry II	4
PS	150	Physics I for Engineers.	3
PS	216	Physics I Laboratory	1
		College Success Seminar	
WX	252	Introduction to Meteorology	3
WX	261	Applied Climatology	3
Total	Cree	lits	28

\*Meets open elective or credit in excess of degree requirement

#### SOPHOMORE YEAR

Cour	se	Title 0	Credits
AS	221	Instrument Pilot Operations	3
CS		Introduction to Computing for Engine	
FA	221	Instrument Single Flight	1
MA	243	Calculus and Analytical Geometry III.	4
PS	105	General Chemistry I	4
PS	105I	L General Chemistry I Laboratory	0
PS	160	Physics II for Engineers	3
WX	220	Data Analysis and Visualization*	3
WX	353	Thermodynamics of the Atmosphere*	3
WX	363	Thunderstorms	3
WX	365	Satellite & Radar Weather Interpretatio	n.3
Total	Cree	dits	31

**Total Credits** 

\*Courses offered only in the Spring semester.

#### JUNIOR YEAR

#### Course Title

Credits

Credits

## FALL

AS 321 Commercial Pilot Operations	3		
EC/SS 1XX/2XX Lower-Level Economics			
-OR- Social Sciences	3		
FA 324 Commercial-Multi Flight	1		
MA 345 Differential Equations and			
Matrix Methods			
WX 354 Dynamics of the Atmosphere	3		
WX 420 Advanced Atmospheric Thermodynamics	3		
SPRING			
COM219 Speech	3		
MA 222 Business Statistics	3		
WX 355 Weather Analysis	5		
WX 390 Atmospheric Physics			
Total Credits 3	1		

## **Total Credits**

## SENIOR YEAR

Course	Title
Course	Title

## FALL

EC/SS 1XX/2XX Lower-Level Economics	
-OR- Social Sciences	3
HU 14X Lower-Level Humanities	3
WX 270 Weather Information Systems	3
WX 427 Forecasting Techniques	3
WX 490 Advanced Dynamic Meteorology I	3
SPRING	
COM222 Business Communication	3
HU/SS 3XX/4XX Upper-level Humanities	
-OR- Social Sciences	3
WX 457 Weather Operations Seminar	3
WX 491 Advanced Dynamic Meteorology II	3
Open Elective	
Total Credits	30
TOTAL DEGREE CREDITS	121

## MILITARY METEOROLOGIST AOC

## FRESHMAN YEAR

Course	Title	Credits
AS 120	Principles of Aeronautical Science	3
COM122	English Composition and Literature.	3
HU 14X	Lower-Level Humanities	3
	Calculus and Analytical Geometry I.	
MA 242	Calculus and Analytical Geometry II	4
PS 150	Physics I for Engineers.	3
PS 216	Physics I Laboratory	1
<b>UNIV 10</b>	College Success Seminar	(1)*
WX 252	Introduction to Meteorology	3
WX 261	Applied Climatology	3
	RÔTC	
Total Cre	dits	30

## **Total Credits**

\*Meets open elective or credit in excess of degree requirement

## SOPHOMORE YEAR

Course		Title	Credits
COM	1219	Speech	3
CS	125	Computer Science I.	4
MA	243	Calculus and Analytical Geometry III	4
PS	105	General Chemistry I	4
PS	105	L General Chemistry I Laboratory	0
PS		Physics II for Engineers	
WX		Data Analysis and Visualization*	
WX		Thermodynamics of the Atmosphere*	
WX	363	Thunderstorms	3
WX	365	Satellite and Radar Weather	
		Interpretation	3
		ROTC	
Total Cre		dits	32

#### **Total Credits**

\*Courses offered only in the Spring semester

## JUNIOR YEAR

Course Title

## Credits

Cour	30		Licuita		
FAL	FALL				
MA	345	Differential Equations and			
		Matrix Methods	4		
EC/S	S 1X	X/2XX Lower-Level Economics			
		-OR- Social Sciences	3		
WX	420	Advanced Atmospheric			
		Thermodynamics			
WX	354	Dynamics of the Atmosphere			
		ROTC	3		
SPR	ING				
MA	222	Business Statistics	3		
WX	355	Weather Analysis	5		
		Atmospheric Physics			
		ROTC	3		
Total	Cre	dits	30		

## SENIOR YEAR

Course	Title
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## FALL

EC/SS 12	XX/2XX Lower-Level Economics	
	-OR- Social Sciences	
WX 270	Weather Information Systems	3
WX 427	Forecasting Techniques	3
WX 490	Advanced Dynamic Meteorology I	3
	ROTC	3
SPRINC	3	
COM 222	English Composition and Literature	3
WX 457	Weather Operations Seminar	3
WX 491	Advanced Dynamic Meteorology II	3
HU/SS 3	XX/4XX Upper-level Humanities	
	-OR- Social Sciences	3
	ROTC	3
Total Cre	dits	30
TOTAL DEGREE CREDITS		122

## METEOROLOGY FOR AVIATION **OPERATIONS AOC**

## FRESHMAN YEAR

Course		Title	Credits
AS	121	Private Pilot Operations	5
COM	[122	English Composition and Literature.	3
MA	241	Calculus and Analytical Geometry I.	4
MA	242	Calculus and Analytical Geometry II	4
PS	150	Physics I for Engineers	3
PS	216	Physics I Laboratory	1
UNIV	/ 101	College Success Seminar	(1)*
WX	252	Introduction to Meteorology	3
WX	261	Applied Climatology	3
WX	301	Aviation Weather	3
Total Credits		31	

\*Meets open elective or credit in excess of degree requirement

## SOPHOMORE YEAR

Course		Title	Credits
AS	221	Instrument Pilot Operations	3
		Aerodynamics	
CS	125	Introduction to Computing for Engine	ers 4
MA	243	Calculus and Analytical Geometry III.	4
PS	105	General Chemistry I	4
PS	105I	General Chemistry I Laboratory	0
WX	220	Data Analysis and Visualization*	3
WX	353	Thermodynamics of the Atmosphere*	3
WX	363	Thunderstorms	3
WX	365	Satellite & Radar Weather Interpretati	on .3
Total	Cree	dits	30

\*Courses offered only in the Spring semester

## JUNIOR YEAR

Credits

Course	Title	Credits		
FALL				
PS 160	Aircraft Performance Physics II for Engineers Differential Equations	3		
WX 354 WX 420	and Matrix Methods Dynamics of the Atmosphere Advanced Atmospheric Thermodynamics	3		
SPRING	•			
MA 222 WX 355	Domestic and International Navigatic Business Statistics	3 5		
SUMM	ER			
COM 219 EC/SS 17	Speech (X/2XX Lower-Level Economics			
HU 14x	-OR- Social Sciences Lower-Level Humanities	3		
Total Cre		39		
SENIOR	YEAR			
Course	Title	Credits		
FALL				
AT 300	Air Traffic Management I			
WX 270 WX 427 WX 490	-OR- Social Sciences Weather Information Systems Forecasting Techniques Advanced Dynamic Meteorology I	3		
SPRING				
COM 222	Airline Dispatch Operations Business Communication	3		
WX 457 WX 491	-OR- Social Sciences	3		
Total Cre	dits	30		
TOTAL D	<b>DEGREE CREDITS</b>	129		

## Academic Programs at the Prescott Campus

## Safety Science

Bachelor of Science This program will be open to students in Fall of 2008

The Bachelor of Science degree in Safety Science provides the student with the skills and knowledge for a career in Aviation Safety or Occupational Health and Safety and is normally completed in eight semesters. The program delivers an effective foundation in safety, preparing the student for any industrial setting and allowing each student to select an Aviation Safety or Occupational Safety and Health area of concentration.

The Department of Safety Science is located in the Robertson Aviation Safety Center.

The Bachelor of Science degree in Safety Science is designed to provide the student with the following knowledge and skills:

- Familiarity with the fundamentals of the ancillary disciplines that are essential to the practice of safety: aviation safety, occupational safety, industrial hygiene, ergonomics/human factors, and quantitative methods
- Ability to understand research processes, techniques, and procedures and to draw appropriate conclusions from the analysis of both quantitative and qualitative data
- Knowledge of basic approaches to accident investigation
- Understanding of the breadth of application of the discipline of safety science, including ground and occupational safety as well as product safety, aviation safety, flight safety, and air crash investigation
- Use appropriate tools for the analysis of safety data to draw inferences about cause, effect, and prevention

## DEGREE REQUIREMENTS

The successful completion of the Bachelor of Science in Safety Science requires a minimum of 121 credit hours. Students will complete a general education core of 24 credit hours and a math and science core of 25 credit hours. Each Safety Science major will complete a safety core of 39 credit hours. The student will choose an area of concentration in Aviation Safety or Occupational Safety and Health as early as possible but certainly by the beginning of the sixth semester of the program. Each of these areas of concentration will require 18 credit hours. This program provides 15 open electives so the student can select a minor course of study that will complement the safety career.

## AVIATION SAFETY AREA OF CONCENTRATION

## FRESHMAN YEAR

Cour	se	Title	Credit
AS	120	Principles of Aeronautical Science	3
AS		Basic Aeronautics I	
COM	[122	Composition	3
HU	14X	Lower-Level Humanities	3
MA	111	College Math for Aviation I	3
MA	112	College Math for Aviation II	3
PS	103	Technical Physics I	3
PS	107	Elements of Biological Science	3
SF	210	Introduction to Aerospace Safety	3
WX	201	Survey of Meteorology	3
Total	Cre	dits	30

## SOPHOMORE YEAR

Course	Title	Credits
CS	Computer Science Elective	3
	Elective	3

COM219 Speech
COM 221 Technical Report Writing
-OR-
COM222 Business Communication
EC 200/210/211 Economics
MA 222 Business Statistics
PS 104 Technical Physics II
PS 105 General Chemistry4
PSY 220 Introduction to Psychology
SF 205 Principles of Accident Investigation3
Total Credits 31

## JUNIOR YEAR

Course		Title	Credits
SF	315	Environmental Science and Safety	3
SF	320	Human Factors in Aviation	3
SF	325	Human Factors and Ergonomics I	3
SF	330	Aircraft Accident Investigation	3
SF	335	Mechanical and Structural Factors	
		in Aviation	3
SF	345	Safety Program Management	3
SF	355	Industrial Hygiene and Toxicology	3
		Electives	9
Total	Cree	dits	30

## **Total Credits**

## SENIOR YEAR

Course		Title	Credits
AS		Aerodynamics	
AS	356	Aircraft Systems and Components	3
HU/	'SS	Upper-Level Elective	3
SF	326	System Safety	3
SF	350	Air Crash and Emergency Managemer	nt 3
SF	410	Design of Engineering Hazard Control	ls3
SF	462	Health, Safety, and Aviation Law	3
SF	475	Senior Project	3
		Electives	6
Total Credits		30	
TOTAL DEGREE CREDITS		121	

## OCCUPATIONAL SAFETY AND HEALTH AREA OF CONCENTRATION

## FRESHMAN YEAR

Course		Title	Credits
COM	1122	English Composition and Literature.	3
CS		Computer Science Elective	3
HU	14X	Lower Level Humanities	3
MA	111	College Math for Aviation I	3
MA	112	College Math for Aviation II	3
AS	120	Principles of Aeronautical Science	3

	107 210	Technical Physics I Elements of Biological Science Introduction to Aerospace Safety Survey of Meteorology	3 3
Total	Cre	dits	30

## SOPHOMORE YEAR

Cour	se	Title	Credits
COM	[219	Speech	3
COM	[221	Technical Report Writing	
		-OR-	
COM	[222	Business Communication	3
EC	200,	/210/211 Economics	3
MA	222	Business Statistics	3
PS		Technical Physics II.	
PS	105	General Chemistry	4
PSY	220	Introduction to Psychology	3
SF	205	Principles of Accident Investigation	3
		Electives	6
Total Credits			31

## **Total Credits**

## JUNIOR YEAR

Cours	se	Title	Credits
SF	311	Industrial Security	3
SF	315	Environmental Science and Safety	3
SF	325	Human Factors and Ergonomics I	3
SF	345	Safety Program Management	3
		Industrial Hygiene and Toxicology	
		Analysis of Observational Data	
		Electives	
SF	425	Human Factors and Ergonomics II	3
Total	Cree	dits	30

## SENIOR YEAR

## Course Title

Course		Title	Credits
BA	317	Organizational Behavior -OR-	
BA	420	Management of Production Operations	53
HU/		Upper-Level Elective	
SF	326	System Safety	3
SF	350	Air Crash and Emergency Managemen	ıt 3
SF	405	Applications of Industrial Hygiene	3
SF		Design of Engineering Hazard Control	
SF		Design of Engineering Hazard Control	
SF		Health, Safety, and Aviation Law	
SF	475	Senior Project	3
		Elective	3
Total	Cre	dits	30
Тота	l Deo	GREE CREDITS	121

## Safety Science/Master of Science in Safety Science

Bachelor of Science - Master of Science in Safety Science This program will be open to students in Fall 2008

This is a five-year program that allows wellqualified students to complete both a B.S. in Safety Science and a Master of Science in Safety Science. This program is available only at the Prescott campus, through the Department of Safety Science. The objective of this five-year program is to produce safety professionals with the following skill set:

- Familiarity with the fundamentals of the ancillary disciplines that are essential to the practice of safety: aviation safety, occupational safety, industrial hygiene, ergonomics/human factors, and quantitative methods
- Ability to understand research processes, techniques and procedures and to draw appropriate conclusions from the analysis of both quantitative and qualitative data
- Knowledge of basic approaches to accident investigation
- Understanding of the breadth of application of the discipline of safety science, including ground and occupational safety as well as product safety, aviation safety, flight safety, and air crash investigation
- Use appropriate tools for the analysis of safety data to draw inferences about cause, effect, and prevention

## DEGREE REQUIREMENTS

Students enrolled in this program must meet the following requirements:

- Maintain a cumulative GPA of 3.2 throughout the academic program.
- Maintain a cumulative GPA of 3.0 for all graduate courses.

• Complete a total of 151 credits hours (listed in the following section). There will be 121 credit hours required for the completion of the BSSS and 30 additional credit hours of graduate requirements for completion of the MSSS.

## **Application Process**

Application to the BSSS/MSSS Program takes place in the second year of study, when candidates submit the proper form to the chair of the Department of Safety Science at the Prescott campus. Decisions will allow the student to be accepted into the BSSS/MSSS program by the beginning of his/her third year of study.

# 5-YEAR PROGRAM FOR AVIATION SAFETY CONCENTRATION

## FIRST YEAR

#### Course Title Credits 120 Principles of Aeronautical Science ......3 AS AS COM122 English Composition and Literature .....3 PS PS SF 210 Introduction to Aerospace Safety......3 **Total Credits** 30

## SECOND YEAR

Course Title Credits CS COM221 Technical Report Writing -OR-EC MA PS PS 105 General Chemistry ......4 PSY SF 205 Principles of Accident Investigation .....3 **Total Credits** 31

#### THIRD YEAR

Course		Title	Credits
SF	315	Environmental Science and Safety	3
SF	320	Human Factors in Aviation	3
SF	325	Human Factors and Ergonomics I	3
SF	330	Aircraft Accident Investigation	3
SF	335	Mechanical and Structural Factors	
		in Aviation	3
SF	345	Safety Program Management	3
SF	355	Industrial Hygiene and Toxicology	3
		Electives	
Total Credits		30	

#### FOURTH YEAR

Cour	se	Title	Credits
AS	309	Aerodynamics	3
AS	356	Aircraft Systems and Components	3
AS		Aviation Law	
		Upper-Level Elective	
SF	326	System Safety	3
		Air Crash and Emergency Manageme	
SF	410	Design of Engineering Hazard Control	ols3
		Occupational Safety	
MSF	613	Aviation Safety	3
		Elective	3
Total	Cre	dits	30

## **Total Credits**

#### FIFTH YEAR

Cour	se	Title	Credit
MSF	580	Industrial Hygiene and Environmental	1
		Protection	
MSF	600	Quantitative Methods	3
MSF	601	Ergonomics	3
MSF	602	Human Factors	3
		Research Methods	
MSF	690	Graduate Research Project	3
MSF		Graduate Level Electives	12
Total	Cre	dits	30
TOTAL DEGREE CREDITS		151	

## 5-YEAR PROGRAM FOR OCCUPATIONAL SAFETY CONCENTRATION

#### FIRST YEAR

Cour	se	Title	Credits
AS	120	Principles of Aeronautical Science	3
COM	122	English Composition and Literature.	3
CS		Computer Science Elective	3
HU	14X	Lower Level Humanities	3
MA	111	College Math for Aviation I	3
MA	112	College Math for Aviation II	3
PS	103	Technical Physics I	3
PS	107	Elements of Biological Science	3
SF	210	Introduction to Aerospace Safety	3

	Survey of Meteorology	
Total Cre	alts	30
SECONI	D YEAR	
Course	Title	Credits
COM219	Speech	3
	Technical Report Writing -OR-	
COM 222	Business Communications	3
	/210/211 Economics	
	Business Statistics	
PS 104	Technical Physics II	3
PS 105	General Chemistry	4
	Introduction to Psychology	
SF 205	Principles of Accident Investigation	3
	Electives	6
Total Cre	dit	31
THIRD Y	<b>YEAR</b>	
Course	Title	Credits

SF	311	Industrial Security	3
SF	315	Environmental Science and Safety	3
		Human Factors and Ergonomics I	
SF	345	Safety Program Management	3
SF	355	Industrial Hygiene and Toxicology	3
		Analysis of Observational Data	
		Human Factors and Ergonomics II	
		Electives	
Fotal	Cre	dits	30

#### **Total Credits**

FOURTH YE	EAR
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Course		Title	Credits
AS	405	Aviation Law	3
BA	420	Management of Production	
		and Operations	
HU/	SS	Upper Level Elective	3
SF	326	System Safety	3
SF	350	Air Crash and Emergency Manageme	ent 3
SF		Applications of Industrial Hygiene	
SF		Design of Engineering Hazard Controls	
SF		Design of Engineering Hazard Controls	
MSF	603	Occupational Safety	3
MSF	613	Aviation Safety	3
Total Cre		dits	30

#### FIFTH YEAR

MSF 580 Industrial Hygiene and Environmental		
Protection		
MSF 600 Quantitative Methods	3	
MSF 601 Ergonomics	3	
MSF 602 Human Factors		
MSF 611 Research Methods	3	
MSF 690 Graduate Research Project	3	
MSF XXX Graduate Level Electives	12	
Total Credits	30	
TOTAL DEGREE CREDITS		

## Academic Programs at the Prescott Campus

# College of Engineering

Dr. Don Rabern, Dean

The College of Engineering offers four complementary programs, all focused on the aerospace industry. Aerospace, Mechanical, Computer, and Electrical engineers often are the primary team members in the design, analysis, or refurbishment of aircraft, spacecraft, missiles, rockets, and the ground-based systems that support their operations. The strength of the college is built on this combination of disciplines focused on aerospace platforms.

Aerospace Engineering concentrates its efforts in space systems, structures, and aerodynamics.

Computer Engineering focuses on the design and development associated with computer hardware, including chips and circuits, and with the analysis, design, and development of mission-critical software systems employed in these devices.

Electrical Engineering focuses on electrical systems, controls, and communications.

Mechanical Engineering focuses on propulsion and robotics with an emphasis on jet aircraft engines and autonomous vehicles such as Unmanned Aerial Vehicles (UAVs) and Planetary Rovers.

The philosophy of our college is to give students a broad background, enabling them to pursue careers in many technical areas, but we choose to use aerospace as our vehicle to demonstrate the exciting, creative, and technical aspects of these engineering disciplines.

With this in mind, our mission is to provide undergraduate education founded

on a rigorous, applied treatment of engineering fundamentals coupled with modern engineering tools. The College of Engineering is dedicated to providing excellence in aviation and space education, based in aerospace, mechanical, electrical, and computer engineering, demonstrated through quality teaching, scholarly activity, facilities, and curriculum. Our engineering programs are recognized for their strong emphasis and rigor in engineering science and design founded on hands-on laboratory-based education. The college's vision is to contribute well-prepared professionals for early success in the industry or in graduate school. Our faculty is dedicated to educating engineers for the 21st century without forgetting the lessons of the 20th century.

The College of Engineering embraces the philosophies of the Accreditation Board of Engineering and Technology (ABET). We have established objectives for our graduating students and alumni to prepare them for a career in the industry or in graduate school. Along with these objectives we have established outcomes we expect from our students through graduation. Those outcomes are listed below:

 Our graduating students will have experienced a core of humanities, social sciences, and communications and demonstrate the use of this core to enhance the technical content of their engineering curriculum.

## Academic Programs at the Prescott Campus

- 2. Graduating seniors will be competent in fundamental math and basic science subjects.
- 3. All graduating engineering students will be competent in a subgroup of core engineering fundamentals appropriate to their discipline.
- 4. Engineering students graduating from our programs will demonstrate proficiency in core topics in their program listed below:

# Aerospace Engineering (Aeronautics Option)

Aerodynamics, Thermal Sciences, Structures, Flight Mechanics, Aircraft Design, Propulsion, Electronics, Aerospace Materials, Astronautics, and Design

# Aerospace Engineering (Astronautics Option)

Astrodynamics, Attitude Dynamics and Control, Structures, Rocket Propulsion, Spacecraft Design, Thermal Sciences, Aeronautics, Space Systems, Space Environment Effects, Aerospace Materials, and Design

## **Electrical Engineering**

Analog/Digital Circuits, Electronic Devices, Controls, Electromagnetics, Power Conversion, Telecommunications, Hardware and Software Systems, and Design

#### **Computer Engineering**

Electrical Circuits, Electronics, Controls, Logic Circuits, Computer Architecture, Computer Operating Systems, Algorithms and Data Structures, and Design

## **Mechanical Engineering**

Thermal Sciences, Mechanisms, Robotics, Air Breathing Propulsion, Electronics, Machine Design, Aerospace Materials, Controls, Vibrations, and Design

- 5. Graduating students will have had the opportunity to specialize and demonstrate competence in a sub discipline in their chosen field, to provide depth in a subject area or prepare them for graduate education.
- 6. All engineering students will be proficient in engineering design.
- All engineering students will demonstrate design competence through a major design (capstone) experience focused on designing a project, device, system, or process incorporating engineering standards and realistic constraints.
- 8. All engineering students will be proficient in modern laboratory techniques and state-of-the-art computer technology.

Aerospace Engineering, Electrical Engineering, and Computer Engineering are accredited by the Accreditation Board of Engineering and Technology (ABET). Mechanical Engineering is brand new to the college, accepting its first freshman class in the fall semester of 2007. Mechanical Engineering will be eligible by ABET to seek accreditation after its first graduate.

Entering students will find that the first-year engineering program is designed to prepare them for entry into the degrees offered by the College of Engineering. The first-year curriculum allows engineering students to take coursework that is common to every engineering degree in the College, allowing students flexibility in choosing engineering degrees without affecting their progress toward graduation.

It is the goal of the College of Engineering that normal incoming freshmen be able to complete their baccalaureate studies in four years. Depending on preparation and the time committed to classes, students may be able to graduate more quickly than that or it may take them longer. The nominal four-year program assumes that students arrive here having mastered trigonometry, two years of algebra, and one year of high school physics. Because communication skills are vital to all modern engineering disciplines, entering students should have a strong background in English composition.

The College of Engineering is proud of its programs. Industry praises the quality of our graduates, and graduate schools welcome our students. The following sections provide specific information on each degree program. Details on the content and emphasis of the degree and the degree requirements are shown. Please remember that questions regarding the degree programs are always welcome. Please feel free to contact the Admissions office, the College of Engineering, or the individual departments directly.

## FIRST-YEAR ENGINEERING

The First-Year Engineering Program is designed to introduce engineering students to the interdisciplinary aspects of engineering. Engineering courses, mathematics, computing, and physics courses are integrated to prepare students to work in teams for solving aerospace problems that reach across the broad areas of engineering. The first year for all engineering students is outlined below:

#### FIRST-YEAR ENGINEERING PROGRAM

Course	Title	Credits
CEC 220	Digital Circuit Design	3
CEC 222	Digital Circuit Laboratory	1
COM 122	English Composition and Literature.	3
COM 219	Speech	3
EGR 101	Introduction to Engineering	2
EGR 115	Introduction to Computing	
	for Engineers	3
HU 14X	Humanities	3
HU/SS	Lower-Level Humanities	
	-OR-	
SS	Elective	3
MA 241	Calculus and Analytical Geometry I.	4
MA 242	Calculus and Analytical Geometry II	4
PS 150	Physics for Engineers I	3
UNIV101	College Success*	(1)
Total Cre	dits	32

\* In excess of degree requirements.

# Aerospace Engineering

**Bachelor of Science** 

The Bachelor of Science degree in Aerospace Engineering provides a broad exposure to engineering fundamentals and prepares the graduating student for a wide range of engineering positions in industry or government. The program also is an excellent preparation for graduate school in a number of disciplines. The program's focus is primarily on the engineering of mission-oriented vehicles for atmospheric and space flight. In addition to the general education requirements, the student will study aerodynamics, structures, propulsion, space systems, controls, materials, instrumentation, electrical fundamentals, computer applications, orbital mechanics, and design. Students choose to integrate their knowledge in either an aircraft or spacecraft capstone design project. Design projects in a number of courses will develop and refine the students' ability to integrate their knowledge, communicate both verbally and in writing, and work in a team environment. A large number of hands-on experiences will expose the student to practical engineering to balance the theoretical analysis required to understand aircraft and spacecraft systems.

The overall objective of the Aerospace Engineering program at Prescott is to produce graduates who will be successful practitioners of aerospace engineering. The program objectives to accomplish this goal are:

## I. Math, Science, and Engineering Fundamentals

Alumni working in the engineering field will demonstrate skills in math, science, and engineering with an emphasis on solving problems using fundamental engineering principles, including engineering logic, traditional analytical methods, modern software, and experimental verification of analytical methods. Additionally and more specifically:

- 1. Be competent in fundamental engineering areas that include statics, dynamics, solid mechanics, circuits, materials science, fluid mechanics, thermodynamics, and experimental techniques and instrumentation.
- 2. Use appropriate software that would enable analysis, simulation, and design of aerospace systems (for example, MATLAB, ANSYS, CATIA).

## **II. Social Context of Engineering Practice**

Alumni working in the engineering field will demonstrate an understanding and philosophy that promotes engineering practice founded in technical integrity, ethics, social and environmental responsibility, and global awareness. Alumni will recognize the importance of preparing themselves for continued education and independent thought.

## **III. Design and Teamwork**

Alumni working in the engineering field will demonstrate the ability to assimilate topics from multiple sources, design a system or process, communicate that design effectively though verbal and written means, and work effectively on a team. They will also be cognizant of engineering project management. Alumni will:

1. Have a broad understanding of the interrelations of the aerospace disciplines and their impact on aerospace designs.

- 2. Understand the importance of teamwork, the value of multiple experiences, and be able to communicate to a broad array of technical and non-technical audiences.
- 3. Bring design expertise to the work environment within a chosen subset of aerospace engineering disciplines.

#### **IV. Discipline Specific Depth**

Alumni working in the engineering field will demonstrate depth in their discipline and exposure in related areas. They will:

- 1. Have demonstrated depth in aerospace structures and propulsion, and either aeronautics or astronautics.
- 2. Have depth in theoretical, computational, and experimental methods.

These objectives coupled with the common college outcomes are extensive and form the foundation of the program. We ask a lot from our students and faculty. The commitment students make in the program and consequently the skills they bring to the workforce are substantial and are required to be among the best in the industry.

#### DEGREE REQUIREMENTS

The Bachelor of Science in Aerospace Engineering program requires successful completion of a minimum of 129 credit hours. The program may be completed in eight semesters assuming appropriate background and full-time enrollment. A minimum cumulative grade point average of 2.00 is needed for all required AE, EGR, EP, and ES courses, excluding technical electives. The courses necessary to earn this degree are listed below. Students should be aware that many courses have prerequisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure required sequencing. Students should note that a grade of C or better is required in MA 241, MA 242, and PS 150 for entry into ES courses and also PS 160 for entry into AE courses.

## Suggested Program of Study

#### FRESHMAN YEAR

Course	Title	Credits
	Humanities -OR- Social Sciences*	3
CEC 220	Digital Circuit Design	3
CEC 222	Digital Circuit Laboratory	1
	English Composition and Literature.	
	Speech	
EGR 101	Introduction to Engineering	2
EGR 115	Introduction to Computing	
	for Engineers	3
HU 14X	Lower-Level Humanities*	
MA 241	Calculus and Analytic Geometry I	4
MA 242	Calculus and Analytic Geometry II	4
PS 150	Physics I for Engineers.	3
UNIV 101	College Success <sup>**</sup>	(1)
Total Cre	dits	32

\*\* In excess of degree requirements.

#### SOPHOMORE YEAR

#### Course Title

		Technical Report Writing Computer Aided Conceptual Design of Aerospace Systems	
ES	201	Statics	
ES		Solid Mechanics	
ES	204	Dynamics	.3
ES	206	Fluid Mechanics	.3
MA	243	Calculus and Analytic Geometry III	.4
MA	345	Differential Equations and	
		Matrix Methods	.4
PS	160	Physics II for Engineers	.3
PS	220	Physics III Laboratory	.1
PS	250	Physics III for Engineers	.3
Total	Cree	dits	33

Credits

#### JUNIOR YEAR (AERONAUTICS OPTION)

Course		Title	Credite
AE	301	Aerodynamics I	3
AE		Aerodynamics II	
AE		Aircraft Structures I	
AE	314	Experimental Aerodynamics	1
AE	315	Experimental Aerodynamics Lab	1
AE	404	Aircraft Structures II.	3
AE		Airplane Stability and Control	
EC/S	STG	Lower-Level Economics*	3
ES		Thermodynamics	
ES	320	Engineering Materials Science	2
ES	321	Engineering Materials Science Lab	1
EE	335	Electrical Engineering I	2
EE		Electrical Engineering I Lab	
PS	105	General Chemistry I	4
Total	Cre	dits	33

#### Total Credits

#### JUNIOR YEAR (ASTRONAUTICS OPTION)

#### Title Course

#### "modits

Cour	se	The C	leuns
AE	301	Aerodynamics I	3
AE	304	Aircraft Structures I	3
AE	313	Space Mechanics	3
AE	325	Experimental Space Systems Engineeri	ng 1
AE	326	Experimental Space Systems	0
		Engineering Laboratory	1
EC/S	ΤG	Lower-Level Economics*	3
EP	394	Space Systems Engineering	3
ES	305	Thermodynamics	3
ES	320	Engineering Materials Science	2
ES	321	Engineering Materials Science Lab	1
EE	335	Electrical Engineering I	2
EE	336	Electrical Engineering I Lab	1
MA	441	Advanced Engineering Mathematics I	3
PS	105	General Chemistry I	4
Total	Cree	dits	33

#### SENIOR YEAR (AERONAUTICS OPTION)

Course		Title	Credits
		Upper-Level Humanities -OR-	
		Social Sciences*	3
		Technical Electives	6
AE	313	Space Mechanics	
AE		Turbine and Rocket Engines	
AE	416	Aerospace Structures and	
		Instrumentation	1
AE	417	Aerospace Structures and	
		Instrumentation Lab	1
AE	420	Aircraft Preliminary Design	4
AE	421	Aircraft Detail Design	4
AE	430	Control Systems Analysis and Design	3
MA	441	Advanced Engineering Mathematics	I3
Total	Cre	dits	31

#### SENIOR YEAR (ASTRONAUTICS OPTION)

Course		Title	Credits
		Upper-Level Humanities -OR-	
		Social Sciences*	3
		Technical Electives	6
AE	404	Aircraft Structures II	3
AE	414	Space Propulsion	3
AE	426	Spacecraft Attitude Dynamics	
		and Control	
AE		Spacecraft Preliminary Design	4
AE	430	Control Systems Analysis and	
		Design	3
AE		Spacecraft Detail Design	4
AE	416	Aerospace Structures and	
		Instrumentation	1
AE	417	Aerospace Structures and	
110	117	Instrumentation Laboratory	1
Tota	l Cre	dits	31
Тота	AL DE	GREE CREDITS	129
Technical Electives:			
AE: All AE courses with the exception of 399 <sup>††</sup> CEAE: With prior approval of the Aerospace			

Engineering Department.		L. White prior approval of the re-
		Engineering Department
	CC.	205 225 244 250 400

- CS: 325, 335, 344, 350, 420 EP: 320, 394, 410, 420, 455
- 306, 315, 395, 399<sup>++</sup>, 403, 412, 495, 499<sup>++</sup> ES:
- MA: 412, 432, 438, 442, 443, 5XX
- ME: All ME courses with the exception of 399<sup>++</sup>, 499<sup>++</sup>
- PS: 301, 303, 320, 401, 405
- EE: 303, 340, 406, 410
- SE: 300

tt Must be approved by the Aerospace Engineering Department before taking this course.

Three credit hours of technical elective credit must be taken from available upper-level College of Engineering courses not specifically listed in the student's degree requirements. The remaining three credit hours must be selected from the list above or an upper-level ROTC course or aeronautical certificate may be substituted.

#### **General Education Electives**

\* Embry-Riddle courses in the general education categories of Humanities and Social Sciences may be chosen as specified below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified above in the Aerospace Engineering vertical outline.

#### **Humanities**

LOWER-LEVEL: Any HU/L course under 300 level.

UPPER-LEVEL: Any HU/L course equal to or above 300 level. Language courses, other than the student's native language, are acceptable for Humanities.

#### Social Sciences

LOWER-LEVEL: Any SS course under 300 level or STG 210.

UPPER-LEVEL: Any SS course equal or above 300 level.

Language courses, other than the student's native language, are acceptable for Humanities.

#### **Economics**

LOWER-LEVEL: Any EC course under 300 level or STG 205.

Prior approval by the Aerospace Engineering Department chair is required for any substitutions for general education electives, including the following: Lower level PSY and RS courses substituting for lower-level Humanities and Social Sciences courses. Upper-level EC, RS, and STG courses substituting for upper-level Humanities and Social Sciences courses.

# **Computer Engineering**

**Bachelor of Science** 

The Bachelor of Science degree in Computer Engineering provides the student with the opportunity to acquire a broad background in computing, programming languages, circuit theory, computer design, telecommunication systems, embedded control systems, real-time systems, and software engineering. The curriculum includes courses in general education, computer science, software engineering, electrical engineering, and the capstone sequence of senior design classes.

This added emphasis on real-time embedded control systems and hardware/software interfaces places the Computer Engineering program in a unique position to increase employment opportunities after graduation. In addition, the program includes significant project work that is designed to prepare students to work as part of a team on the development of complex systems including both software and hardware. It allows the student opportunities to build capabilities in teamwork, designing to requirements, and quality assurance techniques.

The overall objective of the Computer Engineering program at Prescott is to produce graduates who will be successful practitioners of computer engineering. The program objectives to accomplish this goal are:

#### I. Math, Science, and Engineering Fundamentals

Alumni working in the engineering field will demonstrate skills in math, science, and engineering, with an emphasis on solving problems using fundamental engineering principles, including engineering logic, traditional analytical methods, modern software, and experimental verification of analytical methods. Additionally and more specifically, alumni will be

- 1. Able to apply mathematically based physical laws to solve problems presented to them.
- 2. Able to use or learn to use software tools and programming.
- 3. Competent in the fundamental areas of digital and computer systems, software development, and modeling of physical systems.

#### **II. Social Context of Engineering Practice**

Alumni working in the engineering field will demonstrate an understanding and philosophy that promotes engineering practice founded in technical integrity, ethics, social and environmental responsibility, and global awareness. Alumni will recognize the importance of preparing themselves for continued education and independent thought.

## III. Design and Teamwork

Alumni working in the engineering field will demonstrate the ability to assimilate topics from multiple sources, design a system or process, communicate that design effectively though verbal and written means, and work effectively on a team. They will also be cognizant of engineering project management. Alumni will

1. Foster a sense of citizenship, positive group dynamics, team participation, and team responsibility in a global community and economy.

- 2. Demonstrate leadership where appropriate in their work groups.
- 3. Be able to plan, schedule, and carry out projects assigned to them.
- 4. Be able to work together on an interdisciplinary team such as found in the aerospace culture.

## **IV. Discipline Specific Depth**

Alumni working in the engineering field will demonstrate depth in their discipline and exposure in related areas. They will

- 1. Have depth in embedded and real-time control systems, software design, or computer architecture.
- 2. Show an aptitude for independent work while accomplishing the tasks they are assigned.
- 3. Demonstrate an ability to develop a deeper understanding of a particular area of CE or to learn about a new area.

The Computer Engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; Telephone: (410) 347-7700.

#### DEGREE REQUIREMENTS

The Bachelor of Science in Computer Engineering can be earned in eight semesters assuming appropriate background and fulltime enrollment. Successful completion of a minimum of 128 credit hours is required.

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

## Suggested Program of Study FRESHMAN YEAR

Course	Title	Credits
	Lower-Level Humanities -OR-	
	Social Sciences*	
CEC 220	Digital Circuit Design	3
CEC 222	Digital Circuit Laboratory	1
COM 219	Speech	3
COM 122	English Composition and Literature.	3
EGR 101	Introduction to Engineering	2
EGR 115	Introduction to Computing	
	for Engineers	3
	Lower-Level Humanities*	3
MA 241	Calculus and Analytic Geometry I	4
MA 242	Calculus and Analytic Geometry II	4
PS 150	Physics I for Engineers	3
	College Success	
Total Cre	dits	32

Total Credits

\* Meets open elective or credit in excess of degree requirements.

#### SOPHOMORE YEAR

Course		Title	Credits
		Lower-Level Humanities -OR-	
		Social Sciences*	3
CEC	320	Microprocessor Systems	3
CEC	322	Microprocessor Systems Laboratory .	1
CS	125	Computer Science I	4
CS	222	Introduction to Discrete Structures	3
EE	200	Engineering Software Tools	1
EE	223	Linear Circuit Analysis I	3
EE	224	Electrical Engineering Laboratory I	1
MA	243	Calculus and Analytic Geometry III .	4
MA	345	Differential Equations and Matrix	
		Methods	4
PS	160	Physics II for Engineers	3
PS		Physics III for Engineers	
PS		Physics III Laboratory for Engineers.	
Total Credits 3			34

#### JUNIOR YEAR

Course Title Credits CS EE EE 302 Electronic Devices and Circuits ......3 EE 300 Software Éngineering Practices ......3 SE **Total Credits** 30

# Prescott Campus Academic Programs

#### SENIOR YEAR

Course	Title	Credits
	Upper-Level Humanities -OR-	
	Social Sciences*	3
CEC 420	Computer Systems Design	
CEC 421	Computer Systems Design II	3
CEC 450	Real Time Systems	3
	Computer Árchitecture	
EC 2XX	(Economics	3
EE 401	Control Systems Analysis and Design	3
EE 402	Control Systems Laboratory	1
HU 330	Values and Ethics	3
	Open Elective	3
	Technical Elective**	3
Total Credits		31
TOTAL DE	CREE CREDITS	127

\* Embry-Riddle courses in the general education categories of Humanities and Social Sciences may be chosen from those listed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified above in the Computer Engineering vertical outline.

#### **Humanities**

LOWER -LEVEL: Any course in the HU/L series under 300 level. UPPER-LEVEL:

Any course in the HU/L series equal to or above 300 level.

#### Social Sciences

LOWER-LEVEL:
Any SS course under 300 level or PSY 220
UPPER-LEVEL:
Any SS or EC course equal to or above 300 level,
HF 300 or PSY 350.
STG and RS courses may be substituted for
Humanities and Social Sciences at the appropriate
levels.

\*\* Technical electives include any AE, CE, CS, EE, ES, MA, or PS course above the 300 level or other courses approved by the CE department chair.

The Computer Engineering degree includes a space option in which AE 427 and AE 445 substitute for CEC 420 and CEC 421 and EP 394 is taken as one of the technical electives.

# Electrical Engineering

**Bachelor of Science** 

The Bachelor of Science degree in Electrical Engineering provides the student with the opportunity to acquire a broad background in circuit theory, communication systems, computers, control systems, electromagnetic fields, energy sources and systems, and electronic devices. The student also gains specialization in avionics appropriate for entry-level engineering positions in the aerospace industry. Emphasis on design places the Embry-Riddle Electrical Engineering student in a unique position to increase employment opportunities after graduation.

The overall objective of the Electrical Engineering program at Prescott is to produce graduates who will be successful practitioners of electrical engineering. The program objectives to accomplish this are:

#### I. Math, Science, and Engineering Fundamentals

Alumni working in the engineering field will demonstrate skills in math, science, and engineering, with an emphasis on solving problems using fundamental engineering principles, including engineering logic, traditional analytical methods, modern software, and experimental verification of analytical methods. Alumni will be

- 1. Competent in the fundamental areas of statics/dynamics, thermo/heat transfer, and digital/linear circuits as appropriate for a generalized systems education.
- 2. Able to use or learn to use software tools and programming

3. Able to apply mathematically based physical laws to solve problems presented to them.

# II. Social Context of Engineering Practice

Alumni working in the engineering field will demonstrate an understanding and philosophy that promote engineering practices founded in technical integrity, ethics, social and environmental responsibility, and global awareness. Alumni will recognize the importance of preparing themselves for continued education and independent thought.

## III. Design and Teamwork

Alumni working in the engineering field will demonstrate the ability to assimilate topics from multiple sources, design a system or process, communicate that design effectively through verbal and written means, and work effectively on a team. They will also be cognizant of engineering project management. Alumni will

- 1. Foster a sense of citizenship, positive group dynamics, team participation, and team responsibility in a global community and economy.
- 2. Demonstrate leadership where appropriate in their work groups.
- 3. Be able to plan, schedule, and carry out projects assigned to them.
- 4. Be able to work together on an interdisciplinary team such as found in the aerospace culture.

## **IV. Discipline Specific Depth**

Alumni working in the engineering field will demonstrate depth in their discipline and exposure in related areas. They will

- 1. Have developed depth in communications theory, control theory, power electronics, or analog/digital circuits.
- 2. Show an aptitude for independent work while accomplishing the tasks they are assigned.
- 3. Demonstrate an ability to develop a deeper understanding of a particular area of EE or to learn about a new area.
- 4. Be able to use software tools appropriate to their jobs, including Matlab, VHDL, Orcad, etc.
- Be capable of immediate productivity upon graduation.

The Electrical Engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; Telephone: (400) 347-7700.

## DEGREE REQUIREMENTS

The Bachelor of Science in Electrical Engineering requires the successful completion of a minimum of 127 credit hours. The Electrical Engineering degree includes a space option in which EP 394, AE 427, and AE 495 substitute for the ES elective, EE 420, and EE 421.

## Suggested Program of Study

#### FRESHMAN YEAR

Course	Title	Credits
CEC 220	Digital Circuit Design .	

CEC 222 Digital Circuit Laboratory1
COM122 English Composition and Literature3
COM219 Speech
EGR 101 Introduction to Engineering2
EGR 115 Introduction to Computing for
Engineers3
HU/SS Lower-Level Humanities -OR-
Social Sciences*
HU 14X Lower-Level Humanities*
MA 241 Calculus and Analytic Geometry I4
MA 242 Calculus and Analytic Geometry II 4
PS 150 Physics I for Engineers
UNIV 101 College Success (1)+
Total Credits 32

\* In excess of degree requirements.

#### SOPHOMORE YEAR

dits

Cour	se	Title	Credite
CEC	320	Microprocessor Systems	3
CEC	322	Microprocessor Systems Laboratory	1
CS	125	Computer Science I	4
EE	200	Engineering Software Tools	1
EE	223	Linear Circuit Analysis	3
EE	224	Electrical Engineering Laboratory I	1
HU		Elective	3
MA	243	Calculus and Analytic Geometry III	4
MA	345	Differential Equations and	
		Matrix Methods	4
PS	160	Physics II for Engineers	3
PS	250	Physics III for Engineers	3
PS		Physics Laboratory for Engineers	
Total	Cre	dits	31

## **JUNIOR YEAR**

Cou	rse	Title	Credits
COM	1221	Technical Report Writing	3
EE	300	Linear Circuits Analysis II	3
EE	302	Electronic Devices and Circuits	3
EE	303	Signals and Filters	3
EE	304	Electronic Circuits Laboratory	1
EE		Electric and Magnetic Fields	
ES	207	Fundamentals of Mechanics	3
ES	312	Energy Transfer Fundamentals	3
ES		Core Selection	
MA		Math Elective (above MA 300-level) .	3
MA	441	Advanced Engineering Mathematics	I3
		Specified Elective++	
Tota	l Cre	dits	34

#### SENIOR YEAR

Cou	rse	Title	Credits
EC	2XX	Economics	3
EE		Advanced Elective**	6/7
EE	401	Control Systems Analysis and Desig	gn 3
EE	402	Control Systems Laboratory	1
EE	406	Digital Signal Processing	3
EE	407	Digital Signal Processing Laboratory	y1
EE	410	Communication Systems	3
EE		Communication Systems Laboratory	
EE	420	Avionics Preliminary Design	3
EE	421	Avionics Detail Design.	3
HU	330	Values and Ethics	3
Tota	l Cre	dits	30/31
Тота	l De	gree Credits	127/128

\* Embry-Riddle courses in the general education categories of Humanities and Social Sciences may be chosen as directed below, assuming prerequisite requirements are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the level specified above in the Electrical Engineering vertical outline.

#### **Humanities**

LOWER-LEVEL: Any HU course under 300 level. UPPER-LEVEL: Any course equal to or above 300 level.

#### Social Sciences

LOWER-LEVEL: Any SS course under 300 level or PSY 220. UPPER-LEVEL: Any SS or EC course equal to or above 300 level, and HF 300 or PSY 350.

STG and RS courses may be substituted for Humanities and Social Sciences courses at the appropriate level.

\*\* Advanced EE electives are selected from a list provided by the department chair.

Core ES selection is selected from ES 206, 299, 306, 307, 399, 409, 413, 499, or AE 412 or EP 394.

++ Specified elective is any AE, AF, CE, CS, EE, ES, MA, MY, PS course above 300 level, or as approved by department chair and not otherwise taken for the EE degree.

# Mechanical Engineering

#### **Bachelor of Science**

Mechanical Engineering comes to the Prescott campus as a degree offering beginning in the Fall of 2007. When designing this degree program our faculty wanted to ensure that we created a Mechanical Engineering degree that embraced Embry-Riddle's mission and recognized expertise in aerospace. Aerospace platforms, whether atmosphere or space based, require skills from a team of engineers that include Aerospace, Electrical, Computer, and, of course, Mechanical Engineering. Given this, our ME degree stays within that focus of the aerospace platform with two primary focus areas of robotics and propulsion.

The freshman year in the College of Engineering is common to all degree programs. The second year in Mechanical Engineering builds fundamental skills in math and physics while introducing students to Engineering Mechanics and the Thermal Sciences. The sophomore years in both Mechanical and Aerospace Engineering are the same in reflection of the similarity of the two programs. During the junior year, Mechanical Engineering students in Embry-Riddle's program in Prescott will start taking courses in the focus areas of robotics and propulsion. The robotics focus will emphasize the design and analysis of autonomous vehicles that include uninhabited aerial vehicles (UAVs), autonomous space vehicles, and planetary rovers. The propulsion focus will emphasize the thermal sciences and design and analysis of turbomachinary. Jet aircraft engines are the primary area of depth but piston and rocket propulsion are also studied. During the senior year, students will gain additional depth in their focus areas and take

capstone courses in designing an aerospace platform.

Aerospace platforms are designed in teams and with that we provide interdisciplinary opportunities centered around our ME students. Senior ME students will have the opportunity to choose between four capstone sequences as a culminating event focused on teams, integration, and synthesis of four years of education. Mechanical, Aerospace, Electrical, and Computer engineers can choose capstones sequences that include:

- The robotics sequence centered on UAVs and rovers
- The astronautics sequence centered on spacecraft
- The aeronautics sequence centered on aircraft
- Or the propulsion sequence centered on jet aircraft engines.

The overall objective of the Mechanical Engineering program at Prescott is to produce graduates who will be successful practitioners of mechanical engineering. The program objectives to accomplish this goal are:

# I. Math, Science, and Engineering Fundamentals

Alumni working in the engineering field will demonstrate skills in math, science, and engineering with an emphasis on solving problems using fundamental engineering principles, including engineering logic, traditional analytical methods, modern software, and experimental verification of analytical methods. Additionally and more specifically:

1. Be competent in fundamental engineering areas that include statics, dynamics, solid

mechanics, circuits, materials science, fluid mechanics, thermodynamics, machine design, and experimental techniques and instrumentation.

2. Use appropriate software that would enable analysis, simulation, and design of aerospace systems (for example, MATLAB, ANSYS, CATIA, etc.).

#### **II. Social Context of Engineering Practice**

Alumni working in the engineering field will demonstrate an understanding and philosophy that promotes engineering practice founded in technical integrity, ethics, social and environmental responsibility, and global awareness. Alumni will recognize the importance of preparing themselves for continued education and independent thought.

#### III. Design and Teamwork

Alumni working in the engineering field will demonstrate the ability to assimilate topics from multiple sources, design a system or process, communicate that design effectively though verbal and written means, and work effectively on a team. They will also be cognizant of engineering project management. Alumni will:

- 1. Have a broad understanding of the interrelations of the engineering disciplines and their impact on robotic and propulsion system designs.
- 2. Understand the importance of teamwork, the value of multiple experiences, and be able to communicate to a broad array of technical and non-technical audiences.
- 3. Bring design expertise to the work environment within a chosen subset of mechanical engineering disciplines.

#### **IV. Discipline Specific Depth**

Alumni working in the engineering field will demonstrate depth in their discipline and exposure in related areas. They will:

- 1. Have demonstrated depth in the analysis of robotic systems or turbomachinary.
- 2. Have depth in theoretical, computational, and experimental methods.

These objectives coupled with the common college outcomes are extensive and form the foundation of the program. We ask a lot from our students and faculty. The commitment a student makes in the program and consequently the skills they bring to the workforce are substantial and are required to be among the best in the industry.

#### Suggested Program of Study

#### FRESHMAN YEAR

Course		Credits
CEC 220	Digital Circuit Design	3
CEC 222	Digital Circuit Laboratory	1
COM122	English Composition and Literature.	3
COM 219	Speech	3
EGR 101	Introduction to Engineering	2
EGR 115	Introduction to Computing for	
	Engineers	3
HU/SS	Lower-Level Humanities -OR-	
	Social Sciences*	3
HU 14X	Lower-Level Humanities*	3
MA 241	Calculus and Analytic Geometry I	4
MA 242	Calculus and Analytic Geometry II	4
	Physics I for Engineers.	
UNIV 101	College Success	. (1)+
Total Cre	dits	32

#### Total Credits

\* In excess of degree requirements.

#### SOPHOMORE YEAR

Course		Title	Credits
COM 221		Technical Report Writing	3
EGR	200	Computer-Aided Conceptual Design	
		of Aerospace Vehicles	3
ES	201	Statics	
ES	202	Solid Mechanics	3
ES	204	Dynamics	3
ES	206	Fluid Mechanics	3

Total	Cre	dits	33
PS	250	Physics III for Engineers	3
PS	220	Physics III Laboratory	1
PS	160	Physics II	3
MA	345	Differential Equations & Matrix Metho	ds 4
MA	243	Calculus and Analytical Geometry III	4

#### Total Credits

#### **JUNIOR YEAR**

Title

Course

#### Credits

AE	408	Turbines and Rocket Engines	3
AE		Control System Analysis and Design	
EE		Electrical Engineering I	
EE		Electrical Engineering I Laboratory	
ES	305	Thermodynamics	3
ES	320	Engineering Material Science	2
ES	321	Engineering Material Science	
		Laboratory	
HU/		Lower-Level Elective	
ME	4301	L Control System Laboratory	1
ME	304	Introduction to Machine Design	3
ME	305	Machine Design Laboratory	1
ME	302	Introduction to Robotics	3
ME	415	Modeling and Numerical Simulations of	
		Energy and Environmental Systems	3
PS	105	General Chemistry I	4
Total	Cre	dits	33

#### SENIOR YEAR

#### Course Title

Credits

EE C	ours	e** for students taking EE Capstone	3
EC	225	Engineering Economics	3
ES	403	Heat Transfer	3
HU		Values and Ethics	
MA	412	Probability and Statistics	3
ME	400	Vibration and Acoustics	3
ME	403	Thermal Power Systems	3
ME	406	Robotics II	
		-OR-	
ME	417	Advanced Propulsion	3
		Technical Elective	2
		Preliminary Design*	.4/3
		Detail Design*	.4/3
Total Credits			31
TOTAL DEGREE CREDITS			129
T1	: .	-1 Els desse	

#### Technical Electives

ME 410, 416, 426 AE 301, 313, 404, 414, 416

#### Capstone Design Sequence, Preliminary and **Detail Design**

\* ME students have four possible sequences for their capstone sequence:

#### Astronautics

Students taking the Space capstone sequence are required to take:

Cou	rse	Title	Credits
AE	427	Spacecraft Preliminary Design	4
AE	445	Spacecraft Detail Design	4

#### Aeronautics

Students taking the Aircraft capstone sequence are required to take:

Course		Title	Credits
AE	420	Aircraft Preliminary Design	4
AE	421	Aircraft Detail Design	4

#### Propulsion

Students taking the Propulsion capstone sequence are required to take:

Cou	rse	Title C	redits
AE	435	Air-Breathing Propulsion	
		Preliminary Design	4
AE	440	Air-Breathing Propulsion Detail Design	4

#### **Robotics**

Students wishing to take a Robotics capstone sequence need to coordinate activities with the Electrical Engineering Department. In this sequence students take:

0	0 1	1
Course	Title	Credits
EE 420	Preliminary <b>E</b>	Design I
EE 421	Senior Capsto	one Project3
**In addi	tion, students o	choosing the Robotics sequence
will take	one additional	CEC or EE 2 or 3 credit course udent and the EE chair

#### **General Education Electives**

Embry-Riddle course in the general education categories of Humanities and Social Sciences may be chosen as specified below, assuming prerequisite requirements are met.

#### Humanities

HU: LOWER-LEVEL

#### Social Sciences

SS: LOWER-LEVEL

Prior approval by the Mechanical Engineering program coordinator is required for any substitutions for general education electives, including the following: Lower-level PSY and RS courses substituting for lower-level Humanities and Social Sciences courses; Language courses, other than the student's native language, substituting for Humanities.

Minor courses of study are academic programs designed to satisfy students' personal interests and to meet their professional needs. Students explore, in some depth, the offerings in a field of study. A minor course of study provides the student with significant experience in a discipline organized around skills, methodology, and subject matter.

A minor program does not provide the depth of knowledge and experience as a major. All minors consist of 15-24 hours of coherent academic coursework. At least 6 hours must be fulfilled at the upper level. In addition, at least 6 hours of coursework applied to a minor must be completed at Embry-Riddle and at least 3 of those hours completed in residence must be at the upperlevel. Students must earn a 2.00 GPA or higher in the minor to complete that program of study successfully.

To gain the greatest value from their academic experiences, students are encouraged to select minors that complement their degree program and/or other minors they are pursuing. They are also encouraged to declare a minor by the beginning of their senior year. Designed to include a minimum number of required courses, minors provide students, whenever possible, with flexibility in fulfilling program requirements. No more than two substitutions (6 hours) are permitted in any one minor or in any combination of multiple minors. A student who seeks three minors could have two substitutions in one minor, or one substitution in two of the three minors.

In addition to specific minors described in this catalog, students at the Prescott campus and the Aerospace Engineering Department at the Daytona Beach campus may earn an interdisciplinary minor or a minor in one of the listed disciplines by meeting the following requirements:

- 1. Complete a Declaration of Minor form and submit to the Records Office.
- 2. Complete 15 or more credit hours in related courses (at least 6 of these must be completed in residence).
- 3. Complete at least 6 hours of upperdivision credit (at least 3 of these must be completed in residence).
- 4. Complete at least 6 credit hours in the discipline from courses that are not specifically required in the student's degree program.
- 5. Earn at least a 2.00 GPA in the minor.

Not all minors are offered at all Embry-Riddle locations. The University offers the following minors at the Daytona Beach campus (D) and the Prescott campus (P).

Aeronautical Studies - D, P Aerospace Electronics - D Aerospace Life Sciences - D Air Traffic Control - D, P Applied Meteorology - D, P Asian Studies - P Astronomy - D Aviation Maintenance Science - D Aviation Safety -D Aviation Safety - Accident Investigation - P Aviation Safety - Program Management - P Business Administration - D, P Communication - D Computer Aided Design/Computer Aided Manufacturing - D Computer Applications - P Computer Science - D, P Environmental Studies - D, P Flight - D, P Flight Test and Simulation - D Helicopter Flight - D, P Helicopter Operations and Safety - P High Performance Vehicle - D Homeland Security - D Human Factors - D Humanities - D, P Industrial Safety - D Information Technology - D International Relations - D Mathematics - D, P Occupational Safety and Health - P Physics - D Psychology - D, P Secondary Education - D Security Studies - P Space Studies - D, P Technology, Policy, and Management - P

#### **Minor Courses of Study**

## MINOR IN AERONAUTICAL STUDIES

This minor will allow students in non-Aeronautical Science degree programs (and non-Aeronautics degree programs at Prescott) an increased exposure to advanced aviation knowledge by taking a sequence of 18 hours of mostly upper-level Aeronautical Science courses and acquire credit for a minor. No more than nine of the 18 hours required for this minor can come from courses required for the student's degree. A minor in Aeronautical Studies can be earned by successfully completing six of the following:

Course	Title	Credits
AS 254	Aviation Legislation	3
AS 309	Aerodynamics	3
AS 310	Aircraft Performance	3
AS 311	Aircraft Engines - Turbine	3
AS 356	Aircraft Systems and Components	3
AS 357	Flight Physiology	3
AS 350	Domestic and International Navigation	on 3
AS 402	Airline Operations	
AS 405	Aviation Law	
AS 408	Flight Safety	3
AS 410	Airline Dispatch Operations	3
AS 411	Jet Transport Systems	3
AS 420	Flight Technique Analysis	3
Total Cre	edits Required	18

## MINOR IN AEROSPACE ELECTRONICS

The minor in Aerospace Electronics provides a knowledge of digital electronics and its application to aviation and space electronics systems. The minor is not open to students enrolled in the Bachelor of Science degree in Aerospace Electronics or the Aerospace Electronics Area of Concentration in the Bachelor of Science degree in Aviation Maintenance Science. A minor in Aerospace Electronics can be earned by successfully completing the following: Title Course Credits AS EL 107 Direct and Alternating Current Fundamentals and Circuit Analysis.....4

EL	108	Direct and Alternating Current
		Laboratory1
EL	212	Digital Circuit and Systems Analysis4
EL		Digital Circuit Laboratory1
EL		Microprocessor Systems

EL 308 Microprocessor Systems Laboratory .....1

17

#### Total Credits Required

18-21

## MINOR IN AEROSPACE LIFE SCIENCES

An interdisciplinary program of study that provides fundamental knowledge of general biology, and a more advanced knowledge of life sciences in aviation and aerospace applications. Of the 16 credit hours required for this minor, four must be earned with Elements of Biological Science (PS 107, 3 credits) and Biological Science Laboratory (PS 107L, 1 credit). The remaining twelve credits can be earned with any combination of other courses from the listing below:

Cour	se	Title	Credits
AS	357	Flight Physiology	3
HF	321	Drugs in Society and Aerospace	3
HF	326	Human Performance in Extreme	
		Environments	3
PS		Elements of Biological Science	
PS	107I	Biological Science Laboratory	1
PS	142	Environmental Sciences	3
PS	309	Principles of Ecology	3
PSY	310	Sensation and Perception	3
		Physiological Psychology	
SF	315	Environmental Compliance	3
Total	Cree	dits Required	16

## MINOR IN AIR TRAFFIC CONTROL\*

The Air Traffic Control (ATC) minor provides the fundamental traffic controller knowledge and technical competency through a mix of classroom instruction, computer-based instruction, and realistic ATC laboratory simulations.

Embry-Riddle has a formal partnership agreement with the FAA that designates the University as an FAA-approved air traffic control training school. This partnership ensures that the learning objectives and the standards of student achievement are relevant to the needs of the FAA.

To qualify for the ATC minor, students must successfully complete the required prerequisites, listed below, and the four ATC courses.

Cou	rse Title	Credits
AT	300 Air Traffic Management I	3
AT	305 Air Traffic Management III	3
AT	401 Air Traffic Management IV	3
AT	405 Air Traffic Management V	3
WX	201 Meteorology I	3
One	e of the following is required:	
AS	120 Principles of Aeronautical Science -OR-	3
AS	121 Private Pilot Operations	5
	FAA Private Pilot Certificate	

#### Total Credits Required

\* Students who are enrolled in the Air Traffic minor at the Prescott campus will have to take the ATC courses that have a laboratory at the Daytona Beach campus. This normally can be accomplished during the summer terms. Although AT 302 is not required for the ATC minor, those students who would like to be recommended for employment as an FAA Air Traffic Controller must also take AT 302.

## MINOR IN APPLIED METEOROLOGY

The minor in Applied Meteorology introduces the student with an interest in weather to the intriguing world of meteorology. The minor requires nine hours of WX courses beyond the two required courses, WX 201 and WX 301 (WX 352 in older catalogs), a total of 15 hours of WX courses. Six hours of these classes must be higher numbered classes than WX 301. Always check the catalog course descriptions for prerequisites.

105 000	ise descriptions for prerequisit		
Course	Title	Credits	
WX 201	Survey of Meteorology	3	
WX 301	Aviation Weather	3	
WX 261 WX 363 WX 364	ended Electives for flight students: Applied Climatology Thunderstorms Weather for Aircrews Satellite and Radar Weather Interpretation Or any combination of WX courses.	3 3	
Total Cre	Total Credits Required 15		

## MINOR IN ASIAN STUDIES

The Asian Studies minor introduces a student to the cultures, histories, and languages of Asian countries, as well as cross-cultural comparisons between the United States and Asia. Any student can earn the minor by successfully completing at least 15 related credit hours, including six upper-level credits in Asian Studies earned at Embry-Riddle. These 15 credits can be earned from the following options:

**Option I**: Choose courses from the list of Asian Studies courses.

**Option 2**: Transfer up to nine credits in an Asian language or from Asian Studies courses or study abroad, and earn at least six upper-level Asian Studies credits from Embry-Riddle.

Cours	se	Title	Credits
HU	160	Mandarin Chinese I	3
HU	161	Mandarin Chinese II.	3
HU	270	Mandarin Chinese III	3
HU	271	Mandarin Chinese IV	3
RS	200	Modern Asia	3
RS	300	Observing Asian Cultures	3
RS	305	Asian Literature -OR-	
HU	399	Special Topics in Humanities:	
		Directed Studies in Asia.	3
Total Cre		dits Required	15

#### MINOR IN ASTRONOMY

Students may earn a minor in Astronomy by successfully completing one of the following two options:

#### **Option 1:**

Cour	se	Title	Credits
PS	215	Physics I	3
PS	216	Physics I Laboratory	1
PS	208	Physics II	3
PS	219	Physics III	3
PS	220	Physics III Laboratory	1
PS	301	Astronomy	3
PS	303	Modern Physics	3
PS	305	Modern Physics Laboratory	1

EP PS	425 Observational Astronomy 401 Astrophysics	3 3
EP	-OR- 420 Planetary Science	3
Tota	l Credits Required	24

#### **Option 2:**

Course		Title	Credits
PS	150	Physics I for Engineers	3
PS	160	Physics II for Engineers	3
PS	250	Physics III for Engineers	3
PS	253	Physics Laboratory for Engineers	1
PS	301	Astronomy	3
PS		Modern Physics	
PS	305	Modern Physics Laboratory	1
EP	425	Observational Astronomy	3
PS		Astrophysics	
		-OR-	
EP	420	Planetary Science	3
Total Credits Required			23

## MINOR IN AVIATION MAINTENANCE SCIENCE

The minor in Aviation Maintenance Science leads to the student becoming a Federal Aviation Administration certified Airframe and Powerplant technician. The A&P certification is required to successfully complete this minor. This technical certification is a valuable addition to many of the other degrees offered on the Daytona Beach campus. Twenty-four credit hours of coursework from the Aviation Maintenance Science Department count toward the minor, but up to an additional 24 credit hours of AMS courses will be needed for A&P certification. A minimum of six credit hours, up to a maximum of 12 credit hours, will be upper-division (300-level) credit. Check the catalog information on the bachelor degree in Aviation Maintenance Science for the full listing of courses.

24

Credits awarded for the AMS minor:

## MINOR IN AVIATION SAFETY

This minor has a strong aviation focus. Through relevant course selection, students may either concentrate on aircraft accident investigation or aviation safety management.

Cour	se Title	Credits
SF	210* Introduction to Aerospace Safety -Ol	R-
SF	201* Introduction to Health, Occupationa	l, and
	Transportation Safety	
SF	320 Human Factors in Aviation Safety.	

#### AND any three of the following:

Cour	se	Title	Credits
SF	330	Aircraft Accident Investigation	3
SF		Mechanical and Structural Factors	
		in Aviation Safety	3
SF	341	Safety and Security of Airport Ground	l
		Operations	
SF	345	Safety Program Management	3
SF		Aircraft Crash and Emergency	
		Management	3
SF	375	Propulsion Plant Investigation	3
SF		Aircraft Crash Survival Ănalysis	
		and Design	3
SF	445	System Safety in Aviation	
SF	399/	/499 Special Topics in Aviation Safety	3
Total	Cree	dits Required	15

#### **Total Credits Required**

\*AS 408 may be substituted for SF 210/SF 201 in this minor.

NOTE: SF 345, SF 330, and SF 341 can be used for either the Aviation Safety minor OR Industrial Safety minor, but NOT both.

## MINOR IN AVIATION SAFETY -ACCIDENT INVESTIGATION

Students at the Prescott campus may earn a minor in Aviation Safety - Accident Investigation by completing the following course of study.

Course		Title	Credits
SF	210	Introduction to Aerospace Safety	3
SF	320	Human Factors in Aviation Safety	3

#### And nine credits chosen from the following:

SF	330	Aircraft Accident Investigation3
SF	335	Mechanical and Structural Factors
		in Aviation

SF	350 Aircraft Crash and Emergency
	Management
SF	375 Propulsion Plant Investigation
SF	435 Aircraft Crash Survival
	Analysis and Design
Total Credits Required	

## MINOR IN AVIATION SAFETY -PROGRAM MANAGEMENT

Students may earn a minor in Aviation Safety - Program Management by completing the following:

Cour	se	Title	Credits
SF	210	Introduction to Aerospace Safety	3
SF	320	Human Factors in Aviation Safety	3
And	nin	e credits chosen from the follow	ing:
SF	205	Principles of Accident Investigation .	3
SF	345	Safety Program Management	3
SF	445	System Safety in Aviation	3
AS	408	Flight Safety	3
Total	Cre	dits Required	15

## MINOR IN BUSINESS ADMINISTRATION

Students may earn a minor in Business Administration by successfully completing the following. This minor is not open to students pursuing degrees offered by the College of Business.

Course		Title	Credits
BA		Principles of Management.	
EC		An Economic Survey -OR-	0
ĒĊ		Microeconomics	3
ΒĂ	210	Financial Accounting	3
BA		Marketing	
		Specified Electives*	6
Spec	ified	Electives*	
ΒÂ		Aviation Insurance	3
BA	324	Aviation Labor Relations	3
BA	405	General Aviation Marketing	3
BA		Strategic Management of Technical	
		Operations	3
BA	408	Airport Management	3
BA	410	Management of Air Cargo	3
BA	412	Airport Planning and	
		Design Standards	3
BA	415	Airline Management	3

Total	Cree	dits Required	18
EC	420	Economics of Air Transportation	3
		Airline/Airport Marketing	
BA	426	International Aviation Management	3
		Programs in Aviation/Aerospace	
BA	422	Life-Cycle Analysis for Systems and	
BA	419	Aviation Maintenance Management	3

## MINOR IN COMMUNICATION

The minor in Communication encourages an appreciation of communication as the basis of shared meaning, provides interpersonal competencies that benefit students in any workplace, and offers advanced coursework in Communication required in high-skill, high-wage jobs. Students may earn a minor in Communication by successfully completing 15 credit hours, comprising 6 credits of required coursework and 9 credits chosen from specified electives, as seen below.

Course	Title	Credits
COM 225	Science and Technology	
	Communication	3
COM 265	Introduction to News Writing	3
	Specified Electives*	
Total Cre	dits Required	15

#### \*Specified Electives

Cours	e	Title	Credits
COM	260	Introduction to Media	3
COM	320	Mass Communication Law and Ethics	53
COM	322	Aviation and Aerospace	
		Communication.	3
COM	350	Environmental Communication	3
COM	360	Media Relations I	3
COM	364	Visual Design	3
COM	410	Advanced Professional Writing	3
COM	411	Web Design Workshop	3
COM	412	Advanced Technical Writing	3
COM	415	Nonverbal Communication.	3
COM	460	Media Relations II	3
HU :	319	Advanced Speech	3
HU :	361	Interpersonal Communication	3
HU :	362	Communication and	
		Organizational Culture	3
HU :	363	Communication and Society	3
HU :	375	Nature of Language	3
HU ·	420	Applied Cross-Cultural	
		Communication	3

## MINOR IN COMPUTER AIDED DESIGN/ COMPUTER AIDED MANUFACTURING

Students may earn a minor in Computer Aided Design/Computer Aided Manufacturing by successfully completing the following:

Course	Title	Credits
EGR 120	Graphical Communications	3
EGR 305	Advanced CATIA	3
	-OR-	
CS 335	Introduction to Computer Graphics .	3
ME 304	Introduction to Machine Design	3
ME 424	Automation and Rapid Prototyping .	3
ME 428	Design for Manufacturing and Assen	ubly 3
Total Cre	dits Required	15

#### MINOR IN COMPUTER APPLICATIONS

The minor in Computer Applications is designed to provide utilitarian knowledge of desktop computers and local area networks (LAN). Students completing this minor will be able to function as computer specialists in their domain of expertise. The minor is open to all majors and requires 18 credit hours of computer courses. Prerequisite knowledge to start this program is at the level of IT 109. The goal of the minor in Computer Applications is to provide students with a working knowledge of computer applications, local area networks, Windows-based systems, analysis of end-user requirements, and computer hardware.

Cour	se	Title	Credits
CS	117	Computer Configurations	3
CS	118	Fundamentals of Computer	
		Programming	3
CS	207	Network-Based Computing	3
CS	308	Practicum	3
IT	210	Web Page Authoring and Design	3
		Specified Electives*	3
* Spe		l Electives are chosen from the following	
CS <sup>-</sup>	111	Spreadsheet	1
CS		Presentation Graphics	
CS	116	Recent Trends in Application Softwar	e1
Total Cre		dits Required	18

## MINOR IN COMPUTER SECURITY

The minor in Computer Security is intended to provide an introduction to the technologies, issues, and limitations of Computer Security in the context of both computer science and information security in general. The minor consists of the six courses shown below. Students with prior programming experience are encouraged to customize this minor by proposing other technical courses in place of all or part of the lower division sequence of EGR 115 followed by CS 225.

Cour	se	Title	Credits
EGR	115	Introduction for Computing	
		for Engineers	3
CS	225	Computer Science II	4
CS	303	Network Security	3
CS	305	Database Systems and Data Mining .	3
CS	420	Operating Systems	3
CS	432	Information and Computer Security.	3
Total	Cre	dits Required	19

## MINOR IN COMPUTER SCIENCE

Students may earn a minor in Computer Science by successfully completing the following:

Cour	se	Title	Credits
EGR	115	Introduction to Computing for Engine	
		(Daytona Beach campus)	3
CS	125	Computer Science I (Prescott campus)	4
CS	225	Computer Science II	4
SE	300°	*Software Engineering Practices	.4/3
ΧХ	300-	*Software Engineering Practices 400** CS/SE/CEC Electives	6
Total	Cre	dits Required	17

\* SE 300 is a variable credit course. Students attending the Daytona Beach campus receive 4 credits (3 credit lecture, 1 credit laboratory) and students attending the Prescott campus receive 3 credits.

\*\* XX 300-400. In addition to any 300-400 level CS/SE/CEC electives, students may take ES 405 or any computer-related course approved by the Computer and Software Engineering Department (Daytona Beach) or Mathematics and Computer Science Department (Prescott campus).

## MINOR IN ENVIRONMENTAL STUDIES

This course sequence is an interdisciplinary program designed to provide a fundamental knowledge of the natural environment and the dimensions of human impacts. It provides in-depth analysis of the relationship between the environment, culture, and law. Furthermore, it supplies knowledge about major environmental issues surrounding technology and technical careers. Not open to AES-Environment students.

Course	Title	Credits
COM 350	Environmental Communication	3
PS 107	Elements of Biological Science	3
PS 101	Basic Chemistry -ŎR-	
PS 105	General Chemistry I -OR-	
PS 108	Contemporary Chemistry -OR-	
PS 140	Chemistry for Engineers	3/4
PS 142	Introduction to Environmental Science	ce3
PS 304	Environmental Science -OR-	
PS 309	Principles of Ecology	3
SS 360	Environmental Law -OR-	
COM 350	) Environmental Communication	3
Total Credits Required 15-16		

#### MINOR IN FLIGHT

The Flight minor incorporates the courses required to obtain the FAA commercial pilot certificate with instrument and multiengine ratings. In addition to the required flight courses, rigorous academic classes are included to provide professional pilot education in excess of the minimum FAA requirements for the associated FAA certificates. Included is instruction in CRM, team building, resource management, communication skills, and other topics associated with piloting multi-engine aircraft at the commercial level.

#### 

-AND-

#### SINGLE ENGINE FLIGHT TRACK\*

FA	121 Private Single Flight	1
FA	221 Instrument Single Flight	1
FA	321 Commercial Single Flight1	1
	323 Commercial Multi Add On	

#### -OR-

#### **MULTI ENGINE FLIGHT TRACK\***

Total	Cre	dits Required	18
FA	322	Commercial Multi Flight	1
FA	222	Instrument Multi Flight	1
FA	122	Private Multi Flight with Laboratory .	1
FA	121	Private Single Flight	1

#### Total Credits Required

\*See the Advance Standing section in the University Academic Regulations and Procedures and the Aeronautical Science Notes under the Aeronautical Science degree sections of this catalog for information pertaining to these courses and the awarding of credit for previously earned FAA certificates, and an explanation of the single-engine and multi-engine flight tracks.

## MINOR IN FLIGHT TEST AND SIMULATION

The minor in Flight Test and Simulation is an interdisciplinary minor that draws on many different majors fields of study with the commonality of aviation as a focal point. This minor has been designed to be available to almost all University majors by the section of the proper coursework. Typical major fields of study include but are not limited to Aerospace Engineering, Aeronautical Science, Human Factors, and Engineering Physics. Students may earn a minor in Flight Test and Simulation by completing 15 credits.

Cour	se	Title	Credits
SIM	200	Aviation Simulation Systems	3
SIM	300	Flight Dynamics Algorithms	3
		-OR-	
AS	340	Instructional Design in Aviation	3
		Flight Test and Simulation	3
		e following courses are required:	
SIM	400	Instrumentation for Flight Test	3
SIM	402	Introduction to Flight Testing	3
SIM	406	Aviation Simulation Systems	
		Integration	3
SIM	404	Fly-by-Wire Aircraft Simulation	
		and Design	3
Total	Cre	dits Required	15

## MINOR IN HELICOPTER FLIGHT

This minor incorporates courses required to obtain the FAA private and commercial pilot certificates and either the helicopter instrument rating or helicopter flight instructor certificate. Rigorous academic classes are included to provide professional pilot education. Included is instruction in resource management, high-altitude helicopter operations, and other topics associated with piloting helicopters at the commercial level. The flight portion of the minor is taught by an FAA-approved 141 flight school. Advanced standing credit is awarded when the student completes each certificate/rating.

-	Ũ	
Course	Title	Credits
AS 14	2 Private Helicopter Operations	3
AS 25	2 Instrument Helicopter Operations	3
AS 37	2 Commercial Helicopter Operations	3
AS 44	2 Flight Instructor Helicopter Operation	ns
Any up	per-level (300/400) AS, SF, or WX course	e3
Advanc	ed standing for:	
H	elicopter Private Pilot Certificate	1
	elicopter Commercial Pilot Certificate	
H	elicopter Instrument Rating	1
	-ÔR-	
Η	elicopter Flight Instructor Certificate	
Total C	redits Required	15

## MINOR IN HELICOPTER OPERATIONS AND SAFETY

This minor was developed with and for the helicopter industry. Students will develop an understanding of aviation safety, maintenance, personnel management and training and operations management programs in use by the government and civil aviation. Additionally, learning about advanced technology used in the industry is an integral part of this program. This minor coincides with the Helicopter Flight Minor as a capstone program. A minor in Helicopter Operations

and Safety can be earned by successfully completing all of the following:

	1	0 0	
Cour	se	Title	Credits
SF	210	Introduction to Aerospace Safety	3
SF	345	Safety Program Management	3
AS	378	Environmental Helicopter Operations	3
AS	388	Helicopter Flight Planning	3
AS	428	FMS/Autopilots for Helicopters	3
AS	438	Advanced Helicopter Operations	3
Total	Cre	dits Required	18

# MINOR IN HIGH PERFORMANCE VEHICLE

This minor introduces students to High Performance Vehicles. The following topics are covered; suspension design, aerodynamics of race cars, advanced drive systems (such as hybrid electric drives, fuel cells, and highpower engines), and vehicle dynamics and safety systems. Special topics courses on research and student projects related to the minor may be available. This minor is not available to students in the High Performance Vehicle Track of Mechanical Engineering.

				0
Course		Title		Credits
ME	303	Vehicle Dynamics		3
		Introduction to Machine Dest -OR-		
AE	316	Aerospace Engineering Mate	rials	3
ME	400	Vibrations and Acoustics -OR-		3
ME	405	Vehicle Power Systems		3
AE	430	Control Systems Analysis and	d Design	3
Total	Cre	dits Required		15

## MINOR IN HOMELAND SECURITY

This minor has a strong focus on protecting the nation's transportation infrastructure and planning for, responding to, and emergency management of events dealing with acts of terrorism and natural and man-made disasters. This minor complements degrees in safety, aeronautical science, airport management, communication, human factors, aeronautics, business, or aerospace studies. This minor requires 18 credit hours of the following courses:

Course		Title	Credits
HS	201	Introduction to Homeland Security	3
HS		Fundamentals of Transportation	
		Security	3
HS	302	Fundamentals of Occupational Securi	ity3
HS	306	Legal and Investigative Issues of	-
		Security	3
HS	401	Emergency Planning, Response,	
		and Security Management	3
HS	402	Security and Risk Analysis	3
Total Cre		dits	18

## MINOR IN HUMAN FACTORS

Students may earn a minor in Human Factors by successfully completing the two specified courses and an additional three courses from the following list, totaling 15 credit hours. Specified Courses:

Cour	se	Title	Credits
PSY	101	Introduction to Psychology	3
HF	201	Introduction to Human Factors -OR-	3
HF	210	Human Factors I: Principles and Fundamentals	3
Three	of th	e following courses are also required:	
Cour	se	Title	Credits
HF	310	Human Computer Interaction	3
HF	312	Ergonomics and Bioengineering	3
HF	315	Automation and Systems Issues	
		in Aviation	3
HF	325	Human Factors and System Safety	3
HF	330	Human Factors in Space	3
HF		Human Factors in Air Traffic Control	
HF	340	Human Factors and Product Liability	3
HF	410	Human Factors in Crew Station Desig	gn 3
HF	412	Simulating Humans in Complex Syst	ems 3
HF	415	Human Factors in Simulation System	s3
HF	422	Applied Ergonomic Design, Analysis	,
		and Evaluation	3
SF	320	Human Factors in Aviation Safety	3
Total Credits Required			15

## MINOR IN HUMANITIES

Students may earn a minor in Humanities by successfully completing 18 hours by selecting two courses from the HU 140-146 series for a subtotal of 6 credits.

Additionally, students must complete one or more courses from each of the following lists for a subtotal of 12 credits:

#### Credits

#### NARRATIVE

HU HU HU HU	305 310	World Literature Modern Literature American Literature Exploring Film	3 3
SPEC	ULA	ATIVE	
ΗŪ	335	Values and Ethics Technology and Modern Civilization World Philosophy	3
		N AND FINE ARTS	
HŪ	345	Aesthetics of Visual and Musical Arts Comparative Religions	3
Total	Cree	dits Required	18

HU 399/HU 499, Special Topics in Humanities, may be included with advance permission of the department chair.

## MINOR IN INDUSTRIAL SAFETY

This minor exposes students to the broader field of safety. While focusing on managing safety under OSHA and EPA regulations which all business (aviation and non-aviation) in the United States must adhere to, this minor also covers safety programs required by the FAA. Students receive an OSHA 30hour safety certificate after completing the requirements for this minor.

#### **Required Courses**

Course		Title	
SF	201	Introduction to Health, Occupational,	
		and Transportation Safety	3
SF	355	Industrial Hygiene and Toxicology	3
SF	410	Design of Engineering Hazard	
		Controls	3

#### AND any two of the following:

SF	315 Environmental Compliance and Safety.	3	
SF	320 Human Factors in Aviation Safety		
SF	330 Aircraft Accident Investigation		
SF	341 Safety and Security of Airport Ground		
	Operations	3	
SF	345 Safety Program Management		
SF	365 Fire Protection	3	
SF	399/499 Special Topics in Safety	3	
Total	Credits Required	15	
NOTE: CE 245, CE 241, and CE 220, and he are d families that the			

NOTE: SF 345, SF 341, and SF 330 can be used for either the Aviation Safety minor OR Industrial Safety minor, but NOT both.

## MINOR IN INFORMATION TECHNOLOGY

The Information Technology minor includes a core that provides basic knowledge and understanding of computer programming, the World Wide Web, and computer networks. The core provides the foundation for a student to pursue one of two tracks: the Webmaster track or the Network Administration track. The Webmaster track prepares a student to work in the development and administration of an Internet Web site. The Network Administration track prepares a student to work as a system administrator of a computer network.

#### Core

Course	Title	Credits
CS 118	Fundamentals of Computer Programm	
	(or other programming courses such a	IS
	EGR 115 or ČS 125)	3
	Web Page Authoring and Design	
IT 220	Introduction to Networking	3
<b>Elective</b>	(one course from the following):	
BA 320	Business Information Systems -OR-	
	Publishing on the Internet -OR-	
	Approved CS/CEC elective -OR-	
	Human-Computer Interaction	3
Total Cree	dits	12
Track 1: I	Information Technology - Webmas	ter
IT 310	Web Site Management	3
	Programming for the Web	
Total Cree	dits	6

# Track 2: Information Technology - Network Administration

IT	320	Network Configurations	3
IT	340	WAN Theory and Design	3
Total	Cre	dits	6
Тота	L CRI	EDITS REQUIRED	18

## MINOR IN INTERNATIONAL RELATIONS

Students may earn a minor in International Relations by successfully completing the following:

Cour	se	Title	Credits	
SS	331	Current Issues in America	3	

#### One of the following is required:

		0 1			
EC	200	An Economic Survey			
EC	211	Macroeconomics			
SS	110	World History			
SS	120	American History			
SS		History of Aviation in America3			
SS	204	Introduction to Geography			
Thre	Three of the following are required:				
BA	335	International Business			
SS	311	U.S. Military History 1775-19003			
SS					
33	321	U.S. Military History 1900-Present			
SS		U.S. Military History 1900-Present3 Russian-American Relations3			

Total Credits Required			
SS	363	Inter-American Relations3	
SS		American Foreign Policy	
SS	336	The Modern Middle East in World Affairs3	
SS	334	Contemporary Africa and the World3	
55	333	US-Asian Relations	

## MINOR IN MATHEMATICS

Students may earn a minor in Mathematics by completing the following:

Course		Title	Credits
MA	241	Calculus and Analytic Geometry I	4
MA	242	Calculus and Analytic Geometry II .	4
MA	243	Calculus and Analytic Geometry III .	4
MA	245	Applied Differential Equations -OR-	3
MA	345	Differential Equations and	
		Matrix Methods	4
MA		Electives (approved by department chair)	5-6
Total Credits Required			21

# MINOR IN OCCUPATIONAL SAFETY AND HEALTH

Students may earn a minor in Occupational			
Safety and Health at the Prescott can	npus by		
completing the following course of s	tudy.		
Course Title	Credits		
SF 210 Introduction to Aerospace Safety.	3		
SF 325 Human Factors and Ergonomics I	3		
And nine credits from the following:			
SF 205 Principles of Accident Investigation	n 3		
SF 345 Safety Program Management	3		
SF 405 Applications of Industrial Hygiene	e3		
SF 410 Design of Engineering Hazard Cor	ntrols3		
SF 420 Analysis of Observational Data	3		
Total Credits Required	15		

## MINOR IN PHYSICS

Students may earn a minor in Physics by completing the list below. Engineering Physics or Space Physics students are not eligible.

- 1					
Course		Title	Credits		
PS	150	Physics for Engineers I	3		
		-OR-			
PS	215	Physics I	3		
PS	160	Physics for Engineers II	3		
		-OR-			
PS	208	Physics II	3		
PS	250	Physics III for Engineers	3		
		-OR-			
PS		Physics III.			
PS	253	Physics Laboratory for Engineers	1		
		-OR-			
PS	220	Physics III Laboratory	1		
PS	303	Modern Physics	3		
PS	305	Modern Physics Laboratory	1		
		Upper-Level Elective*	3		
Total Cre		dits Required	17		

\*Choose one elective from EP 320, EP 400, EP 440, PS 320, PS 400

#### MINOR IN PSYCHOLOGY

Students may earn a minor in Psychology by successfully completing the three specified courses and an additional two courses from the following list, totaling 15 credit hours.

#### **Specified Courses**

Cour	se	Title	Credits
PSY	101	Introduction to Psychology	3
PSY	350	Social Psychology	3
HF	201	Introduction to Human Factors -OR-	3
HF	210	Human Factors I: Principles	
		and Fundamentals	3
Two		he following courses are also requ	
BA	317	Organizational Behavior	3
HU	361	Interpersonal Communication	3
HU	363	Communication and Society	3
PSY	310	Sensation and Perception	3
PSY	315	Cognitive Psychology	3
PSY	320	Aviation Psychology	3
PSY	335	Physiological Psychology	3
PSY	340	Industrial-Organizational Psychology	3
PSY	345	Training and Development	3
PSY	400	Introduction to Cognitive Science	3
SS	310	Personality Development	3
SS	350	Psychology of Relationships	3
Total	Cre	dits Required	15

Three credits of HF 299, 399, or 499 or PSY 299, 399, or 499 (Special Topics in Psychology) may be substituted with advance permission of the department chair.

## MINOR IN SECONDARY EDUCATION

Students may earn a minor in Secondary Education through a collaborative agreement between Embry-Riddle and the University of Central Florida (UCF) by completing the following courses at UCF:

UCF Courses	Credits
<b>General Methods (Two courses)</b> EDF 2005 Introduction to Education EDF 4603 Analysis of Critical Issues in Education	
<b>Sociological Foundations (Two courses)</b> EDG 2701 Teaching Diverse Populations EDG 4323 Professional Teaching Practices	6
<b>Psychological Foundations</b> EDF 4214 Classroom Learning Principles	3
<b>Special Methods (Select one)</b> EME 2040 Technology for Educators MAE 4360 Mathematics Instructional Analysis	3-4

PET 4710 Teaching Physical Education K-12 SCE 4360 Science Instructional Analysis

#### Total Credits Required

18-19

In conjunction with the minor in Secondary Education, students seeking to acquire teacher certification at the secondary level have the opportunity to satisfy both education and internship requirements (18 additional credit hours) through collaborative agreements with UCF.

## MINOR IN SECURITY STUDIES

This course sequence has the goal of enhancing students' knowledge and employability by providing them with an understanding of basic principles of and issues in the process of policy-making; in-depth analysis of the relationships between security and globalization; and advanced knowledge of intelligence and criminal justice systems around the globe.

Not open to Global Security and Intelligence Studies students.

Cour	se	Title	Credits
SS	325	International Studies	3
SIS	317	Political Change, Revolution, and War	:3
SS	340	American Foreign Policy	3
Two	cou	rses selected from the following list	t:
SIS	312	Global Crime and International	
		Justice System	3
		Studies in Global Intelligence I	
SIS	400	International Security and Globalization	on .3
Total Credits Required		15	

## MINOR IN SPACE STUDIES

Students may earn a minor in Space Studies by completing 15 credits from the following list.

#### Twelve credits selected from:

Course		Title	Credits
SP	110	Introduction to Space Flight	3
SP		Planetary and Space Exploration	
SP		Space Transportation System	
SP		Space Station Systems and Operation	
SP	220	Life Support Systems	3
SP	300	Satellite and Spacecraft Systems	3
SP	400	Introduction to Space Navigation	3
SP		/399/499 Spec. Topics in Space Studie	
In addition, all students must complete:			
SP	425	Selected Topics in Space and Aerospa	ce3

#### 425 Selected Topics in Space and Aerospace...3 **Total Credits Required**

## MINOR IN TECHNOLOGY POLICY AND MANAGEMENT (TPM) STUDIES

This course sequence has the goal of enhancing students' knowledge and employability by providing them with an understanding of basic principles of management; in-depth analysis of the relationships between technology, politics, culture, labor, and business; and advanced knowledge of organizational management and international business. Not open to AES-TPM students.

Cour	se	Title	Credits
BA SS	201 307	Principles of Management Global Policy Studies	3 3
Two	cou	rses selected from the following lis	st:
BA	308	Public Administration	3
BA	311	Marketing	3
BA	314	Human Resource Management	3
BA	317	Organizational Behavior	3
BA	335	International Business	3
Total	Cree	dits Required	15

15

# Special Academic Programs and Opportunities

## Embry-Riddle Language Institute (ERLI)

The Embry-Riddle Language Institute (ERLI) was established to help non-English speaking prospective students and aviation professionals become more proficient in listening, speaking, reading, and writing skills.

This program is offered to those who have a TOEFL level of less than 550 or other demonstrated English-language deficiencies. The purpose of the program is to prepare students for whom English is not the first language to move into Embry-Riddle degree programs or other academic institutions. Specific aviation courses have been developed for aircraft maintenance, avionics, aviation management, air traffic control, and flight. More information is available by contacting the ERLI Office at (386) 226-6192.

## INTERNATIONAL PROGRAMS

Recognizing the unquestionable benefits of international exposure in today's increasing globalization, Embry-Riddle offers its students a wealth of opportunities to study abroad in more than 50 destinations spanning five continents worldwide. Whether it's as short as a one-month summer venture or a two-year dual degree program, we feel these programs provide students with the experience that will greatly enhance not only their academic and professional lives, but their personal lives.

Motivated students in good academic standing (participation requires a minimum GPA of 2.5 for summer programs and 3.0 for exchange programs except under special circumstances) from the residential and Worldwide campuses have the unique opportunity to take courses through our partner schools that will be directly applicable to their degree programs at Embry-Riddle while traveling and participating in numerous cultural activities abroad. Foreign language classes are an essential part of every program, and students at all levels of language experience – from absolute beginners to native speakers – are encouraged to take part. In fact, all of our summer programs are designed to accommodate students who have had no prior foreign language experience. We offer many opportunities to take classes taught in English abroad, including specialized semester-long programs. For the more avid travelers, we offer dual degree opportunities, where students may obtain both an Embry-Riddle undergraduate degree as well as a master-level degree from a foreign institution, simultaneously. Qualified exchange program participants could also have the opportunity to be placed in paid internships with companies or research labs abroad.

## SUMMER STUDY ABROAD

Embry-Riddle offers four to six week summer programs at half-price tuition, providing an additional incentive for students to explore other continents and advance their education. Living expenses in many of our destinations can be substantially lower than in the United States allowing students to save even more. Students who qualify for financial aid will receive an equivalent amount when enrolled in one of our international programs; there are also additional scholarship and grant opportunities available to students who choose to study abroad.

## COOPERATIVE EDUCATION

Cooperative Education/Internship offers qualified students an opportunity to gain valuable experience, explore career options, develop contacts in the industry, and earn college credit. Requirements and benefits vary by degree program and by employer. Students should discuss their co-op/internship plans with their academic advisor, Career Services program manager, and, when applicable, with the co-op/internship faculty advisor in their degree program. One upper-level open elective credit hour is awarded for every 100 clock hours of work completed, up to a maximum of six credit hours in one semester. Additional information, including current openings and requirements, is available from Career Services and on the Career Services Web site. A co-op/internship fee based on the cost of one credit hour in a student's degree program is charged each semester.

## RESERVE OFFICER TRAINING CORPS

Reserve Officer Training programs are subject to the control of the service branch that sponsors them and are operated according to the rules and regulations established by the service branch. These may be changed from time to time without notice or obligation.

Not all Reserve Officer Training programs are available at all University campuses or locations. Students should contact the Admissions Office to determine program availability.

## AIR FORCE RESERVE OFFICER TRAINING CORPS

The Air Force Reserve Officer Training Corps (Air Force ROTC) is an educational program designed to give men and women the opportunity to become Air Force officers while completing their college degrees. The



Air Force ROTC program is focused on preparing cadets to become leaders in today's high-tech Air Force.

Air Force ROTC enrollment is not restricted to individuals who wish to become commissioned officers in the USAF. Students may elect to take Air Force ROTC courses for academic credit only, earning elective credits for all University degrees. Additionally, Prescott campus students who complete all 16 hours of Air Force ROTC coursework are eligible for a Defense Studies minor. For more information, refer to the Minor Courses section of the catalog.

Any qualified student may enroll in Air Force ROTC; check with your local Air Force ROTC detachment for more information.

## FOUR-YEAR PROGRAM

The first half of the four-year program is called the General Military Course, which is offered during a student's freshman and sophomore years. This program allows students to try out Air Force ROTC for up to two years without incurring any obligation (unless they are on an Air Force ROTC scholarship). As students attend class, they learn more about the Air Force and the historical development of airpower. The last two years are called the Professional Officer Course. These junior and senior level classes cover leadership skills and national defense policy.

## TWO-YEAR PROGRAM

This program, also called the Professional Officer Course, or POC, is available to any student or veteran who has approximately two years of college work remaining (undergraduate, graduate, or a combination of the two). It's especially suited for those who major in selected scientific and technical areas such as mathematics, physics, engineering, and computer science. The POC program is highly competitive, so it's important to apply early in your sophomore year.

## ONE-YEAR PROGRAM

The one-year program is available to students with approximately one year of college work remaining. The one-year program is open to all majors, both undergraduate and graduate. If selected, cadets attend a seven-week AFROTC field-training encampment during the summer before they enter AFROTC. After successfully completing all requirements, cadets are commissioned as Air Force officers.

## FINANCES

Textbooks for all Air Force ROTC courses are free. Students who have contracted with Air Force ROTC receive a tax-free subsistence allowance during the academic year of \$250-\$400 per month, depending on their academic year.

## AIR FORCE ROTC SCHOLARSHIPS

Air Force ROTC offers scholarships covering a student's college education for two, three, or four years. Each scholarship pays up to full tuition, laboratory fees, incidental fees, an annual book allowance up to \$600, and a tax-free subsistence allowance of at least \$250 per month (see Finances). As an extra incentive to AFROTC scholarship students, Embry-Riddle provides an annual assurance of \$7,000 per year, approximating the university's annual room and board cost. High school students interested in a scholarship should apply as soon as possible in the six-month application period (June 1 to December 1 of their senior year). Application forms for the scholarship are available online at http://www.afrotc.com.

In-college scholarship opportunities are also available for students already enrolled in the Air Force ROTC program. Freshmen can earn three-year scholarships, while sophomores can earn two-year scholarships. College transferees may also apply for these scholarships.

All scholarship applicants must meet the following minimum requirements:

- Be a U.S. citizen
- Be less than 31 years old as of December 31 of the year you will commission
- Meet military and physical standards
- Pass the Air Force Officer Qualifying Test
- Have a minimum cumulative GPA of 2.50

For more information, contact either:

#### AFROTC Detachment 157

Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900 (386) 226-6880 http://www.erau.edu/omni/db/ academicorgs/dbafrotc

#### -OR-

#### AFROTC Detachment 028

Embry-Riddle Aeronautical University 3700 Willow Creek Road Prescott, AZ 86301-3720 (928) 777-3868 (800) 888-ERAU, ext. 3868 http://www.erau.edu/pr/rotc/afrotc

## ARMY RESERVE OFFICER TRAINING CORPS

Army Reserve Officer Training Corps (ROTC) is open to both men and women, freshmen through seniors, and may lead to a commission as an officer in the U.S. Army. Army ROTC enhances a student's education by providing unique leadership and management training, along with practical experiences. The curriculum is designed to be challenging, educational, and flexible enough to allow students to meet scholastic and personal goals. Classes and training include leadership development, leadership problem-solving, tactics, physical training, map reading, land navigation, rappelling, rifle marksmanship, patrolling, drill and ceremony, military history, ethics, and military law. Students may earn 18 hours of academic credit for completing four years of Army ROTC. The ROTC courses may also be applied toward open elective requirements in degree programs. All uniforms, military textbooks, and equipment are issued to Basic Military Science freshman/ sophomore cadets at no charge.

## ARMY RESERVE OFFICER TRAINING

The Army Reserve Officer Training Corps program gives students an opportunity to acquire the skills and knowledge necessary for commissioning as a second lieutenant in the U.S. Army. The program offers a two, three, and four-year option. The two-year option allows students with at least two academic years remaining in college to meet all requirements for commissioning by attending basic camp or using past military experience for credit.

## BASIC MILITARY SCIENCE

The Basic Military Science courses are offered during the freshman and sophomore years. These courses cover military organization, equipment, weapons, map reading, land navigation, use of compass, rank structure, threat, communications, leadership, and physical training. Each course consists of classroom instruction and a mandatory lab. Students are required to have a doctor's statement allowing participation in collegelevel physical education classes. Freshman and sophomore students may enroll in Basic Military Science classes with no obligation to the Army.

## Advanced Military Science

The Advanced Military Science courses are normally taken during the junior and senior years. These courses specialize in small unit tactics, preparation and conduct of military training, military justice system, staff procedures, decision making and leadership, managerial concepts, problem analysis, military writing, the ethics of the professional soldier, and physical training. The courses consist of classroom instruction and a mandatory lab. This phase requires attendance at a fiveweek National Leadership Development Assessment Course (LDAC) held at Ft. Lewis, Wash., during the summer after the junior year.

## LEADERS TRAINING COURSE

A summer training program is offered for students without previous ROTC or military training who will be academic juniors. A five-week course at Fort Knox, Ky., during the summer after the sophomore year qualifies a student for entry into the Advanced Course, thus allowing completion of all requirements for commissioning in two years. Students attending the summer camp at Fort Knox receive approximately \$800. Students receive six hours of credit for the basic military science course upon completion of the Leadership Training Course.

## **BENEFITS**

All contracted military science students receive a monthly stipend of \$300-\$500 per month.

Four-year, three-year, and two-year scholarships are available to those who qualify. The higher the student's GPA and SAT/ ACT scores, the better their chance of being selected as a scholarship recipient.

In addition, entering freshmen who receive three-year advance designee and four-year Army ROTC scholarships are eligible to receive additional financial incentives from Embry-Riddle. Army Green to Gold Scholarship winners may be eligible for these incentives as well.

All applicants must meet the following requirements:

- Be a U.S. citizen
- Be under 31 years of age prior to commissioning
- Meet required medical and physical standards
- Have a minimum cumulative academic GPA of 2.50
- Have a minimum SAT score of 920 or an ACT composite score of 19

## SCHOLARSHIP BENEFITS INCLUDE

- Full tuition per year
- A subsistence allowance of \$300-\$500 per month
- A \$450 book allowance per semester
- Embry-Riddle ROTC Scholarship Assurance - \$7,000 per year minimum for certain Army ROTC scholarship winners

## Admission to the Basic Course

Admission requirements are:

- Enrollment in a baccalaureate or master degree program
- Must be at least 17 years of age at time of entry
- U.S. citizen
- Must maintain full-time student status each term

## Addission to the Advanced Course

Admission requirements are:

- Successful completion of the Basic Course Leader's Training Camp or its equivalent
- Successful completion of the Army physical examination
- Selection by the professor of Military Science
- Agreement to complete the Advanced Course requirements and serve on active duty, reserve, or National Guard duty as a commissioned officer
- Maintain a 2.00 overall academic GPA and a 3.00 ROTC GPA
- Must maintain full-time student status each term

## ARMY GREEN TO GOLD

If you are currently on active duty and will have two years of active duty before school starts and are accepted by Embry-Riddle as either a freshman, sophomore, or junior, you can compete for an Active Duty Green to Gold four, three, or two-year scholarship.

You must have a GT score of 110 or higher and a cumulative grade point average of 2.50 on a 4.00 grading system to be eligible for the three or two-year scholarship. A GT score is not required for individuals applying for a four-year scholarship. Fouryear applicants must have a cumulative grade point average of 2.00 on a 4.00 grading scale. All applicants must meet other eligibility requirements. An SAT score totaling 920 or an ACT composite score of 19 is required for three and four-year Green to Gold scholarships.

For further information contact:

#### Daytona Beach Campus

Embry-Riddle ARMY ROTC 600 S. Clyde Morris Blvd. ROTC Building, Second Floor Daytona Beach, FL 32114-3900 (386) 226-6470/6437 fax: (386) 226-7615 email: armyrotc@erau.edu

#### Prescott Campus

Embry-Riddle ARMY ROTC Bldg. 80 3700 Willow Creek Road Prescott, AZ 86301-3720 (928) 777-3870 fax: (928) 777-3772 email: kent.macgregor@erau.edu http://www.flyarmyrotc.com/

## PHYSICAL TRAINING

All non-scholarship cadets are required to attend physical training one day per week as part of the course grade. All scholarship and Advanced Course cadets are required to attend physical training three days per week as part of the course grade. Physical training is normally conducted on Monday, Wednesday, and Friday from 6-7 a.m.

# MARINE CORPS PROGRAMS

For freshmen, sophomores, and juniors, the Marine Corps offers the Platoon Leaders Course (PLC) program. Freshmen and sophomores attend two six-week training sessions and juniors attend one 10-week session at Quantico, Va. During the training sessions candidates can earn from \$2,100 to \$3,200, depending on which training session is attended. In addition, eligible candidates may apply for two financial assistance programs, the Financial Assistance Program (FAP) and the College Tuition Assistance Program (CTAP). Call or visit the Web site to receive more information.

To be eligible for the program, the student must be a U.S. citizen (either native-born or naturalized), with full-time enrollment in a minimum of 12 academic credits per semester, and must be working toward an accredited/recognized baccalaureate degree.

The PLC Program offers two entrylevel paths that lead to commissioning as a second lieutenant in the U.S. Marine Corps. The first is the Guaranteed Aviation Program. Applicants must have a qualifying ACT, SAT, or ASVAB score and must take the Aviation Selection Test Battery (ASTB). Those who have at least the minimum score of 4/6 on the ASTB; pass a Class 1 aviation medical examination performed at a Navy medical facility; pass a Marine Corps Physical Fitness Test (PFT); and are accepted into the program by Headquarters Marine Corps, will be eligible to receive a contract guarantee. The second program is the Ground Officer Program. This program encompasses all military occupational specialties not directly related to piloting aircraft, or guaranteed law.

To be eligible for the U.S. Marine Corps Platoon Leaders Class Program, a student must be enrolled full-time. Openings are available for men and women with any major. Contact the Officer Selection Office at (866) 290-2680 (toll free) or (407) 249-5873.

## NAVAL AVIATION CLUB

A dynamic Naval Aviation Club informs and assists students who are eager to learn about naval aviation careers. Membership dues are nominal and no academic credit is conferred. The club features guest speakers and aircraft from fleet squadrons, in addition to field trips to naval air stations, aircraft carriers, and the cradle of naval aviation at Pensacola. Current Navy policy information is made available through close liaison with Navy Recruit Command representatives.

The U.S. Navy offers a Bachelor Degree Completion Program with a guaranteed pilot contract. This program is open to all Embry-Riddle students. If selected, the Navy will pay you \$1,900 per month. This remuneration will be paid to you for the last three years of school, if you are working toward a technical degree, or for the last two years of school for a nontechnical degree. This program can provide you over \$68,000. This is not ROTC. There are no drills, and uniforms are not required. You must maintain a 3.0 GPA (GPA waivers are possible). All majors are eligible. After graduation, you will proceed to the Naval Air Station Pensacola, FL, for Aviation Officer Candidate School. After 14 weeks, you will be commissioned an ensign in the U.S. Navy and begin flight training. For more information, contact the president of the Embry-Riddle Naval Aviation Club.

### NAVAL RESERVE OFFICERS TRAINING CORPS

The Naval Reserve Officers Training Corps (NROTC) unit administers the Naval Science Program at Embry-Riddle. This program affords selected men and women the opportunity to receive instruction in Navy specified courses which, in conjunction with the baccalaureate degree, will qualify them for a commission in the U.S. Navy or Marine Corps. Students enrolled in the University who are physically and mentally qualified are eligible to apply for the NROTC Program. As naval officers, Embry-Riddle NROTC graduates become eligible for varied careers, serving in aviation squadrons, on surface ships, on submarines, and in special operations, or in numerous sub-specialties as an officer of the Marine Corps. With the consent of the professor of naval science, any student, although not enrolled in the NROTC Program, is eligible for enrollment in naval science courses. Students interested in the Embry-Riddle NROTC Program may compete for four-year NROTC national scholarships prior to matriculation. Students who join the unit through the NROTC College Program are eligible to compete for other types of scholarships throughout their college career.

# NAVAL ROTC TWO AND FOUR-YEAR NATIONAL SCHOLARSHIP PROGRAMS

The NROTC Scholarship Program is open to young men and women of all races, creeds, and national origin who are U.S. citizens. Students are selected on their own merit to become officers in the U.S. Navy and Marine Corps.

Scholarship students are appointed midshipmen, U.S. Navy Reserve. The Navy pays for tuition, fees, textbooks, uniforms, and a monthly subsistence allowance starting at \$250 per month for first-year candidates and up to \$400 for fourth-year students during the academic year for four-year scholarship winners. Scholarship students are normally selected through national competition during their senior year in high school. However, students who are already enrolled in college but not in the NROTC Program may compete nationally for twoyear scholarships. If selected, the student will attend the Naval Science Institute in Newport, R.I., for an intensive six-week training course of naval science and military training. Although it is not a requirement, a student in the NROTC Scholarship Program is encouraged to pursue a major in engineering, mathematics, chemistry, or physics to meet the technological requirements of the Navy. Other fields of study for a major leading to a baccalaureate degree are permitted, with the approval of the professor of naval science. Regardless of the major, every Navy scholarship student must complete one year of calculus and calculus-based physics.

Students must include certain Navy specified courses in their program and complete a program of courses as prescribed by the professor of naval science. Upon graduation and successful completion of the naval science curriculum, the midshipman will receive a reserve commission as ensign in the U.S. Naval Reserve or second lieutenant in the U.S. Marine Corps Reserve and will serve on active duty for a minimum of four years, with a total service obligation of eight years.

## NAVY-MARINE CORPS COLLEGE PROGRAM

The NROTC College Program is designed to train and educate well-qualified young men and women for commissioning. Selected students are appointed as midshipmen in the Naval Reserve prior to commencement of the advanced course in the junior year. The Navy pays for uniforms and naval science textbooks during the four-year period and, during the junior and senior years, pays the midshipman a monthly subsistence allowance. Each student is selected for enrollment in the program through application to the Naval Education and Training Command on the basis of past academic performance, potential, personal interviews, and a physical examination. A college program midshipman only acquires a military service obligation after entering the advanced courses at the beginning of the junior year.

Although there are no restrictions on the major college program students may pursue, it is highly recommended that they pursue a course of study similar to that of scholarship students. Students must also include in their program certain Navy specified courses and a program of courses in naval science. Students, upon graduation and successful completion of the naval science curriculum, receive a Reserve commission as an ensign in the U.S. Naval Reserve or as a second lieutenant in the U.S. Marine Corps Reserve and incur a total service obligation of eight years, with at least three of those years served in active-duty status.

### NAVAL ROTC TWO-YEAR COLLEGE PROGRAM (NONSCHOLARSHIP)

NROTC offers a two-year nonscholarship program that is designed specifically for students commencing their third year of college who were not enrolled in the NROTC program during their freshman and sophomore years. Applications must be submitted during the sophomore year by March 1 to permit processing, personal interviews, and a physical examination. Qualifications for acceptance to this program include demonstrated ability to complete college-level science and math courses. Upon acceptance into this program, the student attends a sixweek intensive course at the Naval Science Institute in Newport, R.I., in the summer prior to beginning the junior year of study. Students in a five-year engineering curriculum may attend the institution between their third and fourth years. The six-week summer course qualifies the student for enrollment in the NROTC Program at the junior level. During the student's attendance at the Naval Science Institute, the Navy provides room and board, books, uniforms, transportation from home and return, and also pays the student approximately \$365 per month. Upon successful completion of the course, the Navy pays for uniforms and naval science textbooks provided, and a \$350 subsistence allowance.

## NAVAL ROTC SUMMER TRAINING

The NROTC Scholarship Program student is required to complete training of approxi-

mately four weeks during each of the three summer recesses. During the first summer period, each scholarship student receives instruction in aviation training, marine combat training, surface warfare indoctrination, and submarine indoctrination either in Norfolk, VA, or San Diego, CA. The second summer training is performed aboard operational ships of the U.S. fleet from an enlisted servicemember perspective. During the third summer, candidates for U.S. Navy commissions will perform training aboard operational ships as junior officers. The student who qualifies for nuclear propulsion training may elect to cruise on nuclear-powered ships or submarines. Some midshipmen cruise with allied navies through the Midshipman Foreign Exchange Program. Transportation costs to and from the training sites, subsistence, quarters, and pay of approximately \$365 per month will be paid to every participating student. The candidates for U.S. Marine Corps commissions will perform training at the U.S. Marine Corps Base, Quantico, Va. The Marine Option NROTC Summer Training Program, called Bulldog, is designed to prepare midshipmen for appointment to commissioned grade by providing basic military instruction and physical training. An evaluation of midshipmen is made to ensure that they possess the leadership, academic, and physical qualifications required for appointment to commissioned grade in the Marine Corps Reserve. Female midshipmen participate in all NROTC curriculum requirements and activities, including cruises aboard selected ships. A woman who has qualified for Marine Option Summer Training at Quantico attends the Woman Officer Candidate Course at Officer Candidates School in Quantico, Va.

### GRADUATE PROGRAMS

Those holding bachelor degrees who wish to pursue advanced study in aeronautical science, computer science, aerospace engineering, human factors and systems, or management of aviation and safety, may choose from nine degree program alternatives at the master level.

For more information on all graduate programs available and an application form, contact the following:

### Daytona Beach Campus

Graduate Admissions Office Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900 (386) 226-6115 - or - (800) 388-3728 fax: (386) 226-7111 email: graduate.admissions@erau.edu http://www.erau.edu/db/ gradadmissions

### -OR-

### Prescott Campus

Graduate Admissions Office Embry-Riddle Aeronautical University 3700 Willow Creek Road Prescott, AZ 86301-3720 (928) 777-6993 - or - (800) 888-3728 fax: (928) 777-6958 email: graduate.admissions@erau.edu http://www.erau.edu/pr/admissions/ gtadmissions.html

### MASTER OF SCIENCE IN AERONAUTICS

The Master of Science in Aeronautics (MSA) is designed to provide the aviation/ aerospace professional with a rigorous academic approach to a generalist-oriented degree. It provides an opportunity for flight crew members, air traffic control personnel, flight operations specialists, industry management and technical representatives, and aviation educators to enhance their knowledge and pursue additional career opportunities.

Entry into the MSA program requires possession of an undergraduate foundation in college-level mathematics, introduction to computers, economics, behavioral science, and aviation legislation. Flight qualifications are not required for this degree.

There are seven specializations from which the student may choose: Aeronautics, Aviation/Aerospace Education, Aviation/ Aerospace Management, Aviation/ Aerospace Operations, Aviation/Aerospace Safety Systems, Space Studies, and Human Factors in Aviation Systems. Some specializations may not be offered in any given semester.

### MASTER OF SCIENCE IN AEROSPACE ENGINEERING/MASTER OF AEROSPACE ENGINEERING

The Master of Science in Aerospace Engineering (MSAE) and the Master of Aerospace Engineering (MAE) provide formal advanced study, preparing students for careers in the aerospace industry and research and development. Both degree programs are planned to augment the individual student's engineering and science background with adequate depth in aeroacoustics, nondestructive testing, aerodynamics, design and optimization, propulsion, aerospace structures, composite structures, computational fluid dynamics, or other areas of aerospace engineering. Candidates for both degrees can select courses with the goal of building a graduate program that supports their interests in the aerospace engineering profession, or that prepares them to continue on to doctoral studies.

Both degree programs require a minimum of 30 credit hours of graduate coursework.

These programs are available only at the Daytona Beach campus.

### MASTER OF BUSINESS Administration in Aviation

The Master of Business Administration in Aviation (MBA/A) program blends the development of management skills, tools, and techniques with the study of the aviation and aerospace industry. The MBA/A degree program is designed to develop aviation managers who can apply the concepts of modern management techniques to the challenges of the aviation industry. The MBA/A curriculum combines a strong traditional business core with specialization components in aerospace production and operations management, international management and aviation policy, airline operations and management, airport operations and management, aviation law and insurance, aviation labor relations, and aviation economics. The MBA/A on the Daytona Beach campus has special accreditation by the Association of Collegiate Business Schools and Programs (ACBSP).

The development of versatility and analytical resourcefulness are two of the key aims of the MBA/A program. The program is designed to emphasize pragmatic solutions to the managerial, technical, and operational problems likely to arise in the aviation industry because of the frequent and sweeping changes occurring in technology and regulations.

### MASTER OF SCIENCE IN HUMAN FACTORS AND SYSTEMS

The Master of Science in Human Factors and Systems (MSHFS) degree program is designed to meet the highest academic standards , while also preparing students for immediate employability in real-world, cost-sensitive, and operationally driven aviation/aerospace environments. The degree program has two distinct tracks in Human Factors Engineering and in Systems Engineering. The Human Factors track is based on the scientist-practitioner model of the American Psychological Association (APA), adheres to guidelines established by the committee for Education and Training of APA's Division 21, and meets the accreditation requirements of the International Ergonomics Association.

The Human Factors track develops students' capacity to design, conduct, and apply human factors research in support of the design of simple and complex systems. The curriculum addresses the content and techniques of human factors, including statistical and quantitative procedures, experimental design, survey methods, computer techniques, and other research methodologies.

The Systems Engineering track provides

a systemic focus to the transformation of an operational need into a defined system configuration through the iterative process of functional analysis, synthesis, optimization, and design integration. It addresses considerations of human factors, reliability, maintainability, logistic support, safety, producibility, economic, and related elements as they apply to system design, integration, and evaluation.

This program is available only on the Daytona Beach campus.

# MASTER OF SCIENCE IN SAFETY SCIENCE

The Master of Science in Safety Science (MSSS) degree program is designed to provide the safety and aviation professional with an experiential and practical educational experience to enhance the practice of occupational health and safety. The degree will produce safety professionals who are skilled in providing safety management expertise and who can provide leadership and guidance in compliance issues involving EPA, OSHA, DOD, FAA, DOE, and state health, hygiene, and workplace standards. These safety professionals will be prepared for service in either the aviation/ aerospace industry or other industries and organizations.

This program is available only on the Prescott campus.

### MASTER OF SOFTWARE ENGINEERING

The Master of Software Engineering (MSE) curriculum is designed with industry needs in mind. The goal of the curriculum is to produce a software engineer who can rapidly assume a position of substantial responsibility in a software development organization. The program emphasizes modern approaches to software development, with a special emphasis on software for realtime systems. The curriculum pays particular attention to the following:

- Software processes
- Software project management
- Software requirements engineering and design
- Communication and teamwork skills This program is available to all graduates. Mathematics and computer science prerequisite knowledge is required for students with noncomputing degrees.

This program is available only at the Daytona Beach campus.

### MASTER OF SCIENCE IN SPACE SCIENCE

The Master of Science in Space Science degree program provides graduate-level education and training in space science and space systems engineering, following the similar emphasis of the undergraduate Engineering Physics program. The goal is to provide graduates with the skills that will allow them to make an immediate contribution to space-related industries or to proceed to doctoral studies in a wide variety of disciplines.

The program specifically emphasizes scientific instrumentation, applied optics, remote sensing, spacecraft subsystems (power, attitude, and thermal control), and a wide variety of topics in space science and engineering.

This program is heavily research-ori-

ented, with a majority of the faculty in the Department of Physical Sciences actively involved in scholarly activities in the space sciences and engineering. The research areas include experimental programs with satellite systems, sounding rockets, ground-based remote-sensing experiments, and a parallel program of theoretical studies in space systems engineering, upper atmospheric physics, space physics, plasma physics, and magnetospheric physics.

### AVIATION MAINTENANCE SCIENCE

# Airframe and Powerplant Technician Certification Program

The Airframe and Powerplant Technician Certification program provides the student with the training required to qualify for Federal Aviation Administration (FAA) Airframe and Powerplant Technician Certification. The 16-month program, offered only at the Daytona Beach campus, presents a carefully selected blend of theory and practical applications that qualifies the student to take the FAA certification examinations.

Students perform repairs and overhaul engines and accessories, including those used in the Embry-Riddle pilot-training fleet. The curriculum, facilities, equipment, and instructional staff are fully approved under the Code of Federal Regulations (CFR) Title 14 Part 147. Embry-Riddle holds Air Agency Certificate No. NX4T404M and FAA Repair Station Certificate No. NX42404M.

#### Avionics Line Maintenance Specialization Program

The Avionics Line Maintenance program provides the student with the training needed to successfully obtain the FCC General Radiotelephone Operators License (GROL) as well as receive advanced avionics training using current industry standards and procedures. Students will cover basic wiring and electronics concepts, system installations, and advanced avionics line maintenance troubleshooting.

#### Sources of Information

For general academic and admissions information regarding the Aviation Maintenance programs:

#### Aviation Maintenance Science Dept.

600 S. Clyde Morris Blvd. Daytona Beach, FL 32114 (386) 323-5086 - or - (877) 904-3746 fax: (386) 226-6778 http://www.embryriddle.edu/amt

# COURSE DESCRIPTIONS

Embry-Riddle Aeronautical University course offerings are listed in alphabetical order, according to the course designations below. Courses that may be offered at specific campus locations are notated as follows:

AAS	Applied Aviation Science	CIV COM	Civil Engineering Communication	ME	Mechanical Engineering
AE AEL AES AF AMS AS/ASC	Aerospace Engineering Aerospace Electronics Aviation Environmental Science Air Force Aerospace Studies Aviation Maintenance Science C Aeronautical Science	CS EC EE EGR EL EP ES FA	Computer Science Economics Electrical Engineering Engineering Electronics Engineering Physics Engineering Science Flight-Academic	MSL NSC PS PSY RS SE SF SIM	Engineering Military Science and Leadership Naval Science Physical Science Psychology Regional Studies Software Engineering Safety Science Simulation
AT AVT BA CE CEA CEC	Air Traffic Control Avionics Technology Business Administration Cooperative Education Cooperative Education in Aeronautics Computer Engineering	HON HF HS HU IT L MA	Honors Human Factors Homeland Security Humanities Information Technology Languages Mathematics	SIN SIS SP SS UNIV WX	Global Security and Intelligence Studies Space Studies Social Sciences College Success Applied Meteorology

Courses numbered 001–099 are basic skills courses and do not apply toward degree requirements. Courses numbered 100-299 are lower-division courses and are generally taken in the freshman and sophomore years. Many lower-division courses serve as prerequisites for other coursework, so students are urged to plan ahead to meet necessary prerequisites. Courses numbered 300–499 are upper-division courses, reflecting advanced levels of technical skills and disciplinary knowledge. Upper-division work is generally taken in the junior and senior years. Only the dean of a college, or an appointed designee, may waive corequisite and prerequisite requirements. The University reserves the right to administratively drop a student from a course in which prerequisite requirements have not been met.

Course numbers ending in 95 designate time-limited offerings, such as those taught by a visiting lecturer. Course numbers ending in 96 or 97 identify special sequential courses. Those ending in 98 provide students with a unique, collective program of learning activities supervised by a professor. Courses ending in 99 denote individual study between professor and student.

Numbers in parentheses, immediately following course titles and numbers, indicate lecture and laboratory hours that a class meets each week. For example, (3,3) signifies that the course consists of three lecture hours and three laboratory hours weekly.

The following courses are not necessarily offered every term, nor are they offered at all campus locations.

# Applied Aviation Science

### AAS 101

Applied Aviation Science College Success Seminar (1,0)

1 Credit

A course for incoming freshmen majoring or planning to major in Safety Science, Air Traffic Management, or Applied Meteorology in which students assess and develop the personal, interpersonal, intellectual, and social skills necessary to succeed in college. This course is for freshmen only and is Pass/Fail.

### AAS 199-499

Special Topics in Applied Aviation Science (1,0) 1-6 Credits

Individual independent or directed studies of selected topics in Applied Aviation Science.

**Prerequisite:** consent of instructor and the department chair. May be repeated with a change of content.

# Aerospace Engineering

A grade of C or better is required in MA 241, MA 242, and either PS 150, PS 160 or PS 215, PS 216, PS 250 for entry into all AE courses. A passing grade in all prerequisite courses or department consent is required for entry into all AE courses.

### AE 301

Aerodynamics I (3,0)

3 Credits

The atmosphere. Incompressible and compressible one-dimensional flow. Airspeed measurement. Twodimensional potential flow. Circulation theory of lift. Thin airfoil theory. Viscous flow. Boundary layers. Finite wing theory. Drag in incompressible flow. Wing-body interactions.

*Prerequisites:* ES 204, ES 206, MA 243. *Corequisite:* ES 305.

### AE 302

Aerodynamics II (3,0)

3 Credits

Laminar and turbulent flows, transition point, determination of skin friction drag on an airfoil. Obtaining equations for streamline, for particle path, and for streakline in a flow field. Compressible flow, shock waves, thermodynamics of gas flow. Reversible and irreversible processes. Changes in pressure, density, and temperature across shock waves. Isentropic duct flow and flow through a nozzle. Static performance and maneuvers in flight. Propeller theory. *Prerequisite: AE* 301.

### AE 304

Aircraft Structures I (3,0)

3 Credits

Space structures. Introduction to fuselage truss analysis and wing structural analysis. Inertia force and load factor computation for various flying and landing conditions. Elasticity and combined stress analysis. Beam bending. Area moment of inertia tensor. Shear flow in thin-walled sections. Materials considerations. Finite-element modeling and computer-aided analysis.

Prerequisite: ES 202.

### AE 313

Space Mechanics (3,0)

3 Credits

This course presents the vector-based solution of the two-body problem and the solution for the position and time problem (Kepler's equations). These are used to analyze orbits, satellite launch, ground tracks, orbit transfer, interplanetary trajectories, and interception and rendezvous. Using three-dimensional vector dynamics, the motion and stability of rigid and semi-rigid spacecraft are studied as are the means for controlling spacecraft orientation. *Prerequisites: ES 204, MA 345.* 

#### AE 314

Experimental Aerodynamics (1, 0)

1 Credit

This course supports the Experimental Aerodynamics lab by providing lectures based in practice and theory. Topics include wind tunnel design, instrumentation, scaling effects, tunnel wall corrections, and data acquisition, and data reduction as well as good experimental practices. The Experimental Aerodynamics Lab AE 315 must be taken during the same semester as AE 314.

Prerequisite: COM 221.

Corequisite: AE 301.

### AE 315

Experimental Aerodynamics Laboratory (0,3)

1 Credit

This laboratory consists of a sequence of experiments that demonstrate basic aerodynamic theory while developing skills in the use of classic and modern experimental apparatus, the practice of good experimental technique, and the writing of experimental reports. Specific experiments depend on apparatus availability and instructor preference. The Experimental Aerodynamics Lab, AE 315, must be taken during the same semester as AE 314.

Prerequisite: COM 221.

Corequisite: AE 301.

#### AE 316

Aerospace Engineering Materials (3,0)

3 Credits

Structure, properties, and processing of engineering materials. Crystal structure, defects, imperfections, and strengthening mechanisms. Mechanical properties, fracture mechanics, fatigue and creep, material failures. Phase diagrams and transformations. Degradation of materials. Characteristics of ferrous and nonferrous metals and alloys, ceramics, polymers and composite materials. Emphasis on materials and processes used in the aerospace industry. *Prerequisites:* COM 221, ES202, PS105, or PS140.

AE 325

Experimental Space Systems Engineering (1,0) 1 Credit

Lecture-based course to support the Space Systems Engineering Laboratory. Course covers subsystems of spacecraft, experimental methods, data acquisition, and data reduction. The Experimental Space Systems Engineering Lab, AE 326, must be taken during the same semester as AE 325.

*Prerequisite:* PS 250. *Corequisite:* EP 394.

#### AE 326

Experimental Space Systems Engineering Laboratory (0,3)

1 Credit

Laboratory for the fundamentals of spacecraft systems. A lab covering each of the major subsystems of spacecraft, which may include propulsion, attitude control, power, telemetry and command, communications, structures and vibrations, materials and mechanisms, thermal control, and mass properties. The Experimental Space Systems Engineering Lab, AE 326, must be taken during the same semester as AE 325.

Prerequisite: PS 220.

Corequisite: EP 394.

#### AE 350

Project Engineering (3,0)

3 Credits

Role of the engineer in project management with emphasis on systematic evaluation of the benefits and costs of projects involving engineering design and analysis. Proposal preparation and presentation, engineering contracts, negotiation techniques. Value engineering.

**Prerequisite:** Junior class standing or consent of instructor.

### AE 401

Advanced Aerodynamics I (3,0)

3 Credits

An advanced-level presentation of the theory and applications of incompressible aerodynamics. Kinematics and dynamics of fluid flow. Flow about a body. Shock tube flow. Thin airfoil and finite wing theory. Approximation techniques; numerical methods. Introduction to compressible flow.

Prerequisites: AE 302, MA 441.

### AE 404

Aircraft Structures II (3,0)

3 Credits

Deflection analysis of structural systems by means of virtual work principles and their energy counterparts. The Rayleigh-Ritz method. Redundant truss, frame, and stiffened web structures. Thermal loads. Shear lag. Load transfer at fuselage frames and wing ribs. Cutouts in wing and fuselage members. Shear flow in multicell wing structures. Buckling considerations. *Prerequisite:* AE 304.

AE 408

Turbine and Rocket Engines (3,0)

3 Credits

A study of gas turbine and rocket engines. Topics include control volumes, conservation equations, combustion processes, efficiencies, fuel consumption, nozzle flow, diffusers, ideal and real ramjets, gas turbine engines, performance of rocket vehicles, and solid and liquid propellant rocket motors. *Prerequisite:* AE 302.

AE 409

Aircraft Composite Structures (3,1.5)

3 Credits

Introduction to reinforced plastic composite structural materials and their use in modern aircraft. Discussion of basic material properties, testing procedures, design and analysis using classical lamination theory, and fabrication techniques, including some hands-on demonstrations.

Prerequisites: ES 202, ES 320.

### AE 411

Advanced Experimental Aerodynamics (2,3) 3 Credits

This course consists of a series of advanced experiments using a wind tunnel. Topics include model design and construction, testing procedures, control surface testing, propeller testing, the use of wind tunnel data, scale effects, complete model testing, and an introduction to supersonic testing.

Prerequisite: AE 314.

### AE 413

Airplane Stability and Control (3,0)

3 Credits

Development of longitudinal, lateral, and directional stability and control equations. Control surface design. Control effectiveness and size requirements. Dynamic control theory. Handling characteristics and maneuvering stability of aircraft.

Prerequisite: MA 345.

Corequisite: AE 302.

### AE 414

Space Propulsion (3,0)

3 Credits

The course provides the student with an introduction to the basic principles of liquid and solid propulsion systems. Flight performance parameters are presented for single and multistage vehicles. The thermo-chemistry of the combustion process will also be discussed. Performance enhancements of nuclear rockets and electric propulsion will be covered.

Prerequisites: AE 301 and ES 305.

#### AE 415

In-Flight Laboratory (3,1.5) 3 Credits

Development of longitudinal and lateral-directional, static and dynamic stability and excess power, rate of climb, turn rate, and load factor performance theory, with laboratory concept validations.

Prerequisite: AE 413.

### AE 416

Aerospace Structures and Instrumentation (1,0) 1 Credit

Lecture-based course to support the Structures and Instrumentation Laboratory. Course emphasizes aerospace vehicle testing through instrumentation, data acquisition, and data reduction. Test plans and design are utilized. The Structures and Instrumentation Laboratory, AE 417, must be taken during the same semester as AE 416.

Prerequisites: COM 221, ES 202, EE 335.

### AE 417

Aerospace Structures and Instrumentation Laboratory (0,3)

1 Credit

Principles of modern aerospace vehicle testing and instrumentation. Basic electrical measurements and devices such as strain gages, piezoelectric sensors, and thermocouples. Topics could include measurement of fluid pressure and flow; temperature; thermal and transport properties; strain; motion; vibration; force and torque. Experimental static and dynamic analysis of structures. Processing and analyzing experimental data; report writing and data presentation. The Structures and Instrumentation Laboratory, AE 417, must be taken during the same semester as AE 416.

Prerequisites: COM 221, ES 202, EE 335.

#### AE 420

Aircraft Preliminary Design (3,3)

4 Credits

Airplane conceptual design principles are developed to meet modern aerodynamic, propulsion, structural, and performance specifications. A complete airplane is designed, resulting in a design package consisting of specifications, aerodynamic calculations, inboard profile drawing, weight and balance, general arrangement drawing, aerodynamic drag analysis, and complete performance report.

Prerequisites: AE 314, AE 413.

#### AE 421

Aircraft Detail Design (3,3)

4 Credits

Principles of aircraft detail and component part design, manufacture, and production are covered along with projects to give actual experience in the design of aircraft components. Carries the design of an airplane from the general layout to the design of its detail parts and the design of necessary tools. *Prerequisites:* AE 404, AE 420.

### AE 425

Aircraft Acoustics and Noise Control (3,0) 3 Credits

Sound wave characteristics, levels, and directivity. Hearing and psychological effects of noise. Noise control criteria and regulations. Instrumentation. Noise sources. Acoustics of walls, barriers, and enclosures. Acoustical materials and structures. Noise characteristics of jet and propeller aircraft, including helicopters.

Prerequisite: AE 301.

### AE 426

Spacecraft Attitude Dynamics (3,0) 3 Credits

Fundamentals of spacecraft attitude dynamics. Three-dimensional rigid-body kinematics. Stability and dynamics of symmetric and tri-inertial bodies. Attitude, nutation, and spin-control maneuvers for spin-stabilized spacecraft. Effects of energy dissipation. Momentum-biased spacecraft dynamics. Stability, modeling, and simulation of spin-stabilized and momentum-biased spacecraft. Elements of threeaxis stabilized spacecraft. Effects of gravity gradient, solar radiation pressure, atmospheric drag, and magnetic torque on spacecraft attitude.

Prerequisites: AE 313, MA 345.

#### AE 427

Spacecraft Preliminary Design (3,3)

4 Credits

Spacecraft preliminary design principles are developed to meet mission objectives. A complete spacecraft is designed, resulting in a design package consisting of specifications; calculations; CAD drawings; weight and various subsystem budgets; and a series of trade studies, reviews, and design reports.

*Prerequisites: AE* 313, *EP* 394, or instructor consent. *Corequisite: AE* 426 or instructor consent.

### AE 430

Control Systems Analysis and Design (3,0) 3 Credits

Modeling, analysis, and control of dynamical systems with aerospace applications. Transfer functions, block diagram algebra. Routh Hurwitz stability criteria. Introduction to system design using root locus, Bode and Nyquist diagrams.

Prerequisites: EE 335, MA 345.

### AE 432

Flight Dynamics and Control (3,0) 3 Credits

Aircraft equations of motion. State variable representation of the equations of motion. Longitudinal motion (stick fixed) and lateral motion (stick fixed). Aircraft response to atmospheric inputs. Automatic control theory. Application of classical and modern control theory to aircraft autopilot design.

Prerequisites: MA 345, AE 413.

### AE 433

Aerodynamics of the Helicopter (3,0)

3 Credits

The development of rotating-wing aircraft and the helicopter. Hovering theory and vertical flight performance analysis. Auto-rotation, physical concepts of blade motion and control, aerodynamics and performance of forward flight. Blade stall, stability, and vibration problems. Design problems.

Prerequisites: AE 302, MA 441.

#### AE 434

Spacecraft Control (3,0)

3 Credits

A review of spacecraft equations of motion and state variable representation of the equations of motion. Automatic control theory, the classical approach as well as the modern control approach. Attitude control with thrusters, attitude control with reaction wheels, and attitude stabilization with spin. Attitude control during thrust maneuvers. Control of translational motion.

*Prerequisite: MA* 345. *Corequisite: AE* 426.

#### AE 435

Air-Breathing Propulsion Preliminary Design (3,3) 4 Credits

This course is concerned with the preliminary design, subject to specifications, of an air-breathing engine for aircraft propulsion. A complete engine is designed and presented with proposed engine layout, cycle calculations, installed performance, and engine sizing information. Calculations demonstrating that the proposed engine satisfies requirements are also presented. *Corequisite:* AE 408 or permission of the instructor.

### AE 440

Air-Breathing Propulsion Detail Design (3,3) 4 Credits

This course is concerned with the design of the various components of an air-breathing engine, starting with the general layout. The students are grouped into teams and each team is charged with the design of a major component (inlet, fan, compressor, combustor, turbine, nozzle, support systems). The components are then integrated to verify that they function together.

**Prerequisite:** AE 435 or permission of the instructor.

### AE 445

Spacecraft Detail Design (3,3)

4 Credits

Principles of spacecraft detail and subsystem design, analysis, modeling, manufacture, and test are covered and incorporated into projects to give actual experience in the detail design and integration of spacecraft subsystems and systems. Integration of multiple subsystems into a single functional model is a key component of the course.

*Prerequisites: AE* 304, *AE* 426, *AE* 427, *AE* 430, or consent of instructor.

### AE 299, 399, 499

Special Topics in Aerospace Engineering

1-6 Credits

Individual independent or directed studies of selected topics in aerospace engineering.

**Prerequisite:** Consent of instructor and the department chair. May be repeated with a change of content.

# Aerospace Electronics

### AEL 311

Airborne Pulse Systems (3,0) 3 Credits

A technical study of airborne pulse systems to include distance-measuring equipment and secondary radar to include their operation and support. *Prerequisites: EL* 301, *EL* 303, *and EL* 307. *Corequisite: AEL* 313.

### AEL 312

Airborne Communications and Navigation Systems (3,0)

3 Credits

A technical study of communications and navigation systems to include their operation and support. *Prerequisites: EL 301, EL 303, and EL 307. Corequisite: AEL 313.* 

### AEL 313

Airborne Electronics Maintenance Operations (0,6)

2 Credits

A practical application of theory to the test, evaluation, and support of airborne electronics systems. *Prerequisites: EL* 301, *EL* 303, *and EL* 307. *Corequisites: AEL* 311 *and AEL* 312.

### AEL 315

Linear Systems and Signals Analysis (3,0)

3 Credits

An intensive study of linear electronic circuits and signals using practical, theoretical, and mathematical approaches. Topics include time and frequency domain analysis of discrete and continuous time systems, and the use of the Fourier, Laplace, and Ztransforms to analyze and design these systems for communications and aerospace electronics applications.

Prerequisites: EL 307, MA 245, and PS 250.

### AEL 316

Elements of Engineering Design and Laboratory Procedures (2,3)

3 Credits

This course is intended to familiarize the student with various theoretical and empirical design procedures including CAD/CAE to translate these designs into laboratory breadboard hardware and to observe and practice acceptable laboratory investigative procedures. The student will be required to provide and use an engineering laboratory notebook throughout this course. Project documentation will include a final, scholarly, written engineering report.

*Prerequisite:* EL 307. *Corequisite:* AEL 315.

### AEL 321

Advanced Communications Systems

### Analysis (4,0)

4 Credits

An advanced course in communications techniques. Topics include modulation, filtering, distortion, spectral density and correlation, digital coding, random processes, noise, and optimization with aerospace applications.

Prerequisites: AEL 315 and AEL 316. Corequisites: AEL 322, AEL 323, and AEL 324.

### AEL 322

Advanced Communications, Microwave, and Control Systems Analysis Laboratory (0,3)

1 Credit

The practical application of communications, microwave, and control system theory using applicable hardware and software.

Corequisites: AEL 321, AEL 323, and AEL 324.

### AEL 323

Applied Control System Analysis (2,0)

2 Credits

An intensive study of linear feedback control systems using established analytical approaches. Topics include system designation, response, stability, and compensation techniques with electronic and aircraft applications.

Prerequisite: AEL 315.

Corequisites: AEL 321, AEL 322, and AEL 324.

### AEL 324

Microwave and Radar System Analysis (2,0) 2 Credits

An advanced course in microwave theory and radar with application to airborne systems.

Prerequisite: AEL 315.

Corequisites: AEL 321, AEL 322, and AEL 323.

### AEL 401

Airborne Surveillance Systems (3,0)

3 Credits

A technical study of airborne surveillance systems to include their operation and support. *Prerequisites: AEL* 311 *and AEL* 312.

### AEL 402

Airborne Electronics System Integration (3,0) 3 Credits

A technical study of airborne system integration to include system operation and support. *Prerequisites: AEL 311 and AEL 312. Corequisite: AEL 401.* 

### AEL 403

Advanced Space and Airborne Electronics Systems (3,0)

3 Credits

A technical study of space and airborne electronic systems to include their operation and support. *Prerequisites: AEL* 311, *AEL* 312.

### AEL 404

Airborne Electronics Maintenance Operations II (0,6)

2 Credits

An advanced study of support operations for airborne electronics systems to include practice, installation, regulation, and maintenance techniques.

Prerequisite: AEL 313. Corequisites: AEL 401, AEL 402, and AEL 403.

### AEL 411

Communication and Navigation Systems (3,0)

3 Credits

A comprehensive study of airborne electronics communications and navigation systems to include their design and operation.

Prerequisites: AEL 321, AEL 323, and AEL 324.

#### AEL 412

Surveillance and Control Systems (3,0)

3 Credits

A comprehensive study of airborne surveillance and control systems to include their design and operation.

Prerequisites: AEL 321, AEL 323, and AEL 324.

#### AEL 413

Satellite Communications and Navigation Systems (4,0)

#### 4 Credits

A comprehensive study of satellite navigation and communication systems to include their design, operation, and application. *Prerequisite: AEL* 321.

#### AEL 414

System Test and Evaluation Laboratory (0,3) 1 Credit

A familiarization with state-of-the-art test systems used in the evaluation of airborne electronic components and systems.

Corequisites: AEL 411 and AEL 412.

#### AEL 421

Aerospace Electronic System Integration and Design (3,0)

3 Credits

Design applications in aerospace electronic system integration in current airborne vehicles. Subjects include package design, vehicle mainframe effects on design, FAA regulations and certification, agencies involved in the design, licensing, and standardization of aerospace systems, and manufacturer specifications.

Prerequisites: AEL 411, AEL 412, and AEL 413.

#### AEL 422

Integrated Logistics Support (3,0) 3 Credits

An intensive study of logistics engineering in aerospace. Study to include reliability, maintainability, and product support engineering.

Prerequisite: MA 412.

#### AEL 423

Test System Development Laboratory (0,3) 1 Credit

A familiarization with test and evaluation system development for airborne systems using industryapplicable generic test hardware and software. *Prerequisites: AEL* 411, *AEL* 412, *and AEL* 414. *Corequisites: AEL* 421.

#### AEL 424

Senior Project (2,2)

3 Credits

Capstone project that includes the use of theory and practice learned to design and implement a space or airborne electronic system.

Prerequisite or corequisite: AEL 421.

# Aviation Environmental Science

### AES 330

Environmental Consulting (3,0)

3 Credits

Today's industries, including the aviation industry, are under the umbrella of federal and state regulations dealing with a variety of environmental issues. One aspect of these regulations is an EA (Environmental Assessment), which is part of the NEPA (National Environmental Protection Act) regulations. This process will be examined and used to analyze local and regional projects.

#### AES 406

Environmental Management (3,0)

3 Credits

This course focuses on the development of an environmental management plan. Today much of the environmental work in corporations, including the aviation industry, is carried out in projects. The management of these projects starts with the development of proposals, funding sources, tasks, and timeline. Employees at a variety of levels are required to help manage projects, so terms and organizational contents will be covered.

# Air Force Aerospace Studies

### AF 101

The Foundation of the U.S. Air Force (General Military Course) (1,0)

1 Credit

A survey course designed to introduce students to the U.S. Air Force and Air Force Reserve Officer Training Corps. Featured topics include mission and organization of the Air Force, officership and professionalism, military customs and courtesies, Air Force officer career opportunities. Leadership Laboratory is mandatory for Air Force ROTC cadets and complements this course by providing cadets with followership experiences.

Corequisite: AF 101L.

#### AF 102

The Foundation of the U.S. Air Force (1,0) 1 Credit

Continuation of AF 101. Topics include Air Force core values, leadership principles, group leadership dynamics, and an introduction to communication skills. A weekly Leadership Laboratory is mandatory. *Corequisite:* AF 102L.

AF 101L/AF 102L

Leadership Laboratory (0,2)

0 Credit

Consists of Air Force customs, courtesies, leadership, teamwork, field training orientation, drill, and ceremonies. Includes a mandatory physical fitness program. These courses are graded Pass/Fail.

#### AF 201

The Evolution of USAF Air and Space Power (General Military Course) (1,0)

1 Credit

The AF 201 course is designed to examine the aspects of air and space power through a historical perspective. Using this perspective, the course covers a time period from the first balloons and dirigibles to the Air and Space applications employed at the beginning of the Cold War. Historical examples are studied to extrapolate the fundamentals of air power, including the tenets of air and space power, principles of war, and Air Force competencies, functions, and doctrine. In addition, the students will continue to discuss the importance of the Air Force core values, through the use of operational examples and historical Air Force leaders, and will continue to develop their communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

### AF 202

The Evolution of USAF Air and Space Power (General Military Course) (1,0)

1 Credit

Continuation of AF 201. This course continues to explore Air Force history, beginning with the Vietnam era and culminating with the modern air and space applications employed during Operations Iraqi and Enduring Freedom. A weekly Leadership Laboratory is mandatory.

Corequisite: AF 202L.

### AF 201L/AF 202L

Leadership Laboratory (0,2)

0 Credit

Consists of Air Force customs, courtesies, leadership, teamwork, drill, ceremonies, and field training orientation. Includes a mandatory physical fitness program. These courses are graded Pass/Fail.

#### AF 301

Air Force Leadership Studies (Professional Officer Course) (3,0)

3 Credits

A study of leadership, management fundamentals, professional knowledge, Air Force personnel evaluation systems, leadership ethics, and the communication skills required of an Air Force junior officer. Case studies are used to examine Air Force leadership and management situations as a means of demonstrating and exercising practical applications of the concepts being studied. A mandatory Leadership Laboratory complements this course by providing advanced leadership experience in officer-type activities, giving students the opportunity to apply the leadership and management principles of this course.

#### AF 302

Air Force Leadership Studies (Professional Officer Course) (3,0)

3 Credits

Continuation of AF 301. A weekly Leadership Laboratory is mandatory. *Corequisite: AF* 302*L*.

#### AF 301L/AF 302L

Leadership Laboratory (0,2)

0 Credit

Provides advanced leadership experience in officer-type activities, giving students the opportunity to apply leadership and management principles. Includes a mandatory physical fitness program. These courses are graded Pass/Fail.

**Prerequisites:** Completion of the General Military Course or Two-Year Program selection and/or approval of the professor of Aerospace Studies.

### AF 401

Preparation for Active Duty (Professional Officer Course) (3,0)

3 Credits

Examines the national security process, regional studies, advanced leadership ethics, and Air Force doctrine. Special topics of interest focus on the military as a profession, officership, military justice, civilian control of the military, preparation for active duty, and current issues affecting military professionalism. Continued emphasis is given to the refinement of communication skills. An additional Leadership Laboratory complements this course by providing advanced leadership management principles. *Coreauisite: AF 401L.* 

#### AF 402

Preparation for Active Duty (Professional Officer Course) (3,0)

3 Credits

Continuation of AF 401. A weekly Leadership Laboratory is mandatory. *Corequisite: AF* 402*L*.

#### AF 401L/AF 402L

Leadership Laboratory (0,2)

0 Credit

Provides advanced leadership experiences in officer-type activities, giving students the opportunity to apply leadership and management principles. Includes a mandatory physical fitness program. These courses are graded Pass/Fail.

**Prerequisites:** Completion of the General Military Course or Two-Year Program selection and/or approval of the professor of Aerospace Studies.

### AF 403L/AF 404L

Leadership Laboratory (0,2)

0 Credit

Mandatory. Provides advanced leadership experiences in officer-type activities. Includes a mandatory physical fitness program.

**Prerequisites:** completion of the POC. These courses are graded Pass/Fail.

# Aviation Maintenance Science

The Aviation Maintenance Science courses are taught on an "A" and "B" term basis every semester of the year. For this reason, the hours shown for weekly class and lab time will be noticeably higher than for other courses in this catalog.

### AMS 101

Maintenance Mathematics and Physics (10,0) 2 Credits

The fundamentals of mathematics and physics as applied to an aviation format that includes technical math (fractions, decimals, ratio, geometry, formulae, and proportions) and basic concepts of aviation applied physics (atmospheric properties, thermodynamics, fluid power, heat, power, work, machines, and sound).

### AMS 102

Aircraft Familiarization (10,0)

2 Credits

Theory of aerodynamics and corrosion control involving the physical properties necessary as well as the types of structures and airplanes they are found in is discussed along with the associated safety procedures and aircraft ground operations found in today's aviation profession.

### AMS 103

Tools, Materials, and Processes (8,7) 2 Credits

Credits The development of skills in the use of basic mechanic's hand tools, hardware, safety methods, and the fabrication and installation of fluid lines and fittings through the introduction of tools, hardware, and materials used in aircraft maintenance and repair. Also, various methods of nondestructive testing are studied and applied to various practical situations.

### AMS 111

Regulations, Documentation, and Drawing (15,0) 3 Credits

A presentation of the privileges and limitations of the FAA's Federal Aviation Regulations (FAR) Parts 43, 65, and 91 pertinent to aircraft maintenance and the associated documents, publications, and records applicable to the maintenance technician. Also included is weight and balance for aircraft. Also introduced is basic mechanical drawing and blueprint reading for the technician.

### AMS 112

Fundamentals of Electricity (8,7)

3 Credits

An introduction to direct and alternating current electricity, electrical circuit design and measuring devices, transformers, and electronic devices and applications. Emphasis will be on voltage, current, resistance, and impedance relationships. Lectures are reinforced with laboratory projects.

### AMS 121

Electrical Power Systems I (5,5)

2 Credits

The theory behind aircraft wiring, basic electrical lighting in airframe systems, and DC electrical power systems, generators, and batteries is developed in depth through the use of laboratory projects and classroom material.

Prerequisite: AMS 112.

### AMS 122

Metallic Structures (10,10)

2 Credits

A study of aircraft metallic structures with emphasis on aluminum sheet metal applications and their manufacture, repair, and inspection. Through an intensive lab project and in-depth theory discussions, the student will come to understand metal-working processes and skills necessary for airworthy manufacture and repair. Also included are aircraft painting and finishing materials.

Prerequisites: AMS 101, AMS 102, AMS 103, AMS 111.

#### AMS 123

Instruments and Avionics (8,2)

#### 2 Credits

An overview of current aviation electronic systems (avionics), electromechanical instrumentation, and antenna installation practices. Additional theory of today's electronic instruments and flight management systems, including autopilot, will also be discussed.

Prerequisites: AMS 102, AMS 112.

### AMS 131

Composite Materials and Processes (6.5,6) 2 Credits

The fabrication, repair, finishing, and safety practices relating to plastic, composite, wood, and fabric materials found in current structural applications on aircraft. Labs involve the student with component manufacturing, repair, and inspection through the application of plastic resins and adhesives to common composite materials, vacuum bagging, and light nondestructive inspection of composite parts. *Prerequisites:* AMS 102, AMS 103, AMS 111.

### AMS 132

Aircraft Systems I (6.5,6)

2 Credits

Classroom theory and practical application will involve the operating, service, and line maintenance of heating, cooling, pressurization, oxygen, fire warning, and various fuel systems found in current regional jets.

*Prerequisites: AMS* 101, *AMS* 102, *AMS* 103, *AMS* 111, *AMS* 112.

### AMS 133

Aircraft Systems II (8,7)

2 Credits

Operating principles and basic troubleshooting techniques for hydraulic and pneumatic components and systems will be discussed in the class, with practical lab situations for reinforcement. Component maintenance, repair, and overhaul will be emphasized for landing gear, anti-skid, and braking systems found in today's turbine-powered aircraft.

Prerequisites: AMS 102, AMS 103, AMS 112.

### AMS 242

Airframe Maintenance Practices (9,8.5) 3 Credits

The application of FAA type certificate data sheets, aircraft records, maintenance publications, and Federal Regulations pertinent to airframe inspections that are required by both general and commercial aviation aircraft are covered in theory and applied on Embry-Riddle flight line aircraft. This includes rigging and assembly techniques that are found in current general aviation and jet type aircraft. Also included are basic welding techniques and welding repairs, gas and electric.

Prerequisites: AMS 103, AMS 111, AMS 112.

#### AMS 243

Electrical Power Systems II (9,8.5)

3 Credits

The maintenance, repair, and overhaul of electrical power system components and advanced aircraft electrical systems are addressed in the classroom and the laboratory. Jet-type aircraft systems found in current production aircraft are covered through classroom and computer-based instruction.

Prerequisites: AMS 103, AMS 111, AMS 121.

#### AMS 251

Introduction to Powerplants (8,7)

2 Credits

Reciprocating engine disassembly, inspection, and reassembly procedures are practiced in the lab. In the classroom the study of the theory of these procedures and techniques for reciprocating aircraft engine components and their operation are discussed with emphasis on the design, FAA regulations, and mechanic limitations found in the aviation industry. *Prerequisites: AMS* 101, *AMS* 102, *AMS* 103, *AMS* 111.

#### AMS 252

Fuel, Air, and Exhaust Systems (5,5) 2 Credits

Provides an in-depth study of reciprocating engine fuel metering and distribution, superchargers, heat exchangers, and exhaust manifolds, which are applied to the maintenance, repair, and overhaul of operating reciprocating engine components. Fuel control units and their system operation as it pertains to jet aircraft are also covered.

Prerequisites: AMS 102, AMS 103, AMS 111.

### AMS 253

Powerplant Electrical Systems (6.5,6) 2 Credits

The operating principles of the powerplant ignition system and components found on reciprocating and turbine engine powered aircraft are covered. Included are various powerplant electrical systems: fire detection and extinguishing, DC twin generator systems, and AC generator systems. Auxiliary power units, their operation, and their components are discussed in depth, with the emphasis on systems theory technology. Lab work covers the maintenance, repair, and overhaul of a magneto.

*Prerequisites:* AMS 101, AMS 102, AMS 103, AMS 111, AMS 112, AMS 121.

### AMS 361

Turbine Engines (10,12.5)

3 Credits

A study of the construction and design of modern gas turbine engines used in the current generation of airplanes and helicopters. Turbine engine systems will be studied, including lubrication, fuel scheduling, starting, and ignition. Heavy emphasis will be placed on maintenance, repair, inspection, and troubleshooting techniques.

Prerequisites: AMS 251, AMS 253.

### AMS 362

Propeller Systems (7.5,7.5)

3 Credits

Maintenance, repair, and overhaul theory and practices on propellers and their system components is covered as it pertains to reciprocating and turboprop engines found in today's regional aircraft.

*Prerequisites:* AMS 101, AMS 102, AMS 103, AMS 111, AMS 121.

### AMS 371

Powerplant Inspection and Line Maintenance (10,10)

3 Credits

Operational maintenance and troubleshooting procedures for reciprocating powerplants and powerplant systems are studied in a "real" environment using the 12 engine test stands found on the flight line. Students get hands-on turboprop engine time with the PT-6 and the Garrett 331 operational test stands also found on the flight line.

*Prerequisites:* AMS 121, AMS 251, AMS 252, AMS 253, AMS 362.

### AMS 372

Engine Maintenance, Repair, and Overhaul (10,7.5)

3 Credits

Under the auspices of the FAA Repair Station organization, the student will find invaluable the real learning situation in this lab. The practical and theoretical side is supported through classroom interaction and includes the study of the procedures and acceptable techniques used in engine disassembly, inspection, repair, and reassembly. The use of advanced techniques of nondestructive testing and the recording and return-to-service procedures necessary are covered.

Prerequisites: AMS 251, AMS 253.

#### AMS 380

Radio Communication Theory and Application (2,0) 2 Credits

This course is designed to increase previously learned electronics theory obtained during the course of study toward the A&P certificate or formal basic electronic theory classes. Upon completion of this course the student will be able to pass the FCC General Radio Telephone Examination (Elements 1 & 3).

**Prerequisites:** AMS 112, AMS 121, AMS 243, or A&P Certificate.

### AMS 384

General Aviation Avionics Systems Integration 4 Credits

This course is a study of aviation electronic equipment with hands-on wiring and system testing. Emphasis will be placed on avionics system installation and the block diagrams of individual appliances. Complete wiring of an Allied Signal Silver Crown avionics suite and a GPS unit is a requirement of the class. Upon completion of this course, the student will be able to understand the operation, testing, and troubleshooting of general aviation avionics systems and wiring concepts.

**Prerequisites:** AMS 112, AMS 121, AMS 243, or A&P Certificate.

### AMS 388

Air Transport Avionics Systems Line Maintenance 6 Credits

This course is an advanced course in aircraft wiring and air transport avionics systems with hands-on wiring and testing. This is the capstone course of the AMS 380 to 388 series and will concentrate on corporate and airline maintenance and troubleshooting. Included in this effort will be the use of advanced ramp test equipment and wiring concepts. **Prerequisites:** AMS 112, AMS 121, AMS 243, or A&P Certificate.

# Aeronautical Science

Note for Prescott Campus: Enrollment in the following courses is restricted to students in the Aeronautical Science degree program unless approved by the Aeronautical Science and Flight Department Chairs: AS 121, AS 221, AS 321.

### AS 120

Principles of Aeronautical Science (3,0) 3 Credits

An introductory course in Aeronautical Science designed to provide the student with a broad-based aviation orientation in flight-related areas appropriate to all non-Aeronautical Science degree programs. Subjects include historical developments in aviation and the airline industry, theory of flight, airport operations, aircraft systems and performance, elements of air navigation, basic meteorology theory, air traffic principles, flight physiology, and aviation regulations and safety. Not available to Aeronautical Science students or to students with FAA flight certificates.

### AS 121

Private Pilot Operations (5,0)

5 Credits

This course develops aeronautical knowledge required for certification as a Private Pilot with an Airplane Single Engine Land rating. Topics include regulations, safety, pre-solo operations, cross-country planning, airspace, chart use, communications, weather, performance, weight and balance, aerodynamics, and decision-making.

Co-requisite: ASC 101 (Air Science students).

#### AS 142

Private Helicopter Operations (3,0)

#### 3 Credits

During this course the student obtains the foundation for all future helicopter aviation training. The student will be introduced to helicopter fundamentals of flight and will become familiar with basic flight maneuvers and operating procedures. Emphasis will be placed on developing a safe and competent pilot who is adequately prepared for solo, cross-country, and night operations. The student will receive training in safety awareness, crew resource management, and aeronautical decision-making. By the end of the course, the student will have met the aeronautical knowledge requirements to take the FAA Private Pilot, Rotorcraft-Helicopter, written knowledge test.

#### AS 221

Instrument Pilot Operations (3,0)

#### 3 Credits

This course develops aeronautical knowledge required for addition of an Instrument Airplane rating to a Private Pilot certificate. Topics include instrument flying regulations, safety, operations, navigation systems, chart use, weather, flight planning, decisionmaking, and crew resource management.

Prerequisite: AS 121.

#### AS 252

Instrument Helicopter Operations (3,0)

3 Credits

This course will examine helicopter instrument flying in the National Airspace System below 18,000 feet. Topics to be covered include Federal Aviation Regulations, helicopter performance for instrument flight, instrument approach procedures, weather related to instrument flying, en route navigation, and the elements of resource management. By the end of the course, the student will have met the aeronautical knowledge requirements to take the FAA Instrument, Rotorcraft-Helicopter written knowledge test.

**Prerequisite:** AS 142 or FAA Private Pilot Certificate with Rotorcraft-Helicopter Rating.

#### AS 254

Aviation Legislation (3,0)

3 Credits

This course examines the evolution of federal civil aviation regulations in the United States. It provides an overview of the past and present problems prompting regulation of the industry, the resultant safety legislation, airport development funding legislation, and international aviation legislation.

### AS 309

Aerodynamics (3,0)

3 Credits

Incompressible flow airfoil theory, wing theory. Calculation of stall speed, drag, and basic performance criteria. Configuration changes, high and low speed conditions. Special flight conditions. Introduction to compressible flow. *Corequisite:* PS 104.

### AS 310

Aircraft Performance (3,0) 3 Credits

Aerodynamic performance of aircraft powered by reciprocating, turboprop, or jet turbine engines. Stability and control, weight and balance and operating data.

*Prerequisite: AS* 309. *Corequisite: AS* 311.

### AS 311

Aircraft Engines-Turbine (3,0)

3 Credits

A comprehensive study of aircraft gas turbine engine fundamentals and theory at the technical level. Areas of study include background, types, variations, and applications; engine theory; construction and design; systems and accessories; representative engines. *Corequisite:* PS 104.

### AS 313

Resource Management-An Instrument Pilot Perspective (1,0)

1 Credit

A review of the fundamentals of resource management followed by application to the single-pilot IFR environment. Includes classroom exercises allowing student demonstration and practice of basic resource management theory. Includes preview/perspective of future resource management training.

Prerequisites: AS 213, FA 251.

Corequisite: FA 304.

#### AS 320

Commuter Aviation (3,0)

3 Credits

This course acquaints the student with the development, administrative policies, and operational factors peculiar to commuter aviation, especially since passage of the Airline Deregulation Act of 1978. The impact of mergers and acquisitions, profiles of passenger and cargo carrying commuters, and analysis of commuter successes and failures are discussed. Emphasis is placed on the establishment of a new commuter airline, which includes market and financial analysis, the company plan, aircraft selection and acquisition, route structure and timetable, marketing strategy, and pertinent regulatory requirements. The course culminates in a formal proposal soliciting for venture capital to start a commuter airline.

#### Prerequisite: BA 201.

### AS 321

Commercial Pilot Operations (3,0)

3 Credits

This course develops aeronautical knowledge required for certification as a Commercial Pilot with Single and Multi-Engine Land ratings. Topics include multi-engine flying in VFR and IFR environments, including high altitude, night, winter, and mountain. Topics also include regulations, safety, weather, aerodynamics, weight and balance, performance, aircraft systems, navigation facilities, chart use, and decisionmaking.

Prerequisite: AS 221.

### AS 340

Instructional Design in Aviation (3,0)

3 Credits

The application of the method of scientific inquiry to the process of instruction in aviation is presented. This means the systematic design of instruction, based on knowledge of the learning process, taking into account as many factors about the particular situation as possible. Special emphasis will be placed on examining instructional problems and needs in aviation, setting a procedure for solving them, and then evaluating the results.

**Prerequisite:** Commercial Pilot Certificate with Instrument Rating.

### AS 346

Advanced Navigation (3,0)

3 Credits

This course continues the flight planning and navigation procedures started in AS 246. It brings the student into long-range IFR operations. Planning, FAR Part 121 regulations, routes, oceanic procedures, instrument approach procedures, and emergency considerations are applied to U.S. and international operations. The student is introduced to groundbased radar surveillance and the Global Positioning System.

Prerequisites: AS 246, AS 310.

#### AS 350

Domestic and International Navigation (3,0)

3 Credits

This course will study FAR Part 121 domestic and flag regulations and evaluate their impact on longrange domestic and international flights. The student will be able to use ICAO, JAA, and FAA operational requirements and typical air carrier Ops SPECS to plan domestic and transoceanic flights. CBT simulation programs may be used as necessary to demonstrate actual flight scenarios. High-altitude airspace, navigation, and approach procedure chart interpretation will be examined in detail. Students will study and use the concepts of MNPS and RVSM airspace, dispatch procedures, ETOPS, ETP, driftdown, track messages, LRN accuracy checks, Oceanic Air Traffic Control clearances, international METARs and TAFs and emergencies and contingencies while on oceanic tracks. Communication systems requirements and methodology will be examined to include satellite, digital, and analog devices.

Prerequisites: AS 310 and AS 221 or Instrument Rating.

#### AS 356

Aircraft Systems and Components (3,0) 3 Credits

A comprehensive study of aircraft systems and components at the technical level. Areas of study include aircraft electrical, hydraulic, fuel, propeller, and auxiliary systems including theory of operation, calculations, and related Federal Aviation Regulations.

Prerequisite: PS 104.

#### AS 357

Flight Physiology (3,0)

3 Credits

Aeromedical information. Causes, symptoms, prevention, and treatment of flight environment disorders. Altitude effects, spatial disorientation, body heat imbalance, visual anomalies, and psychological factors are included as they relate to pilot performance and survival effectiveness.

Prerequisite: Sophomore standing.

#### AS 358

Advanced Avionics (3,0)

3 Credits

The student will be taught the electronic characteristics of communications, navigation, and surveillance equipment both on the ground and in the aircraft. This will include historical information leading to the current systems. Systems and concepts taught will include ADF, VOR, INS, IRS, GPS, ILS, VHF and UHF communications, SATCOM, ACARS, TCAS, EGPWS, transponders (Mode A, C, and S), ADS and ADS-B, TLS, free flight and weather radar. Since this area is very dynamic, new systems will be introduced as they are designed and perfected.

Prerequisite: AS 221 or Instrument Rating.

#### AS 372

Commercial Helicopter Operations (3,0) 3 Credits

The student will develop an in-depth knowledge of helicopter components, functions, systems, aerodynamics, and performance at the commercial pilot level. The student will also gain necessary knowledge on en route flight to include weather, navigation, and regulations. By the end of the course, the student will have met the aeronautical knowledge requirements to take the FAA Commercial Pilot, Rotorcraft-Helicopter written knowledge test.

**Prerequisite:** AS 142 or FAA Private Pilot Certificate with Rotorcraft-Helicopter Rating.

#### AS 378

Environmental Helicopter Operations (3,0) 3 Credits

During this course, the student obtains the foundation for helicopter operations in terrain flight and in varying environmental conditions. The student will be introduced to aspects particular to helicopter flight as it pertains to adverse weather, day and night environments specifically pertaining to take-off, cruise, and landing. Emphasis will be placed on understanding principles of flight close to the Earth and hazards both natural and man-made. Additional emphasis will be placed on helicopter flight in and around mountains. The student will be exposed to visual references and how to adjust perceptions to maintain safe, low-level flight in and around hazardous conditions present in commercial helicopter operations. By the end of the course, the student will have sufficient knowledge to understand the concepts necessary for employment in the commercial helicopter industry.

Prerequisite: AS 372 or approval of instructor.

#### AS 380

Pilot Career Planning and Interviewing Techniques (1,0)

1 Credit

A course in which students will discuss and develop short-term and long-term job and career goals, conduct career research using various University and industry resources, prepare a personal job search portfolio, prepare resumes and letters of application, and gain insights and proficiency in interviewing skills so they are better prepared to enter the job market upon graduation. Students will participate in simulated interview scenarios, will be expected to correspond with at least one company, and will be involved in the evaluation of letters, resumes, and interviews. This course will be graded Pass/Fail. *Prerequisite: Junior standing*.

#### AS 387

### Crew Resource Management (3,0)

3 Credits

A capstone course designed to develop a detailed understanding of the organizational behavior, interpersonal relationships skills, and other critical behavioral dynamics of professional flight crews. The course builds upon the knowledge of crew resource management (CRM) acquired during the student's private, instrument, and commercial pilot certification training. The history of CRM, CRM concepts of communication processes, problem solving, group dynamics, workload management, and situational awareness will be investigated. Aircraft incidents and accidents related to the evolution of CRM training programs and FAA regulations will be analyzed. Intrapersonal and psycho-motor skills will be addressed as they relate to safe, legal, and efficient flight operations.

Prerequisites: AS 350 and PSY 101.

#### AS 388

Helicopter Flight Planning (3,0)

3 Credits

During this course, the student obtains the foundation for the FARs as they relate to flight planning and navigation for various operations. The student will be able to use regulatory and operations requirements to plan flights. Remote location flight and terrain flight navigation procedures will be studied closely. Cargo planning for internal and/or external loads will also be considered. Communications procedures with internal and external operations nodes during near-ground operations will be discussed. By the end of the course, the student will have sufficient knowledge to understand the concepts necessary for effective flight planning and operation in the commercial helicopter industry.

Prerequisite: AS 372 or approval of instructor.

#### AS 402

Airline Operations (3,0)

#### 3 Credits

A study of the scope and function of a major air carrier's organizational structure and the specific relationships of the operations department with those of marketing, maintenance, and safety are discussed. A study of corporate issues including the industry in general, market structure, certification, FAR Part 121 regulations, economic issues, mergers, corporate culture, and international topics will be included. From an operational perspective, topics include flight operations employment policies, domiciles, operating specifications, types of services provided, training, passenger considerations, decision making, communications, and pertinent FARs.

#### AS 405

#### Aviation Law (3,0)

3 Credits

This course will introduce the advanced student to the U.S. Constitution as well as to federal, state, and local statutes. The student will become familiar with case law and common law and develop an understanding of the chronological development of these laws and their application to aviation. The student will be introduced to civil law, including tort, product liability, contract, sales, secured credit, property, environmental, and labor laws. Criminal statutory law and government, airman, and operator rights and liabilities will also be studied, as well as international laws and conferences.

Prerequisite: Junior standing.

### AS 408

Flight Safety (3,0)

3 Credits

A capstone course designed to assist the student in developing an attitude and philosophy for accident prevention. The course includes ideal and practical, personal and organizational safety procedures and goals; safety philosophies; aircraft accident reports; human factors; principles of accident investigation, accident prevention programs, and accident statistics; current events; and NTSB special studies.

Prerequisite: Senior standing.

#### AS 410

Airline Dispatch Operations (3,0)

3 Credits

This capstone course includes a review of pertinent Federal Aviation Regulations, navigation systems and procedures, manual flight planning, emergency and abnormal procedures, the general operating manual, aircraft systems and performance development, human factors, and practical dispatching applications.

#### Prerequisite: AS 310.

**Corequisites:** AT 300, WX 301. (AT 300 and WX 301 are only applicable for those students in the Dispatcher Program.)

### AS 411

Jet Transport Systems (3,0) 3 Credits

This course will provide the student with detailed knowledge of jet transport category aircraft systems. The student will learn how to operate typical jet transport category aircraft systems in both normal and emergency situations.

Prerequisite: AS 356.

#### AS 412

Corporate and Business Aviation (3,0) 3 Credits

Operation of a corporate flight department. Value of management mobility. Aircraft and equipment evaluation, maintenance, flight operations, administration, fiscal considerations.

#### AS 413

Resource Management-The Crew Perspective (1,0) 1 Credit

A brief historical overview of crew resource management followed by a study of recent major and regional carrier accidents and direct application of crew resource management fundamentals that were used or not used. Classroom team exercises allow student demonstration and practice of basic resource management theory, specifically applied to the threeperson crew of a Boeing 727. Additionally, students are challenged with crew resource management theory applications by the major carriers today and applications to each student's private life and career.

*Prerequisites: AS* 313, *FA* 418. *Corequisite: FA* 420.

#### AS 420

Flight Technique Analysis (3,0) 3 Credits

Application of aerodynamic principles to the development of optimal pilot techniques and procedures. Uniform procedures applicable to all airplanes and special procedures for large, high-performance, and transport aircraft are analyzed, including principles of flight deck resource management.

Prerequisites: Daytona Beach AS 310, AS 435.

#### AS 428

FMS/Autopilots for Helicopters (3,0) 3 Credits

During this course, the student studies the principles, systems analysis, operations of flight directors with mechanical, glass cockpits, HUDs, autopilots, automatic flight control systems with auto throttle, altitude hold, heading hold, position hold, stability augmentation devices, and flight management systems.

Prerequisite: AS 372 or approval of instructor.

#### AS 435

Electronic Flight Management Systems (3,0) 3 Credits

This course teaches the theory and principles governing flight with autopilot and flight management systems. Students will apply theory and principles by demonstrating good decisions and thought processes in autopilot and FMS/PC simulators.

Prerequisites: AS 310, AS 350.

Corequisite: AS 358.

#### AS 438

Advanced Helicopter Operations (3,0)

3 Credits

During this course, the student obtains the foundation for advanced and specialized commercial helicopter operations. The student will be introduced to advanced commercial operations and their requirements for the PIC/SIC. Emphasis will be placed on developing a safe and competent pilot who is adequately prepared for flight operations in these areas. This course also focuses on training management, safety management, personnel management, maintenance management, and record keeping. By the end of the course, the student will have sufficient knowledge to understand the concepts necessary for leadership in the commercial helicopter industry.

Prerequisite: AS 372 or approval of instructor.

#### AS 442

Flight Instructor Helicopter Operations (3,0)

3 Credits

The theory and proper techniques of instruction and helicopter private and commercial pilot knowledge will be presented. The student will develop, plan, and give practice instruction on topics for private and commercial pilot helicopter pilots. By the end of the course, the student will have met the aeronautical knowledge requirements to take the Fundamentals of Instruction and CFI-Helicopter written knowledge tests.

**Prerequisite:** AS 252 or FAA Commercial Pilot Certificate and Rotorcraft-Helicopter Rating.

### AS 471

All-Attitude Flight and Upset Recovery

1 Credit

Introduction to all-attitude flight and upset recovery using flight simulation software running on high-performance personal computers. Analysis of selected loss-of-control and controlled-collision-with-ground accidents. Simulated training in inverted flight, lowaltitude steep bank and pitch maneuvers upright and inverted, and aerobatics in a high-performance jet airplane. Study of upset training techniques in a transport-type airplane as taught in several major airline/aircraft manufacturing companies. Simulated upset recovery training in a heavy jet transport aircraft from nose-high and nose-low attitudes at various bank angles.

**Prerequisite:** AS 309, Pilot Certificate with Instrument Rating.

#### AS 199, 299, 399, 499

Special Topics in Aeronautical Science

1-3 Credits

Individual independent or directed studies of selected topics in general aviation.

**Prerequisites:** Consent of instructor and approval of department and program chairs. May be repeated with a change of subject. Special topics courses involving flight training are offered in selected areas for the purpose of gaining proficiency in required pilot operations for various certificates and ratings.

### ASC 101

Aeronautical Science Student Success Seminar (1,0)

1 Credit

This course helps students assess and develop the personal, interpersonal, intellectual, and social skills necessary to succeed in a flight-related college degree program. Topics include time management, study skills, principles of learning, goal clarification, and college resources. Practical applications will emphasize strategies for coping with challenges unique to students in a flight-related degree program.

Corequisite: AS 121 or approval of instructor.

# Air Traffic Control

### AT 300

Air Traffic Management I (3,0)

3 Credits

AT 300 is the entry-level course in the Air Traffic Management (ATM) degree sequence. It is also the first of the courses required in the FAA's Collegiate Training Initiative (CTI) program the FAA is using to meet ATC staffing requirements. This course provides students with a fundamental knowledge of the U.S. air traffic control system and develops content knowledge in the following areas: the Federal Aviation Administration, its mission, organization, and operation; the air traffic control career; navigational aids, current and future; airspace; communications; federal aviation regulations; ATC procedures; control tower operations; nonradar operations; radar operations; and future air traffic control systems. The course also provides essential information that is useful for pilots and other aviation professionals.

Prerequisite: AS 120 or AS 132.

### AT 302

Air Traffic Management II (3,0)

3 Credits

Air Traffic Management II gives the student an introduction to the manuals, procedures, maps, charts, and regulations used by pilots and air traffic controllers in the National Airspace System (NAS). Included is an examination of FAA Orders, the Aeronautical Information Manual (AIM), and Federal Air Regulations (FARs). Students will also acquire basic knowledge about SIDs, STARs, en route IFR charts, and instrument approaches. Search and rescue, special operations, NOTAMS, and teamwork in the ATC environment are also studied in this course.

#### AT 305

Air Traffic Management III (3,0)

3 Credits

This course covers the basic air traffic control (ATC) procedures for instrument flight rules (IFR) in terminal ATC facilities in the National Airspace System (NAS). Knowledge and skill requirements for air traffic control specialists (ATCS) in the current ATC system are studied in the classroom and practiced in a realistic, performance-based laboratory environment. Duties and responsibilities of the Tracon air traffic controller are integrated into an understanding of how the total ATC system works. Classroom delivery is augmented by practical laboratory problems using an air traffic control simulation of terminal radar operations.

Prerequisite: AT 300.

### AT 315

Air Traffic Management-VFR Tower (2.5,1) 3 Credits

AT 315 is the air traffic control VFR Tower segment in the Air Traffic Management (ATM) degree sequence. This course provides students with a fundamental knowledge of VFR Tower terminal operations in the U.S. air traffic control system and develops content knowledge in the following areas: control tower equipment and operating positions; the airport traffic area; navigation aids; airspace; VFR traffic patterns; controller/pilot phraseology; aircraft taxi instructions; control of vehicle movement; interagency communications and intrafacility coordination; federal aviation regulations; notification and handling of emergency aircraft; flight progress strip marking; aircraft recognition and characteristics; limited weather observations; airport lighting systems; wake turbulence and its effects on arriving/departing aircraft; VFR and IFR ATC procedures; runway incursions; using ATIS; reporting RVR/RCR; determining prevailing visibility using visual reference; NOTAMs; and criteria for runway selection. The course also provides essential information that is useful for pilots and other aviation professionals.

Prerequisites: AT 300. Corequisite: AT 315L.

#### AT 315L

Air Traffic Management VFR Tower Laboratory 0 Credits

This laboratory is designed to complement AT 315. *Corequisite: AT* 315.

### AT 401

Air Traffic Management IV (2,3) 3 Credits

This course integrates the knowledge of air traffic control gained in previous air traffic control courses with an opportunity to actually "work" air traffic control operating positions. Using a realistic air traffic control simulation, students issue instructions to aircraft, make hand-offs, coordinate with other controllers, solve aircraft confliction problems, and do other controller tasks. The ability to make "realtime" decisions, determine strategies for controlling aircraft, and working with a dynamic scenario are features unique to this learning experience. This course combines classroom discussion and group and team coordination with various forms of evaluation for course credit. Student competency in the performance phase of the course is determined by computer scoring.

Prerequisites: AT 300, AT 305.

### AT 405

Air Traffic Management V (2,3)

3 Credits

This course expands on the skills, knowledge, and abilities the student has acquired in previous ATC classes. AT 405 presents more demanding and complex traffic scenarios requiring higher-level performance and decision-making skills and prepares the student for initial training in any ATC specialization. Students will also gain an appreciation for the challenges of implementing large-scale changes in the National Airspace System. Upon successful completion of this course, students will demonstrate the knowledge and technical aptitude required for entrylevel qualification as an air-traffic control specialist. *Prerequisites: AT 300, AT 305, AT 401.* 

#### AT 406

#### Air Traffic Management VI

3 Credits

This course introduces students to the non-radar procedures and minima prescribed in FAAH 7110.65 and builds on knowledge gained in prerequisite courses. Training includes the vertical, lateral, and longitudinal separation of aircraft in the departure, en route, and arrival phases of flight. Phraseology, strip marking, instrument/visual approaches, and the coordination procedures necessary to operate in an en route non-radar environment will be covered. Students will work a number of air traffic control scenarios and demonstrate higher-level performance and decision making skills required for entry-level qualification as an air traffic control specialist.

Prerequisites: AT 300, AT 305, AT 401, AT 405.

# Avionics Technology

#### AVT 301

Introduction to Avionics (3,0)

3 Credits

A survey course designed to provide a basic knowledge of electronics with application to avionics for the nonavionics major.

### AVT 330

# Simulation Maintenance Technician (2,3) 3 Credits

This course is an introduction to simulator types, FAA regulations germane to simulators, and actual operation of different types of simulators. Types of display devices, computer languages, support systems, inspection techniques, and troubleshooting procedures will be offered in the classroom and laboratory environment.

*Corequisite: AEL* 311, *AEL* 312, *or permission of the department chair.* 

# **Business Administration**

Standing is based on credit hours earned toward the student's declared degree program.

#### BA 101

Introduction to Business Programs and Careers (3,0)

1 Credit

The student will assess and develop the personal and interpersonal dynamics and intellectual and social demands necessary to succeed in college. Time management, study skills, goal clarification, career concerns, and college resources are included in the course. Different aspects of careers and areas of concentration in business will be discussed in depth. This course is graded Pass/Fail and is available to freshmen only.

#### BA 105

American Business Enterprise (3,0)

3 Credits

The course examines the issues, foundations, and environment of the business enterprise system. Business financing, production, marketing, and employee relations are stressed. Not available to Aviation Business Administration students.

#### BA 120

Introduction to Computer-Based Systems (3,0) 3 Credits

An overview of computing in the business environment, and an introduction to the tools, techniques, and strategies of computer-based information system development. The emphasis is on developing computer literacy through the use of computers in the design and presentation of business communications such as plans, proposals, spreadsheets, graphs, and charts.

### BA 201

Principles of Management (3,0)

3 Credits

Provides an overview of relevant management principles and practices as applied in contemporary organizations. Focuses on management theories, philosophies, and functions.

#### BA 210

Financial Accounting (3,0)

3 Credits

An introduction to accounting information systems and financial reports, including accounting concepts and analysis and interpretation of financial reports with an emphasis on the operating activities of aviation-related businesses.

### BA 212

Advanced Financial Accounting (3,0)

3 Credits

An in-depth study of accounting information systems and financial reports used in a management environment, analyzing and interpreting financial reports with an emphasis on the operating, investing, and financing activities of all types of organizations, including airline and aviation related companies.

**Prerequisites:** Financial Accounting and sophomore standing.

#### BA 221

Advanced Computer-Based Systems (3,0)

3 Credits

This course is a continuation of BA 120. It covers advanced concepts of spreadsheet use, database management systems, and presentation graphics. Students perform macro and command language programming in applications packages. In addition, the course provides experience in locating and retrieving graphical and text-based information from the Internet to support management activities.

Prerequisite: Computer skills.

#### BA 308

Public Administration (3,0)

3 Credits

Characteristics of organization and management in government; impact of political processes and public pressures on administration action; role of regulatory agencies; governmental personnel and budgetary procedures; unique qualifications of the public administrator.

Prerequisites: Management and sophomore standing.

### BA 311

Marketing (3,0)

3 Credits

Marketing theory; marketing management, sales management; market research. Public and customer relations, advertising, distribution.

**Prerequisite:** sophomore standing.

### BA 312

Managerial Accounting (3,0)

3 Credits

Emphasizes management's use of cost information in internal decision-making. Decision-making processes include cost analysis, control, allocation, and planning. A variety of accounting techniques applicable to aviation/aerospace companies are presented.

Prerequisites: Financial Accounting and junior standing.

### BA 314

Human Resource Management (3,0)

3 Credits

This course will examine the functions to be accomplished in effectively managing human resources. An in-depth study of the interrelationship of managers, organizational staff, and/or specialists will assist the student in understanding and applying management theories to real-world human resource planning. Areas of concentration include human resource planning; recruitment and selection; training and development; compensation and benefits; safety and health; and employee and labor relations.

Prerequisites: Management and sophomore standing.

### BA 317

Organizational Behavior (3,0)

3 Credits

A basic course in the analysis of various behavioral concepts affecting human behavior in business organizations, with emphasis on research, theory, and practice.

Prerequisites: Management and sophomore standing.

#### BA 320

Business Information Systems (3,0)

3 Credits

A management approach to understanding business information systems. The general characteristics, potential, and limitations of business systems are covered. The major emphasis is on understanding the inputs, processing, and outputs of a variety of business systems; the ways in which business systems are interrelated and the inherent management problems involved in the implementation and control of such systems.

**Prerequisites:** Advanced computer skills and junior standing.

### BA 321

Aviation/Aerospace Systems Analysis Methods (3,0) 3 Credits

Overview of the system development life cycle. Emphasis on current system documentation through the use of both classical and structured tools/techniques for describing process flows, data flows, data structures, file designs, input and output designs, and program specifications.

Prerequisite: Advanced computer skills.

#### BA 322

Aviation Insurance (3,0)

3 Credits

An introduction to the basic principles of insurance and risk with its special application to the aviation industry. An in-depth review of the aviation insurance industry in the U.S. including the market and types of aviation insurers.

Prerequisite: sophomore standing.

#### BA 324

Aviation Labor Relations (3,0)

3 Credits

An investigation of labor-management relations in the aviation industry. Examined are the history of unionism, structure of unions, legal environment and the Railway Labor Act, collective bargaining, public sector relationships, grievance procedures, and conflict resolution. *Prerequisite:* sophomore standing.

#### BA 325

Social Responsibility and Ethics in Management (3,0)

3 Credits

A comprehensive inquiry into the major components of social responsibility including economic, legal, political, ethical, and societal issues involving the interaction of business, government, and society. *Prerequisites: Management and sophomore standing*.

### BA 326

Marketing Management (3,0)

3 Credits

Marketing management in today's global marketplace must focus on developing strategic options and business plans by managers possessing an integrative functional perspective and understanding marketing's role in the firm. Emphasis will be given to corporate and marketing strategy formulation; market analysis and target market selection; strategic marketing programming; and control of the marketing tactics selected.

Prerequisites: Marketing and Junior standing.

### BA 327

Airline-Airport Operations (3,0)

3 Credits

Airline-Airport Operations is a comprehensive overview of the symbiotic and dynamic relationship between airline and airport operations. This course focuses on the day-to-day issues that airline and airport management must address in order to effectively operate. The student will develop an understanding of current issues impacting the relationship between airlines and airports. A historical overview, current airport and airline operational characteristics, regulatory perspectives, current political and financial environment, air service development, and future issues are studied.

### BA 331

Transportation Principles (3,0)

3 Credits

Basic principles of the several modes of transportation: air, sea, rail, highway, and pipeline including problems of competition, the importance of each in the economy, and future developmental prospects. *Prerequisite:* sophomore standing.

#### , D. 4. 000

BA 332 Corporate Finance I (3,0)

3 Credits

The finance function as used by management, including financial analysis and control financial planning; and short, intermediate, and long-term financing, using the theory of cost of capital and leverage in planning financial strategies. Aviation-related businesses are emphasized.

Prerequisites: Financial Accounting and junior standing.

### BA 333

Personal Financial Planning (3,0)

3 Credits

A study of the personal financial planning process. Includes taxes, investments, purchase of housing/ auto, insurance needs and analysis, use of credit, and retirement and estate planning. Student will develop a personal financial plan and will invest in a \$500,000 portfolio of securities.

Prerequisite: junior standing.

### BA 334

Investment Analysis (3,0)

3 Credits

This course is an introduction to the field of investments. The course is designed as a guide for people studying the capital markets for the first time. The course provides a survey of investments including security markets, investment vehicles, investment analysis and portfolio management. Specific topics include the concept of risk and return, types of financial instruments, study of how they are bought and sold, an introduction to how they are valued in the marketplace, a survey of investment companies, asset allocation, concept of efficient markets, equity and bond portfolio management, portfolio performance evaluation, fiduciary responsibility and ethical conduct in investment profession, and corporate governance. The course is taught from the viewpoint of an individual rather than an institutional investor. The course uses current economic and capital market information for a practical application of the course materials.

**Prerequisites:** Junior standing, BA 332 or EC 225, or prerequisite knowledge met with approval of instructor.

### BA 335

International Business (3,0)

3 Credits

An analysis of economic development and international trade in modern times, with an examination of current U.S. relations with other nations. Attention will be focused on the impact of foreign trade on the aviation industry and the industry's contribution to economic development.

Prerequisite: sophomore standing.

#### BA 340

International Accounting (3,0)

3 Credits

This course introduces the student to accounting in the global environment The student will learn about

accounting systems and reporting practices around the world. Efforts toward accounting harmonization and the impact of International Financial Reporting Standards will be discussed. Specific accounting topics, such as accounting for currency exchange rate changes, financial reporting and disclosure issues in a global context, and using financial statements across borders and in emerging capital markets will be covered. Managerial issues in an international context will also be discussed.

Prerequisites: Financial Accounting and junior standing.

### BA 342

International Finance (3,0)

3 Credits

The purpose of this course is to provide the analytical framework required for understanding how changes in international financial conditions influence decisions faced by modern business leaders in a global setting. The focus will be on interactions between cross-border trade and capital flows, inflation, interest rates, exchange rates, monetary and fiscal policy, and economic growth. Exchange rate regimes, exchange rate risk and hedging, global capital budgeting, short-term and long-term financing of multinational enterprise, and managing multinational operations will also be explored. The course is tailored to students seeking careers in global banking and investment or with finance and strategy departments of aviation operating enterprise in global markets.

Prerequisite: BA 332 and Junior standing.

### BA 390

Business Law (3,0)

3 Credits

A survey of the legal aspects of business transactions. Areas covered include contracts, agency, bailment, negotiable instruments, partnerships, corporations, consumer credit, and the government's influence on business law.

Prerequisite: sophomore standing.

### BA 405

General Aviation Marketing (3,0)

3 Credits

Marketing and management concepts applicable to FBOs and other general aviation enterprises. Travel analysis is performed to determine the need for a business aircraft.

Prerequisite: junior standing.

#### BA 406

Strategic Management of Technical Operations (3,0)

3 Credits

This course presents an advanced study of strategic management theory, technical management, and the management of technology in a global aviation industry. Detailed coverage of the aviation technical management field is provided as well as that of the working aviation environment and system integration where the effective management of research, design, production, technical sales, and services functions are employed.

Prerequisite: Graduating senior standing.

#### BA 408

Airport Management (3,0)

3 Credits

An examination of the management of airports with an emphasis on the facilities that make up an airport system, including airspace, airfield, and terminal and ground access operations.

Prerequisites: Management and junior standing.

### BA 410

Management of Air Cargo (3,0)

3 Credits

Intensive study of the practices and problems of management with respect to air cargo. Importance of air cargo service to the economy, rate and tariff problems, terminal facilities, competition, and future prospects.

Prerequisite: junior standing.

### BA 411

Logistics Management for Aviation/Aerospace (3,0) 3 Credits

This course examines ways to optimize the physical flow of goods and materials in a firm from acquisition through production, and movement through channels of distribution. It focuses on applying logistics theory to aviation management problems in materials handling, managing inventory, planning capacities, and locating distribution centers. It includes case studies with aviation/aerospace applications using computer models.

**Prerequisite:** junior standing.

### BA 412

Airport Planning and Design Standards (3,0) 3 Credits

The principles of airport master planning and system planning are studied. Fundamental principles of airport layout and design are covered, including geometric design, airport drainage, pavement design, passenger and cargo terminal layout, and capacity and delay effects.

Prerequisites: Airport Management and senior standing.

### BA 415

Airline Management (3,0)

3 Credits

An introduction to the administrative aspects of airline operation and management. Topics include the annual profit plan, uniform system of accounts and reports, demand analysis, scheduling, the theory of pricing, fleet planning, facilities planning, and airline financing.

Prerequisites: Management and junior standing.

#### BA 418

Airport Administration and Finance (3,0) 3 Credits

An advanced study of the organizational, political, and financial administration of public and private civil use airports. Areas of emphasis include public relations management, safety and security issues, employee organizational structures, financial and accounting strategies, revenue and expense sources, economic impacts of airport operations, airport performance measurement standards, and current trends and issues of direct concern to airport administrators. *Prerequisites: Airport Management and senior standing.* 

#### BA 419

Aviation Maintenance Management (3,0)

3 Credits

Comprehensive examination of organizational maintenance policies, programs, and procedures. Emphasis on maintenance planning; forecasting and cost control; reliability and safety; and flight schedule performance.

Prerequisites: Statistics and junior standing.

#### BA 420

#### Management of Production and

Operations (3,0)

3 Credits

An intensive study of management in all organizations: service oriented and product oriented. Scheduling, inventory control procurement, quality control, and safety are investigated. Particular attention is given to applications of aviation-oriented activities.

Prerequisites: Statistics and senior standing.

#### BA 421

Small Business Management (3,0)

3 Credits

An analysis of the theoretical and practical knowledge necessary to be successful in conceiving, initiating, organizing, and operating a small business. Special focus will be placed on small businesses in the aviation field.

Prerequisites: Financial Accounting and senior standing.

#### BA 422

Life Cycle Analysis for Systems and Programs in Aviation/Aerospace (3,0)

3 Credits

This course is a study of system theory and its relationship to aviation/aerospace systems management. It covers a brief history of system theory and system life cycle and presents the major activities in each phase of a system's life cycle. Also covered are specific topics related to system design and support, including reliability, maintainability, availability, testing, quality control, customer support, product improvement program analysis, and the role of data collection and analysis in the operational phase. Related topics covered are cost-effectiveness analysis and project management. The course examines applications and case studies specific to aviation/aerospace, including military applications and computer simulation models.

Prerequisite: senior standing.

#### BA 424

Project Management in Aviation Operations (3,0) 3 Credits

This course introduces the student to the concept of project management in aviation operations. It addresses the three-dimensional goals of every project: the accomplishment of work in accordance with budget, schedule, and performance requirements. The procedures for planning, managing, and developing projects in an aeronautical environment are covered as well as the aspects of controlling project configuration from inception to completion. Automated tools used to determine cost, schedule, staffing, and resource allocation are covered, as well as the process of determining the effectiveness and technical validity of aviation-related projects. *Prerequisites: Computer skills and senior standing*.

### BA 425

# Trends and Current Problems in Air Transportation (3,0)

3 Credits

Analysis of selected contemporary issues, problems, and trends facing management in various segments of the aviation industry, including general aviation and the airlines. Students apply previously learned concepts to practical problems to develop increased understanding and demonstrate knowledge of the subject.

Prerequisites: Management and senior standing.

### BA 426

International Aviation Management (3,0) 3 Credits

An investigation of international aviation management and its three elements: the nature of international aviation business, working in a foreign environment, and managing in an international environment.

**Prerequisites:** International Business and senior standing.

#### BA 427

Management of the Multicultural Workforce (3,0) 3 Credits

An investigation into the management of the multicultural workforce. The elements of cultural anthropology and international business, communicating across cultures, contrasting cultural values, and managing and maintaining organizational culture are addressed in the context of international aviation management.

Prerequisites: Management and junior standing.

#### BA 430

International Trade and Regulations (3,0)

3 Credits

Economic analysis of international trade, capital flows, and labor migration with particular emphasis on the laws governing these factors. Aviation applications include code-sharing and other international airline agreements and the impact of trade subsidies and open skies treaties.

**Prerequisites:** Economics, Business Law, and junior standing.

### BA 434

Corporate Finance II (3,0) 3 Credits

The objective of this course is to study the major decision-making areas of managerial finance and some selected topics in financial theory. The course

some selected topics in financial theory. The course reviews the theory and empirical evidence related to the investment and financing policies of the firm and attempts to develop decision-making ability in these areas. This course serves as a complement and supplement to Corporate Finance I. Topics include leasing, dividend policy, mergers and acquisitions, corporate reorganizations, financial planning, working capital management, and international finance. Aviation and aerospace related businesses are emphasized.

**Prerequisites:** Corporate Finance I and junior standing, or permission of the instructor.

#### BA 436

Strategic Management (3,0)

3 Credits

This business capstone course examines strategic management principles involving strategy, formulation, implementation, evaluation, and organization analysis. Case analysis employing strategic management principles is used to examine and solve organization problems. Total quality management concepts are studied for improvement of organizational effectiveness.

Prerequisite: graduating senior standing.

#### BA 450

Airline/Airport Marketing (3,0)

3 Credits

An investigation of the role of marketing in the aviation/airport industries. Topics to be covered include consumer segmentation, database management, integrated marketing communications, public relations, vendor relations, and retailing.

Prerequisites: Marketing and senior standing.

#### BA 299, 399, 499

Special Topics in Management

1-4 Credits

Individual independent or directed studies of selected topics in management.

**Prerequisites:** Consent of the instructor and approval of the department chair. May be repeated with change of content.

# **Cooperative Education**

#### CE 396, 397, 398

#### 1-6 Credits

Aerospace Engineering (AE), Aerospace Studies (AR), Aeronautical Science (AS), Aircraft Engineering Technology (ET), Aviation Business Administration (ABA), Management of Technical Operations (MTO), Aviation Management (AM), Avionics (AV), Computer Engineering (CEC), Computer Science (CS), Electrical Engineering (EE), Flight (FL), Global Security and Intelligence Studies (GSIS), Maintenance Technology (MT), Space Studies (SP), Science, Technology, and Globalization (STG). Provides practical learning experience in full-time or part-time employment related to the student's degree program and career goals. Course title and level are based on the work assignment.

**Prerequisite:** Approval by the department chair and cooperative education administrator.

NOTE: Cooperative Education and internship experiences are designed as academically based experiential education. A student enrolled in a University-approved co-op/internship professional activity and registered for 6 credit hours will be considered full-time by all University departments other than Financial Aid. The Financial Aid Office will consider a 6-hour coop/internship as half-time enrollment and will process financial aid accordingly. They will report enrollment to the outside agencies as half-time, thus keeping them out of repayment on their student loans.

#### CE 496, 497, 498

1-6 Credits Continuation of CE 396, 397.

# **Computer Engineering**

#### CEC 220

Digital Circuit Design (3,0) 3 Credits

Introduction to logic design and interfacing digital circuits. Boolean algebra, combinatorial logic circuits, digital multiplexers, circuit minimization techniques, flip-flop storage elements, shift registers, counting devices, and sequential logic circuits.

Corequisite: CEC 222.

### CEC 222

Digital Circuit Laboratory (0,3)

1 Credit

Laboratory experiments in the measurement and verification of digital circuits. Discrete and integrated logic circuit design analysis and measurements. *Corequisite:* CEC 220.

### **CEC 300**

Computing in Aerospace and Aviation (3,0) 3 Credits

This course explores the computer engineering aspects of systems ranging from embedded sensor and actuator controllers to high-performance computing systems used in air traffic control and weather forecasting. The critical factors that impact the engineering decisions involved, including technological, economic, social, and professional issues, are discussed. Key engineering techniques and practices, including database, human-computer interaction, and networks of systems, are explored through case studies and representative examples from the aerospace and aviation domains.

Prerequisites: EGR 115 and junior standing.

#### CEC 315

Signals and Systems (3,0)

3 Credits

Introduction to signal processing systems for both digital and analog systems. Mathematics of signal representation and signal processing, including functional descriptions of signals and systems. Implications of linearity and time-invariance, and input-output behavior of linear, time-invariant systems. Causality and stability. Zero-input and zerostate responses. Z and Laplace Transforms. Fourier Series and Fourier Transforms for discrete and continuous systems. Extensive use of MATLAB and Simulink.

Prerequisite: EGR 115. Corequisite: MA 345.

#### CEC 320

Microprocessor Systems (3,0)

3 Credits

Study of digital computer organizations. Introduction to microcomputer systems using a current microprocessor. Assembly language programming techniques for microcomputers will be used to study digital computer operation. Input and output techniques, memory devices, RS 232, and other interfacing techniques will be studied. Hardware and software relationships will also be discussed. *Prerequisites:* CEC 220 and experience in programming in a high-level language. *Corequisite:* CEC 322.

#### **CEC 322**

Microprocessor Systems Laboratory (0,3) 1 Credit

Hands-on experience with a microprocessor is provided through weekly experiments involving hardware and software techniques.

Corequisite: CEC 320.

#### **CEC 330**

Digital Systems Design with Aerospace Applications (3,3)

4 Credits

This is the continuation of Introduction to Digital Circuit Design (CEC 220). Students in this class use tools such as FPGA (field programmable gate array) to design and implement digital circuit components and subsystems that are responsible for the control and operation of an aerospace system. In addition, students will be introduced to high-level design languages, such as VHDL (VHSIC hardware description language), RTL (register transfer language), and their application to the design and development of digital circuits.

Prerequisites: CEC 220 and CEC 222.

#### CEC 410

Digital Signal Processing (3,0)

3 Credits

Specification, design, and implementation of offline signal processing systems on general-purpose computers and real-time signal processing systems on special-purpose digital signal processing microprocessors (DSPs). Review of sampling theory and discrete-time filtering. Filter design tools. Digital-toanalog and analog-to-digital conversion hardware. DSP core architectures and hardware interrupts. Aspects of system-on-a-chip DSPs for data transfer, cache management, external memory reference, and co-processor interface. Real-time operating systems for DSPs. Applications to modern communication and control systems.

*Prerequisite:* CEC 315. *Corequisite:* CEC 411.

#### **CEC 411**

Digital Signal Processing Laboratory (0,3) 1 Credit

Laboratory companion course to CEC 410 featuring development of signal generation, processing, and analysis systems using digital signal processing microprocessors (DSPs). DSP software development and debugging environments. Chip- and board-support libraries. Use of algorithm libraries for rapid system development. System development tools, including automatic code generation with Simulink. Culminates in development of stand-alone boardbased DSP system.

Corequisite: CEC 410.

#### CEC 420

Computer Systems Design I (2,3)

3 Credits

This is the first course in the senior project sequence (CEC 420 and CEC 421). This course introduces students to discussing issues of management, planning, task assignment, resource allocation, requirement collection, and system specification and design. The team working in a distributed environment will develop a base for implementation of a computer-centered system with elements of both hardware and software. The artifacts developed during this course will be used as the foundation for further develop-ment during the second course (CEC 421) in the sequence.

**Prerequisites:** Computer Engineering major, senior status.

#### CEC 421

Computer Systems Design II (1,6)

3 Credits

This is the second course in the senior project sequence (CEC 420 and CEC 421). This is the continuation of CEC 420. This course continues with project development, focusing on issues of detailed design, modularization, component selection, coding, assembling, and testing. The team working in a distributed environment will implement and test a computercentered system with elements of both hardware and software.

**Prerequisite:** EE 420 (Prerequisite for Prescott campus only).

#### CEC 440

Autonomous Vehicle Design (3,0)

3 Credits

This course introduces students to the issues involved in the development of autonomous vehicles as applied in aerospace and aviation. This multidisciplinary course is designed to give students a variety of basic concepts and hands-on experience in robotics and automation. Topics include control, sensing, vision, intelligence, and mechanics. To gain hands-on experience, students will participate in a project in which they will design and build an autonomous vehicle that will participate in an international robotics competition.

Prerequisite: CEC 320.

### CEC 450

Real-Time Systems (3,0) 3 Credits

> The course introduces the concepts of real-time systems from the user and designer viewpoint. The requirements, design, implementation, and basic properties of real-time application software are described with an overview of system software. Related topics such as interrupts, concurrent task synchronization, sharing resources, and software reliability are discussed. A team project on a real-time prototype application may be incorporated in the course.

Prerequisites: CS 225, CEC 320. Corequisite: CS 420.

### CEC 460

Telecommunications Systems (3,0)

3 Credits

Techniques and applications in telecommunications. Types of data communication versus line discipline methodology. Hardware requirements and constraints. Speed versus quality. Security and encoding algorithms.

Prerequisite: CEC 320 or permission of instructor.

### CEC 470

Computer Architecture (3,0)

3 Credits

This course describes in detail the Von Neuman computer architecture which includes processors, memory, input/ output, and transfer of information; examples of machine language, assembly language, microprogramming and operating system will be discussed. Additional topics in advanced computer architecture and computer systems will be covered. *Prerequisite:* CEC 320.

#### CEC 299, 399, 499

Special Topics in Computer Engineering 1-6 Credits

Directed studies of selected topics in computer engineering.

Prerequisite: Consent of instructor and department chair.

# **Civil Engineering**

#### CIV 140

Engineering Measurements with Laboratory (1,3) 2 Credits

Introduction to data collection and analysis. Principles of surveying and mapping, with emphasis on modern methods. Laboratory methods.

#### CIV 304

Structural Analysis (3,0)

3 Credits

Analysis of statically determinate and indeterminate structures using statics, kinematics, virtual work, strain energy, force, and displacement methods. Structural laboratory testing. *Prerequisite: ES* 202.

CIV 307

Civil Engineering Materials I (3,3)

4 Credits

Properties of engineering materials: steel, concrete, soil, asphalt, polymers, composites. Relationship between structure and behavior. Standard methods of testing and inspecting. Laboratory methods.

### CIV 311

Introduction to Transportation Engineering (3,0)

3 Credits

Fundamentals of transportation engineering including planning, design, construction, maintenance, operation, economics, and the role of transportation facilities in society. Concepts, underlying theory, and design issues are detailed.

#### CIV 316

Hydraulics (3,0)

3 Credits

Open channel and pipe flows. Hydraulic structures. Groundwater hydrology and stormwater management.

#### CIV 320

Soil Mechanics (3,3)

4 Credits

Study of the engineering behavior of soil: origin, classification, identification, and structure. Permeability, seepage, consolidation, settlement, slope stability, lateral pressures, bearing capacity. Soil sampling and testing. Laboratory methods.

## CIV 330

Computer Applications in Transportation (1,3) 2 Credits

Application of computer software for planning and design of transportation systems. Emphasis is placed on finding solutions to current problems associated with existing airport and intermodal transportation systems.

Prerequisite: CIV 311.

#### CIV 340

Construction Engineering (3,0)

3 Credits

Delivery of construction projects. Introduction to construction equipment, production rates, construction methods for concrete, asphalt, steel, wood, and masonry, planning and scheduling, safety, and construction economics.

## CIV 362

Engineering and Construction Operations in Space (3,0)

3 Credits

U.S. space exploration policies in the 21st century. Construction in zero- or low-weight environments. Development of lunar and planetary resources. Controlled ecological life support systems. Lunar concrete.

## CIV 370

Computational Methods in Civil Engineering (3,0) 3 Credits

Numerical techniques for solving civil engineering problems. Applications of statistical methods. Matrix operations. Spreadsheet development.

Prerequisite: CS 223.

## CIV 421

Geotechnical and Foundation Engineering (3,0) 3 Credits

Prediction of settlement, analysis of the stability of slopes, prediction of the bearing capacity of shallow and deep foundations, and determination of earth pressures acting on retaining structures.

Prerequisite: CIV 320.

## CIV 422

Design of Pavement Structures (3,0)

3 Credits

Theory and practice in pavement design for highways and airfields, pavement performance, structural design of pavement layers, types of materials used in pavement layers, characterization of pavement layer materials, introduction to pavement management concepts.

Prerequisite: CIV 320.

# CIV 424

Rehabilitation of Pavement Structures (3,0)

3 Credits

Pavement distresses and their causes. Pavement evaluation, roughness, friction, drainage survey and evaluation, structural evaluation, material characterization, traffic loading evaluation, design of pavement rehabilitation alternatives, economic analysis, and selection of preferred alternatives.

Prerequisite: CIV 320.

#### CIV 431

Reinforced Concrete Design (3,0)

3 Credits

Properties of concrete, its constituents, and reinforcement steels. Design of beams, columns, beam-columns, and slabs. Cracking and deterioration. Torsion and shear reinforcement. Anchorage and bond detailing. Application of the concrete design code.

Prerequisite: CIV 304.

## CIV 432

Structural Steel Design (3,0)

3 Credits

Steel and its properties. Design of tension members, column members, torsional members, plate girders. Welded and bolted connections. Steel design specifications and building codes. Current philosophies in steel design.

Prerequisite: CIV 304.

## CIV 441

Civil Engineering Materials II (3,1)

4 Credits

Physical and mechanical properties of construction materials, portland cement concrete, proportioning of concrete mixtures including admixtures. Fiber reinforced concrete design and evaluation. Origin, production, specifications, and tests of bituminous materials and paving mixtures used in construction and maintenance of roads and pavements, pavement surface properties, pavement distress, and correction alternatives.

Prerequisite: CIV 307.

## CIV 447

Airport Design I (3,0)

3 Credits

Fundamental principles of airport layout and preliminary design. Airport site selection, runway length and orientation, air traffic control, capacity, and delay.

Prerequisite: CIV 311.

## CIV 457

Airport Design II (3,0)

3 Credits

Airport terminal passenger and vehicle processing systems. Lighting and signing systems, pavement marking, baggage handling, communication systems, and security systems.

Prerequisite: CIV 447.

## CIV 460

Senior Design Project (3,0)

3 Credits

Detailed and complete design of a civil engineering facility. Progress reports and presentation. Interdisciplinary group cooperation is emphasized. *Prerequisite: senior standing*.

## CIV 490

The Civil Engineering Profession (1,0)

1 Credit

Current problems in engineering, professional duties and responsibilities, opportunities for professional development, ethics, and professionalism.

Prerequisite: Graduating senior status.

# CIV 499

Directed Design Project (Variable)

1-3 Credits

Directed design project. Individual investigation of current design problem. Offered by special arrangement only.

**Prerequisite:** Permission of Civil Engineering program coordinator.

# CIV 199, 299, 399

Special Topics in Civil Engineering (Variable) 1-3 Credits

Directed studies of special topics in Civil Engineering. Offered by arrangement only. *Prerequisite:* Consent of instructor and Civil Engineering program coordinator.

# Communication

## COM 008

Academic English for Non-Native Speakers of English (4,0)

4 Credits

A developmental course designed to help intermediate-level non-native speakers of English develop their English language proficiency. The emphasis is on writing and reading in academic settings. Students cannot withdraw from the course. The course must be passed with a grade of C or better. (Credit not applicable to any degree.)

## COM 018

Advanced Academic English for Non-Native Speakers of English (4,0)

4 Credits

A developmental course designed to help advancedlevel non-native speakers of English develop their English language proficiency. The emphasis is on writing and reading in an academic setting and on preparation for degree-credit bearing communication courses. (Credit not applicable to any degree.) Students cannot withdraw from the course. The course must be passed with a grade of C or better. **Prerequisite:** HU 008 or ESL Placement Test.

# COM 020

Fundamentals of Communication (4,0)

4 Credits

Designed to improve the student's reading and writing abilities through focusing on critical thinking. All three skills are approached as facets of each other and as processes that the student learns to control and take responsibility for. The fundamentals of grammar, punctuation, and sentence structure are strengthened when students write and revise multiparagraph expository essays. A grade of C is required to pass this course, and it may not be dropped. (Credit is not applicable to any degree.)

# COM 122

English Composition and Literature (3,0)

3 Credits

This course focuses on principles of writing in response to readings in the humanities, social sciences, and other interdisciplinary fields. Students develop their communicative, evaluative, critical thinking, and research writing abilities through the close examination of key texts across those disciplines.

**Prerequisite:** Satisfactory completion of basic skills requirements.

## COM 219

Speech (3,0)

#### 3 Credits

A continuation of the study of communication and communication theory with emphasis on overcoming communication apprehension, developing listening skills, mastering oral performance, and writing about communication. Individual sections may focus on public speaking, group discussion, oral interpretation, or interpersonal communication. Section emphasis varies by instructor and is listed in the Schedule of Courses.

Prerequisite: COM 122.

## COM 221

Technical Report Writing (3,0)

3 Credits

Preparation of formal and informal technical reports, abstracts, resumes, and business correspondence. Major emphasis placed on the long technical paper and the acquisition of advanced writing skills.

Prerequisite: Any course from the HU 140 series.

#### COM 222

Business Communication (3,0)

3 Credits

An introduction to effective business communication. Topics in oral, written, nonverbal, and intercultural communication are covered. Research methods, effective speaking, and the preparation of letters, memoranda, and reports are emphasized.

Prerequisite: Any course from the HU 140 series.

#### COM 225

Science and Technology Communication (3,0) 3 Credits

This course introduces the practices of communicating news and issues in science and technology to a variety of publics through magazine-style writing and public speaking. Guest speakers will present research questions, methodologies, and issues within the sciences. Coursework also includes readings from successful science and technology communicators, illustrating various solutions to writing about complex subjects. Special topics include identifying science and technological stories, evaluating sources and information, and communicating findings clearly, comprehensibly, and accurately for publication and speaking engagements.

Prerequisite: COM 221.

#### COM 260

Introduction to Media (3,0)

3 Credits

The structure of, professional opportunities in, and social issues arising from media industries. Required of all Communication students. Must be taken within the first year of entering the program.

Prerequisite: COM 122.

#### COM 265

Introduction to News Writing (3,0)

3 Credits

COM 265 offers Communication majors theory and practice in the fundamentals of various journalistic genres: news reporting, features, interviews, spot news, page layout, interpretive journalism, and more. This course introduces students to use of the AP Stylebook, libel law, and ethical issues in journalism. *Prerequisite:* COM 122 or permission of instructor.

## COM 320

Mass Communication Law and Ethics (3,0)

3 Credits

This course is based on case studies introducing students to the legal and ethical environments underpinning First Amendment rights in the United States from the nation's founding to the present. Topics in law include intents of the framers, prior restraint, libel, privacy, hate speech, freedom of information laws, shield laws, and copyright. Topics in ethics concentrate on models for decision-making in difficult situations. Practices of journalists, media relations practitioners, and Internet communicators will be examined. Topics in ethics concentrate on models for decision-making in difficult situations.

Prerequisite: COM 221.

## COM 322

Aviation and Aerospace Communication (3,0) 3 Credits

This course introduces the practices of communicating news and issues in aviation and aerospace to a variety of publics through magazine-style writing and public speaking. Students will learn how to recognize the news value of contemporary aviation issues, to gain an understanding of those issues through research and interviews with experts, and to write about and discuss the issues. Coursework also includes readings from respected aviation writers that illustrate aviation's economic and social impact on society. Special topics include safety, airport security and congestion, emerging legal issues, and international aviation trends. *Prerequisite:* COM 221.

## COM 350

Environmental Communication (3,0) 3 Credits

This course centers on national and regional environmental issues, including planning, regulation, and crises. Topics include responses to climate change, endangered species, wetlands preservation, coastal development and hazardous materials regulation. Field trips and guest speakers will be included. Students learn how to research and write articles and stories for nature and environmental magazines as well as general-audience media.

Prerequisite: COM 221 or COM 225.

# COM 351

Journalism (3,0)

3 Credits

Theory and practice of the techniques of journalism, familiarizing the student with the functions, skills, and responsibilities required in writing, editing, and producing news and technical publications.

Prerequisite: Any course from the HU 140 series.

# COM 360

Media Relations I (3,0)

3 Credits

The course focuses on different theories of persuasive communication and the construction of persuasive messages. Individual instructors may explore persuasive communication in public service and political campaigns, interpersonal communication, social movements, persuasive writing, or advertising. Students are evaluated on their ability to recognize, apply, and evaluate the communication theories used to design persuasive messages.

Prerequisite: COM 219.

## COM 364

Visual Design (3,0)

3 Credits

This course presents principles of visual design applying to print and electronic publications, including unity, emphasis, balance, line, shape, value, color, and texture. Special topics include ethics, typography, semiotics, and layout. Students analyze existing graphical artifacts and create print and electronic projects focused on communicating science and technology, using professional design software.

*Prerequisites:* COM 221, COM 222, or an equivalent professional writing course; COM 265.

#### COM 410

Advanced Professional Writing (3,0)

3 Credits

A sophisticated process approach to strategies for effective communication in the workplace. Balancing theory and practice in professional communication, students will work singly and in collaborative teams to integrate visuals, layout and design, editing and review systems, online documentation, and electronic publishing. All assignments carry written components with equal emphasis placed on oral execution. *Prerequisites:* COM 219, COM 221, COM 265.

## COM 411

Web Design Workshop (3,0)

3 Credits

In addition to highlighting theories of communication related to design and content, this course serves as a practical workshop in Web site development, with an emphasis on communicating science and technology in a professional context. In close consultation with the professor, students design and produce Web sites for University programs, departments, non-profit organizations, and businesses. Experience with Web development software is recommended.

*Prerequisites:* COM 221, COM 222, or an equivalent professional writing course.

## COM 412

Advanced Technical Writing (3,0)

#### 3 Credits

Communication specific to the technical communication profession is studied, and students prepare at least one formal project suitable for inclusion in a career portfolio. The projects may include, but are not limited to, the following: technical manual, grant or business proposal, product development and documentation, multimedia training or product presentation, training modules, and corporate reports. Projects may be in paper, electronic, or combination of multimedia formats, depending on trends in the profession and use of technology. Professional technical communicators may serve as mentors or speakers.

Prerequisite: COM 221.

## COM 415

#### Non-Verbal Communication (3,0)

3 Credits

This course entails the study of communication behaviors and processes not involving the expression of written or spoken words, which contribute information to a message. Special attention is directed to the study of voice qualities; facial expression and body language; space, personal distance, and touch; the use of time and objects; and personal appearance. Study also involves non-verbal communication in applied settings, as well as research strategies for observing, measuring, and understanding non-verbal phenomena.

**Prerequisites:** COM 219, equivalent Speech Communications course. (Also offered as HU 415. Students receive either Communication or Humanities credit, but not both.)

## COM 440

Senior Employment Practicum (1,0)

1 Credit

Open only to Communication majors. Preparation and evaluation of resumes, employment correspondence, portfolios, and mock employment interviews. Must be taken the semester after completing 88 hours. *Prerequisite:* COM 265.

## COM 460

Media Relations II (3,0)

3 Credits

Mastery of writing and speaking genres in media relations with an emphasis on crisis communication. *Prerequisites:* COM 265, COM 360.

# **Computer Science**

# CS 101

Introduction to Keyboard Operations (1,0) 1 Credit

I Credit

Fundamental skills and techniques in the operation of the keyboard and the use of computers in word processing. Emphasis is placed on the fundamentals of word processing and the development of touch typing with speed and accuracy.

# CS 111

Spreadsheet (1,0)

1 Credit

An understanding of spreadsheet applications and commands designed to develop an intermediate level of spreadsheet competency. An exploration of practical spreadsheet applications such as budgets, income taxes, profit and loss statements, and calculating grades, among many others. Specific commands include creating, editing, saving, retrieving, and printing spreadsheets using statistical data and financial functions; depicting spreadsheet; information graphically in bar graphs, pie charts, and line graphs; linking and integrating spreadsheets; and using spreadsheet macros.

Prerequisite: IT 109 or equivalent knowledge.

## CS 114

Presentation Graphics (1,0)

1 Credit

An overview of business graphics. Emphasis is on the design and creation of professional graphics such as charts and short documents to be used to clarify information in oral and written presentations. Specific topics include planning and organizing charts and presentation documents; creating pie charts, bar charts, line charts, and presentation documents; formatting, editing, and printing; using text, symbols, and graphics; importing artwork; and creating an automated presentation of charts and documents.

#### CS 116

Recent Trends in Application Software (1,0) 1 Credit

The content of the course is left to the specific needs of the student and new software.

Prerequisite: IT 109 or equivalent knowledge.

#### CS 117

Computer Configurations (3,0)

3 Credits

Provides the student with an in-depth understanding of the technical aspects of hardware and software and a study of the current trends in computing. The course will include hardware and software installations, troubleshooting, and a survey of resources in personal computing.

# CS 118

Fundamentals of Computer Programming (3,0) 3 Credits

Introduction to basic concepts of structured programming with applications in business, technology, and engineering. This course is intended for the student with little or no experience in programming.

# CS 125

Computer Science I (3,3)

4 Credits

Introduction to problem-solving methods, algorithm development, and software engineering; software development process, program design, coding, review, testing, and documentation; and programming using a modern programming language that supports modular development. The course has a closed laboratory that includes activities dealing with the computing environment, the software development process, and programming exercises. **Prerequisite:** Experience in programming in a high-level language (prerequisite for Daytona Beach campus only), and proficiency in high school pre-Calculus mathematics.

#### CS 207

Network-Based Computing (3,0) 3 Credits

Local area network installation and operations. Topics covered include, but are not limited to, LAN, WAN, terminology, protocols, topologies, mail systems, network administration functions, and hardware.

Prerequisites: CS 117 and CS 118.

#### CS 210

Scientific Programming (3,0)

3 Credits

Introduction to problem-solving methods, algorithm development, program design, coding, debugging, testing, use of subprograms and documentation, and programming in a block-structured high-level language covering control structures and simple data structures such as arrays and files. This course emphasizes scientific/engineering programming techniques and applications.

Corequisite: MA 112 or MA 241.

#### CS 222

Introduction to Discrete Structures (3,0)

3 Credits

An introduction to the fundamental algebraic, logical, and combinatorial concepts of mathematics that provide a foundation for the study of computer science.

**Prerequisites:** Experience in programming in a high-level language, pre-Calculus mathematics.

## CS 223

Scientific Programming in C (3,0)

3 Credits

This is a course in C programming for scientists and engineers. Using a problem-solving approach for developing algorithms, the algorithms are implemented in C and include the following topics: data types and related operations, input/output, control structures, functions, array, files, and strings. *Prerequisite:* MA 112 or MA 241 or permission of instructor.

#### CS 225

Computer Science II (3,3) 4 Credits

This course emphasizes program design, style, data abstraction, information hiding, and testing;

advanced programming features; and introduction to object-oriented concepts, basics of algorithm analysis, exception handling, string processing, recursion, pointers, and simple data structures. The course has a closed laboratory that includes activities dealing with the computing environment, the software development process, and programming exercises.

*Prerequisite:* CS 125 (*Prescott*) or EGR 115 (*Daytona Beach*).

#### CS 235

Assembly Language Programming (3,0)

3 Credits

Introduction to computer architecture; assembler concepts and instruction format; addressing techniques; interrupt processing, especially input/output; segmentation, linkage, and external procedures; programming projects to develop understanding of assembly language concepts.

Prerequisites: CS 220, CS 225.

#### CS 303

Network Security (3,0)

3 Credits

This course introduces the principles and algorithms of modern encryption and some major issues and problems of computer security. Topics covered include the notion of block ciphers and implementations such as DES and Blowfish. Modern public key encryption techniques such as the RSA algorithm. Statistical attacks on encryption including traffic monitoring. Hash functions. Digital signatures and authentication methods. An introduction to some attacks and defenses such as viruses, worms, and firewalls. This course is intended to be a required course in an Information Security minor or a technical elective for students majoring in Computer Science or Computer Engineering.

**Prerequisites:** MA242 or CS222 or consent of the instructor. CS225 or consent of the instructor. Junior status or consent of the instructor.

## CS 305

Database Systems and Data Mining (3,0) 3 Credits

Introduction to database systems and data mining. The course will cover the relevant theory of database systems, the usefulness of data mining, and the examination of current data mining efforts. Assignments, papers, and projects will reflect real-life use of data mining and provide perspective for managing data mining activities.

Prerequisite: CS 225

#### CS 308

Practicum (3,0)

3 Credits

This capstone project course is individualized to each student and uses most facets of their prior instruction.

*Prerequisite:* All other courses required in the computer applications minor.

# CS 315

Data Structures and Analysis of Algorithms (3,0) 3 Credits

This course emphasizes the design, implementation, and analysis of algorithms dealing with searching, sorting, graphs, trees, and disk files. *Prerequisites:* CS 222, CS 225.

## CS 317

Files and Database Systems (3,0)

3 Credits

Introduction to file and database systems. The course will cover the theory of database systems, various database models, and the design of a database system. Course homework will reflect real-life problems requiring cooperation, problem formulation, and problem-solving skills. A team/group term project may be assigned.

Prerequisites: CS 222, CS 225.

## CS 325

Programming in ADA (3,0)

3 Credits

Advanced systems concepts using the ADA language to implement software engineering, concurrent programming, and structured design techniques. *Prerequisites:* CS 210, CS 225, or permission of the instructor.

## CS 332

Organization of Programming Languages (3,0) 3 Credits

A comparative study of different programming paradigms. Students program in several languages chosen to illustrate the essential features of the paradigms studied. Formal language concepts are also introduced.

Prerequisites: CS 222, CS 225.

# CS 335

Introduction to Computer Graphics (3,0) 3 Credits

Introduction to computer graphics, algorithms, graphics programming, graphics design, use of graphic packages, and applications of computer graphics to aviation, business, and scientific problems. A term project involving a graphics programming application may be assigned.

**Prerequisites:** MA 241 and a proficiency in implementation language.

# CS 344

C Programming and UNIX (3,0)

3 Credits

This course is an advanced course in the C programming language and the UNIX programming environment and provides basic information about the general principles of operating systems. It begins with an introduction to the UNIX operating system, followed by an in-depth study of the C programming concepts and techniques in the UNIX environment. In addition, topics such as the function and structure of operating systems, process management, memory management, concurrency, UNIX system programming, and UNIX programming tools will be covered. *Prerequisite: CS 225 or equivalent experience in programming.* 

## CS 350

Computer Modeling and Simulation (3,0) 3 Credits

Introduction to the basic aspects of modeling and simulation. Topics include statistical models, queuing theory, random variate generation, simulation languages, object-oriented programming, graphic output with animation, design and analysis of experiments, and verification and validation of simulation models. A term project involving the simulation of an element of aviation or aerospace may be assigned.

**Prerequisites:** MA 222 or MA 412, a proficiency in computer programming, and junior/senior standing.

# CS 375

Algorithms (3,0)

3 Credits

This course covers strategies, mathematics, implementations, and performance properties of fundamental algorithms employed in computer science. *Prerequisites:* CS 315 and MA 242 or permission of instructor.

# CS 415

Human-Computer Interfaces (3,0)

3 Credits

This course introduces Computer Science students to several important aspects of how humans use computers and how software is designed for usability. Students are introduced to usability issues, graphical systems, and graphical interfaces.

Prerequisite: SE 320 or permission of the instructor.

## CS 420

Operating Systems (3,0)

3 Credits

Development, structure, and functions of operating systems; demand service models; development of concurrent models.

Prerequisite: CS 225 and junior standing.

## CS 425

Net-Centric Computing (3,0)

3 Credits

This course introduces Computer Science students and other engineering majors to areas of software and computer science that pertain to networks and network-based computation.

**Prerequisites:** CEC 320 and CS 317 or permission of instructor.

# CS 432

Information and Computer Security (3,0) 3 Credits

The course will start with an overview of the larger context of information security, including the "softer" aspects of personnel and operational security, and then delve into the technical basis and practical difficulties of COMPUSEC itself. This course is intended to be a required course in an Information Security minor or a technical elective for students majoring in Computer Science or Computer Engineering.

**Prerequisites:** CS420 or consent of the instructor. Junior status or consent of the instructor.

## CS 445

Interfacing (3,1)

#### 3 Credits

Introduction to microcomputers and microcontrollers, effect of the microprocessor on the system, memory, and microcomputer input/output methods. The subject of interface components and their characteristics, designing interface components, interfacing to standard buses and peripherals. Interface layout and construction. Interface software design and implementation.

Prerequisite: CS 320 or equivalent.

## CS 455

Artificial Intelligence (3,0)

3 Credits

This course introduces students to the basic concepts of artificial intelligence with emphasis on knowledge engineering. Students gain experience, through individual and group exercises, in the various phases of system development: planning, requirements and specification, design, implementation, and testing. Students study and apply commercial tools to the development of knowledge-base systems in the aerospace and aviation domain.

Prerequisite: CS 222 or permission of instructor.

#### CS 299, 399, 499

Special Topics in Computer Science

1-6 Credits

Individual independent or directed studies of selected topics in computer science.

**Prerequisites:** Consent of the instructor and the department chair.

# Economics

Standing is based on credit hours earned toward the student's declared degree program.

#### EC 200

An Economic Survey (3,0)

3 Credits

An introduction to macro and microeconomic principles, problems, and policies with a view to current economic problems.

## EC 210

Microeconomics (3,0)

3 Credits

An introduction to the economic principles of free enterprise supply and demand, private and social implications of profit maximization, market structure, and resource markets. Current microeconomic issues in aviation (such as liability reform, evolution of airline competition, etc.) are discussed.

## EC 211

Macroeconomics (3,0)

3 Credits

An introductory analysis of employment, inflation, recession, GDP economic growth, and international trade with an emphasis on practical policy alternatives. Macroeconomic aviation applications such as the counter-cyclical growth of start-up airlines and consideration of ATC privatization are incorporated.

#### EC 225

Engineering Economics (3,0)

3 Credits

An introduction to microeconomic principles, problems, and policies as well as basic financial principles such as time value of money, capital budgeting, and cost of capital. The course will provide the engineering graduate with the tools needed for success in the workplace.

# EC 310

Labor Economics (3,0)

3 Credits

A survey of the economics of the labor market to include wage determination and employment theory, labor organization, labor legislation, and current developments in labor relations.

Prerequisites: Microeconomics and junior standing.

# EC 312

Money and Banking (3,0)

3 Credits

A preliminary investigation of the financial institutions of the United States and the relationship of monetary policy to income and price stabilization. Some analysis of international capital flows will also be undertaken.

Prerequisites: Microeconomics and junior standing.

# EC 315

Managerial Economics (3,0)

3 Credits

An analytical approach to the manager's role in understanding pricing, costing, production, and forecasting. Concentrates on simple quantitative models to explain the firm's position in the market and how the manager can react to and control this information. Aviation topics commonly discussed include airport privatization and employee ownership of airlines.

Prerequisites: Microeconomics and junior standing.

## EC 420

Economics of Air Transportation (3,0) 3 Credits

A study of the economic aspects of airline service with consideration given to the impact of federal aid and regulation, types of aircraft, airport problems, consumer interests, and competitive practices. *Prerequisites: Microeconomics and junior standing*.

EC 299, 399, 499

Special Topics in Economics

1-4 Credits

Individual independent or directed studies of combinations of selected topics in economics.

**Prerequisite:** Consent of the instructor and the department chair.

# **Electrical Engineering**

#### EE 120

Introduction to Engineering Management (3,0) 1 Credit

Study of the tools engineers use to manage projects, programs, and research.

## EE 200

Engineering Software Tools (3,0)

1 Credit

Study of software tools needed to solve engineering problems. Topics include but are not limited to the study of MATLAB, computer-aided design tools, and graphical simulation programs.

## EE 220

Digital Circuit Design (3,0)

3 Credits

Introduction to logic design and interfacing digital circuits. Boolean algebra, combinatorial logic circuits, digital multiplexers, circuit minimization techniques, flip-flop storage elements, shift registers, counting devices, and sequential logic circuits.

## EE 222

Digital Circuit Laboratory (0,3)

1 Credit

Laboratory experiments in the measurement and verification of digital circuits. Discrete and integrated logic circuit design analysis and measurements. *Corequisite:* EE 220.

## EE 223

Linear Circuits Analysis I (3,0)

3 Credits

Volt-ampere characteristics for passive circuit elements, resistive network circuit theory, and simplification. Kirchoff's current and voltage laws. Introduction to linear network theorems and transformations. Transient response of RC, RL, and RLC circuits. Steady state and impedance circuit analysis for sinusoidal sources.

Corequisites: MA 345, PS 250.

## EE 224

Electrical Engineering Laboratory I (0,3) 1 Credit

Problem sessions, electrical instrumentation and measurement, verification of theory presented in EE 223, working knowledge of electronic test equipment. *Corequisite: EE* 223.

## EE 300

Linear Circuit Analysis II (3,0)

3 Credits

Continuation of EE 223. Study of the Laplace and Fourier transforms, Fourier analysis, complex plane, resonance and coupled circuits, Bode Diagrams, and two-port networks.

Prerequisite: EE 223.

Corequisite: MA 441 or permission of instructor.

## EE 301

Electrical Engineering Laboratory II (0,3)

1 Credit

Problem sessions, analysis and simulation of analog and digital circuits using computer-aided design and analysis tools.

Corequisite: EE 300.

# EE 302

Electronic Devices and Circuits (3,0)

3 Credits

Introduction to basic semiconductor theory and semiconductor device characteristics. Diode and transistor models used in the analysis and design of electronic circuits. Basic amplifier circuits. Single and multi-stage amplifier analysis, design, and frequency response. Integrated circuit implementation of differential stages and operational amplifier circuits.

*Prerequisite:* EE 223 or permission of the instructor. *Corequisite:* EE 304.

## EE 303

Signals and Filters (3,0)

3 Credits

Mathematics for filtering and spectral analysis of continuous and discrete systems. Solutions to filtering approximations via Butterworth, Chebyshev, elliptic, and others. Introductions to Z-transforms and digital filter design methods.

**Prerequisites:** EE 300 and MA 441 or permission of instructor.

## EE 304

Electronic Circuits Laboratory (0,3)

1 Credit

Laboratory experiments in the measurement of electronic device characteristics. Design of biasing networks, small signal amplifiers, and switching circuits. *Corequisite: EE* 302.

## EE 305

Electronic Devices and Circuits II (3,0)

3 Credits

Study of the characteristics of operational amplifiers. Design of op amp circuits used in a variety of electronic signal conditioning applications. Analysis and design of popular analog-to-digital and digitalto-analog circuits and their system application and limitations. Further study of basic components found in instrumentation systems, such as sensors, signal conditioning circuitry, power supplies, A/D and D/A circuitry, and other special electronic devices. Final design project requires the design of a simple data acquisition system.

Prerequisites: EE 300, EE 302.

## EE 306

Introduction to Electrical Systems (2,0)

2 Credits

Direct Current electricity; circuits, resistance, DC machinery. AC current; transformers, three-phase circuits, AC machinery, commercial applications, building codes.

# EE 307

Avionics I (3,3)

4 Credits

Provides the first part of a comprehensive and rigorous study of avionics systems. A laboratory is provided to give the student the opportunity to gain hands-on experience. The course covers avionics systems from the basic physics of avionics to the latest technology.

**Prerequisites:** EE 223, EE 224, MA 345, PS 250, PS 253.

#### EE 308

Introduction to Electrical Communications (3,0) 3 Credits

This is an introductory course in communications and includes channels, networks, Shannon's law, random processes, modulation, and multiplexing. Transmitters and receivers are covered as an application of the theory introduced in this course. The Fourier transform is the major mathematical tool used in this course. The subjects are the basic foundation of both analog and digital communications, both wired and wireless.

#### EE 310

Avionics II (3,0)

3 Credits

Provides the second part of a comprehensive and rigorous study of avionics systems. This course includes practical laboratory examples. The course covers avionics systems from the basic physics of avionics to the latest technology. This course is a continuation of EE 307.

Prerequisite: EE 307.

## EE 320

Microprocessor Systems (3,0)

#### 3 Credits

Study of digital computer organizations. Introduction to microcomputer systems using a current microprocessor. Assembly language programming techniques for microcomputers will be used to study digital computer operation. Input and output techniques, memory devices, RS 232, and other interfacing techniques will be studied. Hardware and software relationships will also be discussed.

**Prerequisites:** EE 220 and experience in programming in a high-level language.

## EE 322

Microprocessor Systems Laboratory (0,3)

1 Credit

Hands-on experience with a microcomputer is provided through weekly experiments involving hardware and software techniques.

Corequisite: EE 320.

## EE 325

Unmanned Aerial Vehicles (3,0) 3 Credits

This course provides the student with an overview of the engineering requirements for unmanned aerial vehicles. Included are the understanding of the mission requirements, such as surveillance, tactical, high altitude, long endurance, and armed. The basic fundamentals of machine control are reviewed and specific applications of those fundamentals to aerial vehicles. Methods of minimizing detection such as electromagnetic radiation, radar cross section, and acoustic noise generation. Particular attention is paid to design for reliability and security.

#### EE 330

Measurements for Medicine and Physical Sciences from Spacecraft and Aircraft (3,0)

#### 3 Credits

This course covers the unique problems associated with making measurements from aircraft and spacecraft. This includes problems associated with moving platforms including mechanical accelerations, high electrical noise environment, and unattended measuring. For physiological measurements particular emphasis is placed on safety and problems associated with very low level signals. Modern computer-driven data acquisition methods are discussed.

#### EE 335

Electrical Engineering I (2,0)

2 Credits

Introduction of the fundamentals of electrical engineering. Circuit theory and variables. Voltage-current relationship for passive elements. Circuit analysis and network solutions. Phasors and frequencydomain analysis. Transient analysis of first and second order systems. Equivalent circuits and power. The Electrical Engineering Lab, EE 336, must be taken during the same semester as EE 335.

Prerequisites: COM 221, MA 345, PS 250, PS 253.

## EE 336

Electrical Engineering Laboratory I (0,3)

1 Credit

Laboratory experiments and techniques in electrical engineering. The Electrical Engineering Lab EE 336 must be taken during the same semester as EE 335.

## EE 340

Electric and Magnetic Fields (3,0) 3 Credits

Electrostatics and magnetostatics. Study of magnetic and dielectric material properties; Maxwell's equations; energy and radiation of plane waves. Introduction of electromagnetic waves, transmission lines, the Smith chart, and radiation from antennas. *Prerequisites:* MA 441, PS 250.

## EE 355

CNS, Communications, Navigation Surveillance, Systems (3,0)

3 Credits

The basic fundamentals of airborne communications, navigation, and surveillance systems are covered in this course. Long-range and short-range communications are discussed, with particular emphasis on data transmission. En route and landing systems are covered. Space base navigation systems are covered with emphasis on the Global Positioning System. Surveillance systems include primary and secondary radar as well as ground proximity and terrain warning systems.

## EE 401

Control Systems Analysis and Design (3,0) 3 Credits

Modeling, analysis, and design of analog and digital linear control systems using time and frequency domain techniques. Topics include feedback control system characteristics performance analysis and stability, Z-transforms, and controller design.

Prerequisites: EE 303, EE 320, or CEC 320.

## EE 402

Control Systems Laboratory (0,3)

1 Credit

Laboratory experiments involving the principles of operation and design of linear control systems. Experiments to support theory introduced in EE 401. *Corequisite: EE* 401.

## EE 403

Avionics Communication Systems (3,0)

3 Credits

This course covers the fundamentals of communications systems, both digital and analog. This course is in preparation for other communications systems courses.

Prerequisites: EE 302, EE 303.

## EE 406

Digital Signal Processing (3,0)

3 Credits

Discrete-time description of signals and systems. D/A and A/D conversion, sampling, and aliasing. Fourier transform of discrete signals, the discrete Fourier transform, and the Z-transform. Digital filter structures, filter implementation, and synthesis techniques. Digitization, quantization, and finite precision effects. Discrete system simulation and DSP applications.

*Prerequisite:* EE 303. *Corequisite:* EE 407.

#### EE 407

Digital Signal Processing Laboratory (3,0)

1 Credit

Analog and digital filter design using MATLAB Digital filter implementation with C programming and assembly code. Input/output, filtering, and waveform generation with a 32-bit floating-point DSP development system. *Corequisite: EE* 406.

#### EE 408

Data Communications (3,0)

3 Credits

This course is a continuation of EE 403 and covers the fundamentals of data communications. Subjects include basic modulation, encoding, error detection, and error correction.

Prerequisite: EE 403.

## EE 410

Communication Systems (3,0)

3 Credits

Theory and application of electronic communication systems; spectral analysis; modulation and demodulation techniques; transmitting and receiving systems. Behavior of receivers and transmitters in the presence of noise. Study of avionic radio systems presently in use, such as NAV, COMM, DME, ATCRBS, ILS, and others.

Prerequisites: EE 303, EE 340.

## EE 412

Communication Systems Laboratory (0,3)

1 Credit

Laboratory experiments involving design and analysis of electronic communication circuitry and measuring performance characteristics and limitations of various communication components and systems. *Corequisite: EE* 410.

#### EE 415

Satellite Communications Systems (3,0) 3 Credits

This course covers all aspects of satellite communications systems. Orbits are discussed, such as GEO, MEO, and LEO, including highly elliptical orbits. The RF link for satellites is discussed with special considerations for various types of orbits. Typical spacecraft and ground station characteristics are studied.

#### EE 417

Digital Communications (3,0)

3 Credits

This course covers digital codes, including the understanding of the generation of common codes and the advantages and disadvantages of the various types of codes. Bandwidth considerations are introduced. Common distortion and interference phenomena are studied in terms of intersymbol interference, bit error rates, and the tools for analyzing these impairments, such as eye diagrams and constellation diagrams. Techniques for improving digital communications, including matched filters, error detection, error compression, and data compression, are discussed.

#### EE 420

Avionics Preliminary Design (3,0)

#### 3 Credits

Study of FAA requirements governing design of airborne electronic equipment. Study of component and subsystem specification and design practices. Application of the above in the preparation of a proposal/design plan for an airborne electrical/electronic subsystem. Integrate the knowledge gained throughout the curriculum with practical aspects of the practice of engineering to enable the student to comprehend engineering as a pivotal aspect of the business cycle and to responsibly participate in society by the practice of his/her profession. The course will introduce the combination of hardware and software requirements and preliminary design, preparation of project, and testing plans following established industry standards.

Prerequisite: senior standing.

#### EE 421

Avionics Detail Design (3,0)

3 Credits

Continuation of EE 420 or EE 428. Senior-level project. Students will work as members of a team in the execution of winning proposals from EE 420/428. The course incorporates the combination of hardware and software detailed design, implementation, and testing following established industry standards. *Prerequisite:* EE 420 or EE 428.

#### EE 422

Wired and Fiber Optic Communications (3,0)

3 Credits

This course applies the foundations laid down by EE 310 and EE 417 to wired and fiber optic communications. The course discusses the characteristics of theoretical and real transmission lines. The similarities of electrical transmission lines and fiber optic transmission are studied. Methods of establishing networks using electrical transmission lines are discussed as well as the impairments encountered by such networks. Fiber optic networks are introduced, building on the foundation set down by the electrical transmission line networks.

#### EE 424

Wireless Communications (3,0)

3 Credits

This course studies the special situations associated with wireless communications, in particular from moving platforms. The basic physics of radio wave propagation are studied including signals, antennas, and multipath problems. Spread spectrum techniques are discussed along with other modulation methods applied to mobile radio including space-based systems. Cellular techniques are studied.

#### EE 425

Wireless Communications Lab (0,3)

1 Credit

This is the companion lab for EE 424. The lab provides practical experience through laboratory measurements and analysis in the subject areas covered by EE 424.

#### EE 427

#### Preliminary Design I (3,0)

1 Credit

Study of organizational structure, quality assurance, reliability, and system standards and specifications. Preparation of senior design specifications.

#### EE 428

Preliminary Design II (3,0)

1 Credit

Study of component and system testing. Preparation of senior design proposal. *Prerequisite: EE* 427.

## EE 450

Elements of Power Systems (3,0)

3 Credits

Electrical power conversion and control. Use of electronic devices as switches. Power computations for linear and nonlinear circuits, single and three-phase power distribution, and transformers. Controlled and uncontrolled rectification. AC voltage controllers, DC-DC converters, DC power supplies, DC-AC inverters, and resonant converters.

**Prerequisite:** Senior standing or permission from instructor.

# EE 452

Power Systems Laboratory (1,2)

1 Credit

Laboratory projects in power conversion and control. Measurement techniques of average and apparent power, power factor, average and RMS voltage and current, and harmonics. PWM control circuits, power electronic circuit design, and thermal management techniques.

Corequisite: EE 450.

# EE 460

Advanced Controls and System Integration (3,0) 3 Credits

Continuation of EE 401. Study of modern control methods including state variables, controllability and observability, and modern design techniques. Integration of avionics systems by different avionics bus protocols including ARINC-429, ARINC-629, Mil Std 1553, and RS-232. Study of avionics systems common to modern aircraft. Design project.

Prerequisite: EE 401 or equivalent.

# EE 475

Senior Telecommunications Project (2,3) 3 Credits

The capstone course for the telecommunications track. This course will entail a design project involving a broad spectrum of tasks including system design, software, hardware, test, and evaluation. The students will plan the project using the latest computer tools and monitor the progress. Group and interdisciplinary efforts are encouraged.

## EE 299, EE 399, EE 499

Special Topics in Electrical Engineering 1-6 Credits

Directed studies of selected topics in electrical engineering.

Prerequisite: Consent of instructor and department chair.

# Engineering

# EGR 101

Introduction to Engineering (1,2)

2 Credits

An introduction to the interdisciplinary aspects of the engineering of aerospace systems. This is a projectbased course demonstrating how aerospace engineering, electrical engineering, computer engineering, civil engineering, and software engineering are combined to produce results. Students are involved in an array of conceptual exercises, simple design activities, and projects dealing with engineering in aerospace-related areas.

# EGR 111

Engineering Drawing (2,0)

2 Credits

Freehand pencil sketching for graphical communication of engineering designs. Standard forms for design graphic and view layout, orthographic projection, section and auxiliary views, dimensioning, tolerancing, introduction to shop processes. This course is not equivalent to EGR 120.

# EGR 115

Introduction to Computing for Engineers (3,0) 3 Credits

This is an introductory course in programming and computing for scientists and engineers. The course introduces students to the following aspects of software engineering: specification, requirements, design, code, and test. This course uses a problem-solving approach for developing algorithms. The following topics will be included: data types and related operations, looping, decision, input/output, functions, arrays, files, and plotting.

Prerequisite: Pre-Calculus or permission of the instructor.

# EGR 120

Graphical Communications (2,2)

3 Credits

Freehand pencil sketching and CAD as tools for graphical communication of engineering designs. Standard forms for design graphics and view layout, orthographic projection, section and auxiliary views, dimensioning, tolerancing, introduction to shop processes.

Prerequisite: Enrollment in an engineering program.

## EGR 200

Computer Aided Conceptual Design of Aerospace Systems (2,3)

#### 3 Credits

Application and use of a high-end computer-aided design (CAD) tool for graphical communication of conceptual engineering designs. Includes definition of standards and conventions for generating part and assembly drawings as well as introductory methods for creating and documenting conceptual aerospace systems design. Application of rapid prototyping methods for constructing and integrating aerospace models as well as conceptual aircraft design.

## EGR 305

3D-CADD and Engineering Documentation (3,0) 3 Credits

Application and use of high-end computer-assisted drafting, design, and analysis tool (CATIA) to engineering challenges. Applications of CATIA workbenches: the product specification tree, knowledgware, parametric design, part and assembly design, modification, document release and control, final drawings, and changes.

Prerequisites: EGR 120, ES 201, ES 204.

# Electronics

# EL 107

# Direct and Alternating Current Fundamentals and Circuit Analysis (4,0)

4 Credits

A detailed study of basic DC and AC theory and circuit concepts. Subject areas include the physical nature of matter, Ohm's Law, DC and AC components, series and parallel circuits, reactance, resonance, and transformer theory.

*Prerequisite:* MA 111 or MA 145. *Corequisites:* EL 108, MA 112.

## EL 108

Direct and Alternating Current Laboratory (0,3) 1 Credit

One three-hour laboratory session per week with experiments paralleling the material of EL 107. *Corequisite:* EL 107.

## EL 203

Microelectronics Fundamentals and Circuit Analysis (4,0)

4 Credits

An introductory course in solid-state fundamentals and circuit analysis. Subject areas include semiconductor construction, biasing, small and large signal amplifier analysis, active devices, operational amplifiers, oscillators, and frequency considerations.

Prerequisites: EL 107, EL 108.

Corequisite: EL 204.

#### EL 204

Microelectronics Laboratory (0,3)

1 Credit

One three-hour laboratory session per week with experiments paralleling the material of EL 203. *Corequisite:* EL 203.

## EL 212

Digital Circuit and Systems Analysis (4,0)

4 Credits

An introduction to digital fundamentals and their applications to electronic and avionics systems. *Prerequisite: EL* 107. *Corequisite: EL* 213.

## EL 213

Digital Circuit Laboratory (0,3)

1 Credit

One three-hour laboratory session per week with experiments paralleling the material of EL 212. *Corequisite: EL* 212.

## EL 301

Electronic Communication Systems (3,0)

3 Credits

Introduction to communications circuits and systems. Subject areas include AM, FM, and SS modulation and receivers, transmission lines, wave propagation, antennas, wave guides, microwave devices, data, communications, and radar fundamentals.

Prerequisites: EL 203, EL 204, and MA 112 or MA 241.

## EL 302

Electronic Communications Laboratory (0,3)

1 Credit

One three-hour laboratory session per week with experiments paralleling the material of EL 301. *Corequisite:* EL 301.

## EL 303

Pulse Components and Circuit Applications (2,0) 2 Credits

An introduction to pulse fundamentals and circuits and their response in high-frequency applications. *Prerequisites: EL* 203, *EL* 212, *and MA* 112 *or MA* 241.

## EL 304

Pulse Circuits Laboratory (0,3)

1 Credit

One three-hour laboratory session per week with experiments paralleling the material of EL 303. *Corequisite:* EL 303.

# EL 307

Microprocessor Systems (3,0)

3 Credits

An advanced course designed to acquaint the student with microprocessor architecture, software, and hardware. Subject areas include microprocessor organization, instruction sets, memory mapping software and hardware, and microprocessor system design and interfacing to buses, I/O devices, memories, registers, and other digital devices.

**Prerequisites:** EL 212, EL 213, and CS 223 or CS elective.

# EL 308

Microprocessor Systems Laboratory (3,0) 1 Credit

One three-hour laboratory session per week with experiments paralleling the material of EL 307. *Corequisite:* EL 307.

# **Engineering Physics**

A grade of C or better is required in MA 241, MA 242, PS 140, PS 141, PS 215, and PS 216 for entry into all EP and ES courses.

# EP 101

Current Topics in Space Sciences (1,0)

1 Credit

A survey seminar intended to explore contemporary topics encountered in the exploration of the upper atmosphere and near space environment.

# EP 320

Electro-Optical Engineering (3,0)

3 Credits

Geometrical optics of mirrors, thin and thick lenses, prisms, and systems. Ray tracing with optical CAD. Fiber optics applications. Physical optics including interference, diffraction, and polarization. Phaser methods. Engineering considerations in choice of different types of detectors. Space systems applications. Image processing. Emphasis on design.

Prerequisites: EGR 115, PS 303.

Corequisites: MA 345, PS 305.

#### EP 340

Introduction to Space Systems Design (2,1.5)

2 Credits

An introduction to space mission analysis and design process, mission characterization, evaluation, and requirements definition. Introduction to computeraided design (CAD). Numerical modeling and simulation of engineering systems, the finite element method, the finite difference method. *Prerequisite:* ES 202.

EP 391

Microcomputers and Electronic Instrumentation (2,3)

3 Credits

This course will provide students with a background in electronics as it applies to the design of circuits of measuring instruments and to interface sensors and computers. The program of study will concentrate on following the form of the electrical signal from light, pressure, temperature, and other sensors as it proceeds through signal conditioning circuits and into the microcomputer for further processing. In the laboratory portion of the course the student will explore the design of pertinent regulated power supplies, amplifiers, logic circuits, filters, stepper motors, servo motors, and A-to-D and D-to-A converters. This work will serve as the basis for design project assignments to produce one or two working instruments that are interfaced to a microcomputer.

**Prerequisites:** EGR 115, PS 219, PS 220, or instructor's waiver.

Corequisite: MA 345.

## EP 393

Spaceflight Dynamics (2,0)

2 Credits

Basic topics in analytical dynamics, two body orbits and the initial value problem, the two body orbital boundary value problem, Earth coverage and space mission geometry, non-Keplerian effects, orbital maneuvers and rendezvous, and interplanetary transfer. Fundamentals of ascent flight mechanics, launch vehicle selection, fundamentals of entry flight mechanics, and the associated thermal control problem.

Prerequisite: ES 204 or instructor consent.

## EP 394

Space Systems Engineering (3,0)

3 Credits

Development of the fundamental principles used in the engineering and design of space systems. Several major subsystems including power, telemetry and command, communications, thermal control and guidance, navigation, and control subsystems are covered. Topics on space environmental control and life support systems, space system integration and testing and space system operations are also discussed.

**Prerequisite:** AE 313 or EP 393 or consent of the instructor.

#### EP 400

Thermodynamics and Statistical Mechanics (3,0) 3 Credits

Basic thermodynamics, entropy, kinetic theory, distribution of molecular velocities, Maxwell-Boltzmann statistics, Bose-Einstein statistics, Fermi-Dirac statistics, microcononical ensemble, canonical ensemble. *Prerequisite:* PS 303.

## EP 410

Space Physics (3,0)

3 Credits

Origin, evolution, and structure of neutral and ionized terrestrial atmosphere. Effect of sun's electromagnetic radiation on ozone shield. Photoionization and thermal structure of the neutral atmosphere as well as the ionosphere and magnetosphere. Solar disturbances and their effects on satellite orbit decay and on longdistance communication. Studies of composition, thermodynamics, and physical processes of the near-Earth space environment. Rocket and satellite monitoring and remote sensing. Numerical and instrument design projects.

Prerequisite: EP 320. Corequisite: EP 440.

#### EP 420

Planetary Science (3,0)

3 Credits

Study of the planetary system: origin, evolution, composition, present configuration, dynamics, interiors, surfaces, atmospheres, and magnetospheres of the planets and, where appropriate, similar aspects of the satellites, asteroids, and comets. Interpretations of existing data and definition of future experiments to aid in determination of the origin and evolution of the solar system are stressed.

Prerequisite: PS 303.

#### EP 425

Observational Astronomy (2,3)

3 Credits

Basic design and use of an optical telescope, fundamentals of astronomical optics including refracting and reflecting systems, principles and applications of optical filters and adaptive optics. Design optimization and trade-offs in an observing system. Telescope system calibration and techniques for enhancing tracking accuracy. Visual observation and analysis of images of the sun, moon, planets, stars, nebulae, and galaxies. Electronic imaging including quantification of radiant energy, spectroscopy, and techniques for reducing the effects of noise sources. Optical and detector design trade-offs for measurement optimization.

**Prerequisites:** PS 303, PS 305, and either PS 301 or PS 401.

## EP 440

Engineering Electricity and Magnetism (3,0)

3 Credits

Solutions of electrostatics problems using Poisson's equation and Laplace's equation, electrostatic energy, electric current, magnetic field, electromagnetic induction, physics of plasmas, Maxwell's equations, and application of Maxwell's equations (reflection, refraction, waveguides, antenna radiation). Students will write some simple computer programs.

*Prerequisites:* EGR 115, MA 442, PS 303, PS 305, PS 320, or instructor consent.

#### EP 455

Quantum Physics (3,0)

3 Credits

The Schrodinger equation in one and three dimensions and its solutions for step potentials, the harmonic oscillator, and the hydrogen atom. Operators and their matrix representations: Dirac bracket formalism, angular momentum and spin, spin-orbit interaction. Identical particles and exchange symmetries. Time-independent and time-dependent perturbation theory and approximation methods: transition rates, Fermi's rule, scattering theory. Classical and quantum statistical distributions.

Prerequisite: EP 440 or instructor consent.

#### EP 496

Space Systems Design I (1,3)

2 Credits

A program of undergraduate research, supervised by physics or engineering faculty, leading to the writing of a technical design report in an area of current interest in engineering physics.

Prerequisites: EP 340 and EP 394.

#### EP 497

Space Systems Design II (2,4) 3 Credits

This is a required course in the Engineering Physics program. It is the second of a two-semester sequence and completes senior design project requirements of this program. Continuation and completion of EP 496.

Prerequisite: EP496.

#### EP 199, 299, 399, 499

Special Topics in Engineering Physics

1-4 Credits

Individual, independent, or directed study of topics in the fields of applied physics, space systems, and allied engineering disciplines. Student design projects involve significant engineering design such as microgravity experiments and moon-buggy design. May be considered as an engineering elective with approval of the program coordinator.

# **Engineering Science**

A grade of C or better is required in MA 241, MA 242, and either PS 150 or PS 215 and PS 216 for entry into all ES courses. A passing grade in all prerequisite courses or department consent is required for entry into all ES courses.

#### ES 201

Statics (3,0)

#### 3 Credits

A vector treatment of the concepts and characteristics of forces and couples. Distributed forces. Center of mass, centroid. Equilibrium of particles and rigid bodies. Trusses and frames. Internal forces. Shear and moment distribution in beams. Area moments of inertia.

**Prerequisites:** PS 150 or PS 215, EGR 120 or EGR 111, or consent of the instructor.

Corequisite: MA 243.

#### ES 202

Solid Mechanics (3,0)

3 Credits

The concepts of stress and strain and their tensor properties. Elastic stress-strain relations. Analysis of stress and deformation in members subject to axial, torsional, bending, and combined loading. Column stability.

Prerequisite: ES 201.

#### ES 204

Dynamics (3,0)

3 Credits

A vector treatment of the kinematics and kinetics of particles and rigid bodies. Acceleration, work, energy, power, impulse, and momentum.

Prerequisite: ES 201.

Corequisite: MA 345.

#### ES 206

Fluid Mechanics (3,0)

3 Credits

Physical characteristics of the fluid state. Fluid statics. Kinematics of fluid motion. Flow of an incompressible ideal fluid. The impulse-momentum principles. Similitude and dimensional analysis, fluid measurements.

Prerequisite: ES 201.

#### ES 207

Fundamentals of Mechanics (3,0)

3 Credits

Vector analysis of forces and moments. Equilibrium analysis of static systems. Center of gravity. Kinematics, kinetics, work and energy, impulse and momentum.

Prerequisite: PS 150.

#### ES 305

Thermodynamics (3,0)

3 Credits

A study of the concepts of heat and work and their transformation as governed by the first and sec-

ond laws of thermodynamics. Properties of pure substances. Ideal gas behavior and relationships. Reversible processes and temperature-entropy diagrams. Conventional power cycles. Properties of ideal gas mixtures. Combustion.

*Prerequisites:* ES 206 and PS 160 or PS 208 or consent of the instructor.

## ES 306

Fiber Optics (2.5,.5)

3 Credits

An introductory course on optical fiber technology and applications. Course covers optical waveguide theory (multi-mode and single-mode), light sources (LEDs and lasers), and light detectors and how these components work together to form an electro-optical system. Applications to communications, sensors, and aviation are studied. Some laboratory work, computer design, and literature research are required to broaden the student's viewpoint and to achieve 1 credit of engineering design.

Prerequisites: MA 441, PS 160.

#### ES 312

Energy Transfer Fundamentals (3,0) 3 Credits

First and Second Laws of Thermodynamics for control masses and control volumes. Fundamentals of heat transfer: conduction, convection, and radiation. Application of energy balances. *Prerequisite: PS* 160.

## ES 315

Space Environment and Effects (3,0)

3 Credits

This course studies the effects of the space environment on spacecraft and spacecraft design. The vacuum, neutral, plasma, radiation, and space debris environments and their effect on space missions are examined. Special emphasis is placed on investigating the effects of radiation on the electrical spacecraft subsystems and the space debris environment.

**Prerequisites:** PS 250, junior standing, or instructor consent.

#### ES 320

Engineering Materials Science (2,0)

2 Credits

Materials used in aeronautical engineering applications. Properties of materials and their measurements. Metals and their structures. Characteristics of metallic phases. Equilibrium diagrams. Processing of metals and alloys. Plastics, their structures, and characteristics. Ceramics and their characteristics. Composite materials. Corrosion. The Engineering Materials Science Lab ES 321 must be taken during the same semester as ES 320.

*Prerequisites:* COM 221, ES 202, and PS 105 or PS 140 or consent of the instructor.

#### ES 321

Engineering Materials Science Laboratory (0,3) 1 Credit

Laboratory experiments and techniques in materials science, composites, and solid mechanics. The Engineering Materials Science Lab must be taken during the same semester as ES 320.

#### ES 403

Heat Transfer (3,0)

3 Credits

One- and two-dimensional steady and unsteady state conduction heat transfer including an introduction to finite-difference and finite-element methods of analysis. Free and forced convection heat transfer. Radiation heat transfer.

*Prerequisites:* ES 206 or permission of instructor, ES 305, MA 345.

#### ES 405

Electrical Engineering II (3,0)

3 Credits

Diode, transistor, and operational amplifier circuit analysis. System block diagrams, feedback, and transfer functions. Digital and analog computer principles. Boolean algebra, logic gates, and microprocessors. Rotating electrical machines, transformers, and other electro-mechanical energy conversion devices. *Prerequisite: EE 335.* 

#### ES 412

Structural Dynamics (3,0)

3 Credits

Simple harmonic motion. Undamped and damped free vibration and forced vibration. Multiple degrees of freedom. Multi-mass torsional and transverse systems. Equivalent torsional systems. Balancing. Dynamic damping. Computer analysis using finite element modeling.

Prerequisites: ES 202, ES 204, MA 345.

## ES 413

Engineering Fundamentals Review (1,2) 1 Credit

This course is a review of fundamental engineering principles. Problem-solving tutorial sessions help engineering students prepare for the National Fundamental Engineering or Engineering-In-Training Examination.

Prerequisite: Senior status.

#### ES 299, 399, 499

Special Topics in Engineering Science

1-6 Credits

Individual independent or directed studies of selected topics in engineering science.

**Prerequisites:** Consent of instructor and department chair. May be repeated with change of content.

# Flight-Academic

## FA 109

Intermediate Flight Transition and Procedural Familiarization (3,0)

3 Credits

A review of elementary commercial pilot flight operations including basic aircraft control, elementary radio navigation, air traffic control procedure, cross-country operations, and solo flight. Associated ground instruction will include a review of knowledge areas required for Private Pilot certification. This course is specifically designed for students entering Embry-Riddle's Commercial Pilot program with a Private Pilot certificate and desiring advanced standing.

**Prerequisite:** FAA Private Pilot Certification with Airplane Single-Engine Land Rating.

## FA 121

Private Single Flight (1,0) 1 Credit

> During this course the student obtains the foundation for all future aviation training. The student will receive training in the maneuvers and procedures necessary for him/her to meet the standards contained in the FAA Private Pilot Practical Test Standards. Additionally, the student will receive training in safety awareness, crew resource management, and aeronautical decision-making. At the successful completion of this course the student will have gained the aeronautical experience necessary

to attain a Private Pilot Certificate with an Airplane Single Engine Land Rating.

**Corequisite:** AS 121 (NOTE FOR DAYTONA BEACH CAMPUS: the FAA requires AS 121 to be completed at Embry-Riddle with a "C" or higher. Students who transfer credit for AS 121 will be required to complete additional ground training in FA 121 to meet the FAA requirement.)

#### FA 122

Private Multi Flight with Laboratory (1, 0)

1 Credit

The student will receive training in the maneuvers and procedures necessary to meet the standards contained in the FAA Multi Engine Private Pilot Practical Test Standards. Additionally, the student will receive training in safety awareness, crew resource management, and aeronautical decision-making. At the successful completion of this course the student will have gained the aeronautical experience necessary to attain the addition of a Multi-Engine Rating for the Private Pilot Certificate.

*Prerequisite:* Private Pilot Certificate with an Airplane Single Engine Land Rating (FA 121). *Corequisite:* FA 122L.

## FA 215

Upset Training

1 Credit

This flight course is designed to give certified pilots the experience and knowledge to immediately recognize aircraft upset situations and the skills to safely and precisely recover from such occurrences. This course will include flight recoveries from nose-high, nose-low, and inverted attitudes; spin entries and recoveries; and basic aerobatic maneuvers.

## FA 221

Instrument Single Flight (1,0)

1 Credit

The student will receive training in the maneuvers and procedures necessary to meet the standards contained in the FAA Instrument Rating Practical Test Standards. Additionally, the student will receive training in safety awareness, crew resource management, and aeronautical decision-making. At the successful completion of this course the student will have gained the aeronautical experience necessary to attain the addition of an Instrument Rating for the Private Pilot Certificate.

**Prerequisite:** Private Pilot Certificate with an Airplane Single Engine Land Rating (FA 121).

*Corequisite: AS* 221. (NOTE FOR DAYTONA BEACH CAMPUS: the FAA requires AS 221 to be completed at

Embry-Riddle with a "C" or higher. Students who transfer credit for AS 221 will be required to complete additional ground training in FA 221 to meet the FAA requirement.)

#### FA 222

Instrument Multi Flight (1,0) 1 Credit

The student will receive training in the maneuvers and procedures necessary to meet the standards contained in the FAA Instrument Rating Practical Test Standards. Additionally, the student will receive training in safety awareness, crew resource management, and aeronautical decision-making. At the successful completion of this course the student will have gained the aeronautical experience necessary to attain the addition of an Instrument Rating for the Private Pilot Certificate.

**Prerequisite:** Private Pilot Certificate with an Airplane Multi Engine Land Rating (FA 122).

#### Corequisite: AS 221.

(NOTE FOR DAYTONA BEACH CAMPUS: The FAA requires AS 221 to be completed at Embry-Riddle with a "C" or higher. Students who transfer credit for AS 221 will be required to complete additional ground training in FA 222 to meet the FAA requirement.)

## FA 321

Commercial Single Flight (1,0)

1 Credit

The student will receive training in the maneuvers and procedures necessary to meet the standards contained in the FAA Commercial Pilot Practical Test Standards. Additionally, the student will receive training in safety awareness, crew resource management, and aeronautical decision-making. At the successful completion of this course the student will have gained the aeronautical experience necessary to attain a Commercial Pilot Certificate with an Airplane Single Engine Land Rating.

**Prerequisite:** Private Pilot Certificate with Airplane Single Engine Land and Instrument Airplane Ratings (FA 221).

**Corequisite:** AS 321. (NOTE FOR DAYTONA BEACH CAMPUS: the FAA requires AS 321 to be completed at Embry-Riddle with a "C" or higher. Students who transfer credit for AS 321 will be required to complete additional ground training in FA 321 to meet the FAA requirement.)

#### FA 322

Commercial Multi-Flight (1,0)

#### 1 Credit

The student will receive training in the maneuvers and procedures necessary to meet the standards contained in the FAA Multi Engine Commercial Pilot Practical Test Standards. Additionally, the student will receive training in safety awareness, crew resource management, and aeronautical decision-making. At the successful completion of this course the student will have gained the aeronautical experience necessary to attain a Commercial Pilot Certificate with an Airplane Multi Engine Land Rating.

**Prerequisite:** Private Pilot Certificate with Airplane Multi Engine Land and Instrument Airplane Ratings (FA 222).

**Corequisite:** AS 321. (NOTE FOR DAYTONA BEACH CAMPUS: the FAA requires AS 321 to be completed at Embry-Riddle with a "C" or higher. Students who transfer credit for AS 321 will be required to complete additional ground training in FA 322 to meet the FAA requirement.)

## FA 323

Commercial Multi-Add On (1,0)

1 Credit

The student will receive training in the maneuvers and procedures necessary to meet the standards contained in the FAA Multi Engine Commercial Pilot Practical Test Standards. Additionally, the student will receive training in safety awareness, crew resource management, and aeronautical decisionmaking. At the successful completion of this course the student will have gained the aeronautical experience necessary to attain the addition of a Multi-Engine-Rating for the Commercial Pilot Certificate.

**Prerequisite:** Commercial Pilot Certificate with Airplane Single Engine Land and Instrument Airplane Ratings (FA 321).

## FA 326

Commercial Single Add On Flight (1,0)

1 Credit

The student will receive training in the maneuvers and procedures necessary to meet the standards contained in the FAA Commercial Pilot Practical Test Standards. Additionally, the student will receive training in safety awareness, crew resource management, and aeronautical decision-making. At the successful completion of this course the student will have gained the aeronautical experience necessary to attain the addition of a Single Engine Rating for his/ her Commercial Pilot Certificate.

**Prerequisite:** Commercial Pilot Certificate with Airplane Multi Engine Land and Instrument Airplane Ratings (FA 322).

## FA 370

#### Advanced Multi-Engine Instrument Flight 1 Credit

Introduction to autopilot and flight director operations to further develop instrument piloting skills to the ATP level. In addition, the student is introduced to advanced cross-country operations, with emphasis on precision flying skills and the use of automated flight management systems in an IFR environment.

**Prerequisites:** Commercial Pilot Certificate with a Multi-Engine Class Rating and Instrument Airplane Rating(FA 322 or FA 323).

## FA 417

Flight Instructor Rating

3 Credits

The student will receive training in the maneuvers and procedures necessary for him/her to meet the standards contained in the Flight Instructor practical test standards, Single-Engine Land with Instrument Airplane rating. Additionally, the student will receive training in cockpit resource management and safe flying practices. Associated ground instruction will include completion of the Fundamentals of Instruction, the Flight Instructor Airplane, and the Flight Instructor Instrument written test.

**Prerequisite:** FAA Commercial Pilot Certificate with Single-Engine and Instrument Rating (FA 321 or FA 326).

## FA 420

Airline Flight Crew Techniques and Procedures 2 Credits

Instruction in airline flight crew operations with emphasis on the transition of the professionally qualified pilot into a highly skilled member of an air carrier flight management team.

*Prerequisites:* Commercial Pilot Certificate with Multi-Engine/Instrument Airplane Rating, AS 387, AS 435. *Corequisite:* AS 420.

# FA 460

# Multi-Engine Flight Instructor Rating 2 Credits

The student will receive training in the maneuvers and procedures necessary for him/her to meet the FAA standards required to add the Multi-Engine Flight Instructor Rating to his/her CFI/I Rating. Additional instruction will be provided in advanced multi-engine flight crew training techniques including cockpit resource management and safe flying practices. **Prerequisites:** FA 417 or FAA Commercial Pilot Certificate with Airplane Multi-Engine Land and Instrument-Airplane Ratings and a FAA Flight Instructor Certificate with an Instrument Airplane Rating.

## FA 199, 299, 399, 499

Special Topics in Flight 0-2 Credits

Flight training in selected areas for the purpose of gaining proficiency in required pilot operations for various certificates and ratings.

**Prerequisites:** Approval of chief flight instructor and department chair.

# Honors

## HON 150

Honors Seminar I (3,0)

3 Credits

This course is open only to freshmen enrolled in the Honors program, and will satisfy the lower-level Humanities requirement in general education. An interdisciplinary Humanities course, it focuses on aesthetic, philosophical, and historical aspects of a subject, making use of text materials from several disciplines and varied media. The course also emphasizes student participation in a seminar discussion format and requires that students develop their research, critical thinking, and oral and written communication abilities. Requirements will include (but will not be limited to) text and Web-based original research, written essays, oral presentations, and participation in group discussion. Topics may vary according to instructor.

# HON 250

#### Honors Seminar II (3,0)

3 Credits

This course is open only to students enrolled in the Honors program, and will satisfy 3 credits of the lower-level Social Sciences requirement in general education. The course focuses on material pertinent to one or more disciplines within the broad arena of the Social Sciences. Specific emphases will vary by instructor. The course also emphasizes student participation in a seminar discussion format and requires that students develop their research, critical thinking, and oral and written communication abilities. Requirements will include (but will not be limited to) text and Web-based original research, written essays, oral presentations, and participation in group discussion.

## HON 350

Honors Seminar III (3,0)

Honors Seminar III will satisfy either the Humanities or the Social Sciences upper-level elective requirement in general education. Building on the previous two Honors seminars, it will require students to further develop their ability to locate and assess primary and secondary research materials, to present effective verbal and written presentations that display more sophisticated research and presentational sensibilities, and to engage in discussion that is rooted in close reading of assigned and unassigned material. Whatever the specific course topic, the seminar will be an interdisciplinary exploration of the subject, will emphasize student participation in focused class discussion, and will foster further development of research, critical thinking, and oral and written communication abilities. Topics vary by instructor.

# Human Factors

## HF 201

Introduction to Human Factors (3,0)

3 Credits

This introductory course in Human Factors psychology will provide a survey of topics including, but not limited to, human information processing characteristics, ergonomics and biomechanics, physiology, workload, and fatigue as well as common training and selection practices. Basic human abilities and limitations will be discussed in an operational context. A variety of scenarios will be used to illustrate the potential conflicts between humans, machines and the operational environment and the potential negative impact of those conflicts. Consideration of the human operator or consumer and the operational environment during the system design process will be emphasized.

# HF 210

Human Factors I: Principles & Fundamentals (3,0) 3 Credits

This course is intended to provide the student with an understanding of the basic principles of Human Factors Psychology and prepare students for further courses in the HF capstone sequence. The course includes the research, principles, and methods that are beneficial (and essential) in optimizing the interaction between people and machine elements of a system, while taking the environment into account

## HF 302

Human Factors II: Analytic Methods and Techniques (3,0)

4 Credits

Covers a variety of engineering and behavioral analytic methods and techniques critical to the study of work performance. Provides required tools needed to accomplish workload analysis as a requisite to a systems design or a redesign of an existing system. *Prerequisite:* HF 201 or HF 210.

## HF 305

Human Factors III: Test and Evaluation (3,0)

4 Credits

Studies quantitative means of modeling, analyzing, and predicting the performance of human-machine systems. Topics include queuing models, system simulation, model validation, data collection, quantitative analysis of system performance, and system design evaluation.

Prerequisite: HF 201 or HF 210.

## HF 310

Human-Computer Interaction (3,0)

3 Credits

The application of cognitive principles, ergonomics, and human factors guidelines and principles to the design and evaluation of human-computer systems. Topics include display technologies, human visual capacities, design of display parameters, and image quality metrics.

Prerequisite: HF 201 or HF 210.

## HF 312

Ergonomics and Bioengineering (3,0)

3 Credits

Advanced applications from a variety of bioengineering subfields are identified and defined with respect to their importance in the practice of human factors. Quantitative methods for the analysis of human movement. Topics include anthropometry, kinematics, kinetics, work and power, muscle mechanics, and electromyography. Introduces students to the application of ergonomic principles to the industrial environment. Includes subject matter on ergonomic planning and implementation, the work environment, NIOSHA work factors, and workstation equipment and design.

Prerequisite: HF 201 or HF 210.

## HF 315

Automation and Systems Issues in Aviation (3,0) 3 Credits

This course will involve analyzing and discussing the most current issues relevant to the new generation of aviation systems. Assumptions on which current systems are based will be identified and alternatives examined.

Prerequisite: HF 201 or HF 210.

#### HF 325

Human Factors and System Safety (3,0)

3 Credits

This course emphasizes the integration of human factors in all phases of a system's life-cycle. Accident prevention, beginning with systems engineering together with sound management, are combined in this course to enable the student to fully comprehend the human's vital roles in preventing accidents. The total program, from basic design concepts through testing, maintenance/systems management, and operational employment, is fully examined and evaluated.

Prerequisite: HF 201 or HF 210.

#### HF 335

Human Factors in Air Traffic Control (3,0) 3 Credits

A comprehensive examination of the application of human factors to air traffic control systems. The course covers the full range of applications of human factors

Prerquisite: HF 201 or HF 210.

## HF 340

Human Factors and Product Liability (3,0) 3 Credits

This course will provide the student with an understanding of the legalities and liabilities of product manufacturing. Topics to be covered will include what is required of a manufacturer when designing a product for human use, what can go wrong, the role of expert witnesses in a product liability case, a review of specific case studies, and a discussion of awards to plaintiffs.

## HF 400

Human Factors IV: System Design (3,0)

4 Credits

Application of human factors concepts to system design. Develops human factors influence on system dynamics, structure, and control as well as impact on reliability and maintainability. Emphasizes the design of control-display integration, cockpit configuration, maintainability, and reliability. Emphasizes the significant human factors contributions to the design of state-of-the-art aerodynamic and space systems. *Prerequisites: HF* 302 *and HF* 305.

#### HF 410

Human Factors Engineering: Crew Station Design (3,0)

3 Credits

In-depth treatment of human factors principles applicable to the design of crew command centers for aerodynamic aviation/aerospace systems. *Prerequisite: HF* 201 or *HF* 210.

## HF 412

Simulating Humans in Complex Systems ((3,0) 3 Credits

This course involves understanding the theory and applications for modeling human behavior in the operation of complex systems. The student will learn to program basic problems such as a traffic flow problem, a hospital transportation problem, and a bank teller efficiency problem. Several software architectures will be presented and the student will gain a working knowledge of these. Examples may include Micro Saint Sharp, ACT-R, and MIDAS. The use of human performance modifiers to discrete event simulations such as fatigue and thermal shock will be discussed as they impact task management plans. The goals of the class are to acquaint the student with how human behavior in complex systems can be simulated, studied, and assessed with the goal of applying the results.

**Prerequisites:** HF20X or HF21X. Familiarity with a programming language or macro programming such as Microsoft Access or Excel is encouraged but not required.

Prerequisite: HF 201 or HF 210.

# HF 415

Human Factors in Simulation Systems (3,0) 3 Credits

This course provides a comprehensive examination of the human factors aspects of simulation in modern aviation/aerospace. Topics will include history, stateof-the-art simulation systems, and current research and development. Discussion focuses on the extent and impact of human factors in simulator training. Topics from flight crew training, evaluation, effectiveness, and simulator sickness are examined in detail. *Prerequisite:* HF 201 or HF 210.

## HF 422

Applied Ergonomic Design, Analysis, and Evaluation (3,0)

3 Credits

This course will provide students with comprehensive exposure to the application of ergonomics analysis in the design of human/machine systems and products. Students will examine, verify, and correct the design of differently configured systems with CATIA's human modeling and ergonomics workbench. Students will learn to verify how well an existing design accommodates a specified population. Core parameters to be examined are comfort, reach, clearance, core of vision, posture analysis, range of motion, lift/lower, and push/pull analysis. Students will learn how to create a mannequin with unique characteristics of a specified population. Additionally, students will be exposed to the relevant methods of statistical analysis required to verify the output of the computer modeling simulations. Students are introduced to the statistical tools used in the corroboration of ergonomic design and verification.

## HF 490

Practicum in Human Factors Psychology (3,0) 3 Credits

Supervised applied practicum experience. This requirement may be fulfilled in several ways, including co-ops, internships, or working on an on-campus research team. Practica provide opportunities to gain practical experience in real-world settings. The student completes a specific project under the supervision of an organizational sponsor and/or a faculty member.

Prerequisites: Approval of advisor and department chair.

#### HF 299, 399, 499

Special Topics in Human Factors Psychology (3,0) 1-6 Credits

An area of study under the direct supervision of a faculty member. The course requirements and area of study are negotiated between the faculty member and the student with the approval of the department chair.

Prerequisites: Approval of advisor and department chair.

# Homeland Security

## HS 201

Introduction to Homeland Security

3 Credits

The primary focus of this course is on issues dealing with the security of the citizens and industries of the United States, with emphasis on the transportation system and critical infrastructure protection roles of the states, cities, and municipalities. Specific subjects introduced include the mission, the functions and responsibilities, and the legislative and regulatory framework governing the various agencies of the Department of Homeland Security, criminal acts against transportation, emergency management within the United States, the intelligence community and its role in homeland security, and issues pertaining to air, maritime, surface, and cargo security.

## HS 301

Fundamentals of Transportation Security 3 Credits

The primary focus of this course is on security in all modes of public transportation. Students will study the governmental organizations responsible for the security of people and property while being transported by air, rail, marine, or on the highways, as well as the federal regulations governing security in these modes of transportation. Specific subjects discussed include the federal regulations governing all modes of transportation, the role of safety and security program managers, airport security, air carrier security, foreign and indirect air carrier security, cargo security, transportation of dangerous goods, and the role of security-oriented technology. **Prerequisite:** HS 201.

## HS 302

# Fundamentals of Occupational Security 3 Credits

This course will introduce the student to the fundamentals of security and emergency planning, including the nature, scope, history, and essential elements of security in the workplace, with emphasis on the transportation industry. Specific areas include the operational aspects of security strategies for identifying and controlling security exposures, applicable legal issues, personal protection, property protection, role of intelligence, and concepts of disaster planning and management.

# HS 306

Legal and Investigative Issues of Security 3 Credits

This course is designed to provide the student with an understanding of the legal issues involved in the development, implementation, and operational aspects of administering a security program. Emphasis is placed on the framework of the legal system in the United States, as well as the international legal system. Specific subjects covered include the Patriot and Freedom of Information Acts, as well as other security-related acts, conventions, and agreements to which the United States is a party, the legal rights of the traveling public and those empowered to enforce security regulations, private security issues, and the part federal agencies play in supporting local law enforcement personnel.

## HS 307

Law Enforcement in Security

3 credits

This course is designed to provide the student with an understanding of the objectives and tactical issues and methods employed by those persons empowered to establish and enforce security programs. Emphasis is placed on the enforcement of required security programs involving transportation, including airports and air carriers. Specific subjects covered include the role of the law enforcement officer in security and in emergency response, counter terrorism, and witness interviewing.

## HS 401

Emergency Planning, Response, and Security Management

3 Credits

This course studies the various elements involved with planning for and responding to workplace, transportation, and natural disasters and emergencies. This course will adopt an all-hazards approach to the general and technical aspects of disaster planning and response, including the incident management system; alarm, warning, and communications systems; evacuation; medical response; search and rescue; media and information management; and business recovery. Case studies will be examined through the existing structures of government agencies such as FEMA, EPA, OSHA, FAA, NTSB, as well as local first responder organizations.

Prerequisite: HS 302.

# HS 402

Security and Risk Analysis 3 Credits

This course is designed as a capstone course for the Homeland Security degree and will focus on the fundamentals of risk analysis: threat identification, vulnerability analysis, and the consequent measures of risk as applied to critical infrastructures, with an emphasis on transportation systems. Topics include adversary characterization, critical asset identification, consequent analysis, vulnerability analysis of targets and facility characterization, risk ranking, assessment of countermeasures, cost benefit and analysis, and security auditing. A project dealing with the securing of a facility is an integral part of this course.

Prerequisite: HS 401.

# Humanities

Note: Foreign language courses are listed under the Language discipline (L).

## HU 125

Choral Union (3,0)

1 Credit

A singing organization open to all members of the university community. Training in choral techniques, acquaintance with choral music of all periods. (May be elected up to eight times for open elective credit.)

# The Humanities 140 Series

The HU 140 series constitutes an integral component of the University's General Education Program. This series offers students a variety of choices, with each course fulfilling a lower-level requirement in the humanities. Courses in the HU 140 series emphasize writing, reading, and appreciation skills and are designed to expose students to the complexity of human emotions and experiences. Students also explore the framework of historical and cultural contexts in which artistic and creative expressions have arisen.

In selecting a course from the HU 140 series, students have opportunities to concentrate their studies on one form of cultural expression, such as music, literature, or the visual arts. Others may opt for a course that provides a chronological examination of a cultural expression or a thematic approach to several disciplines in the humanities.

## HU 140

# Western Humanities I: Antiquity and the Middle Ages (3,0)

3 Credits

A continuation of COM 122 with an interdisciplinary emphasis. Traces the evolution of the Western humanistic tradition from antiquity to the Middle Ages using examples from art, architecture, music, philosophy, and literature. Emphasizes writing, reading, and appreciation skills.

Prerequisite: COM 122.

# HU 141

Western Humanities II: Renaissance to Postmodern (3,0)

3 Credits

A continuation of COM 122 with interdisciplinary emphasis. Traces the evolution of the Western humanistic tradition from the Renaissance to the Postmodern using examples from art, architecture, music, philosophy, and literature. Emphasizes writing, reading, and appreciation skills. *Prerequisite:* COM 122.

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#### HU 142

Studies in Literature (3,0) 3 Credits

A continuation of COM 122 with emphasis on a survey of literature. Reading materials include selected novels, poems, and plays. Emphasizes writing, reading, and appreciation skills.

Prerequisite: COM 122.

# HU 143

Introduction to Rhetoric (3,0) 3 Credits

A continuation of COM 122, HU 143 offers a broad survey of rhetorical theory and practice. Whether noble or base, rhetoric primarily uses language to achieve a desired end, usually persuasion. This course employs primary and secondary readings as a means to examine how rhetorical principles manifest themselves in a variety of cultural texts and to understand the powers of persuasion. Although instructors may choose various approaches to teaching this course, students should expect some exposure to classical rhetoricians.

Prerequisite: COM 122.

# HU 144

Studies in Art (3,0)

3 Credits

A continuation of COM 122 with an emphasis on art. Provides a foundation in the basic vocabulary, concept, processes, and history of art. Works of art, sculpture, architecture, and film from various cultures are analyzed. Emphasizes writing, reading, and appreciation skills.

Prerequisite: COM 122.

## HU 145

Themes in the Humanities (3,0)

3 Credits

A continuation of COM 122 with interdisciplinary emphasis. Through close reading of primary texts and analysis of visual and performing arts, Themes in the Humanities explores ideas central to the evolution of culture. The course is not restricted by period and is open to the full range of humanistic studies. Themes vary by instructor and are listed in the Schedule of Courses. Emphasizes writing, reading, and appreciation skills.

Prerequisite: COM 122.

#### HU 146

Music Appreciation and Criticism (3,0)

3 Credits

A continuation of COM 122 with an emphasis on listening to and writing about music. Elements of music (rhythm, meter, tempo, pitch, and pitch relationships), instruments of music, and musical forms. The course emphasizes Western classical music.

Prerequisite: COM 122.

## HU 250

Introduction to Logic (3,0)

3 Credits

Principles of valid thinking; the nature of inductive and deductive inferences and their applications. *Prerequisite:* Any course from the HU 140 series.

# HU 300

World Literature (3,0)

3 Credits

Major works and literary trends in world literature. Course content varies by instructor and is listed in the Schedule of Courses.

Prerequisite: Any course from the HU 140 series.

# HU 302

Contemporary Issues in Science (3,0) 3 Credits

This course bridges science and the humanities, examining how different disciplines approach problems of common interest. Students study selected contemporary issues such as stem cell use in medicine, evolution vs. intelligent design, imminent worldwide crises, DNA engineering, responses to climate change, and possible problems associated with autonomous machines and artificial intelligence. As they examine their own assumptions while participating in debates that encourage appreciation of other viewpoints, students demonstrate understanding of course topics in class discussion and formal papers. The course is team-taught by a Physical Sciences professor and a Communication professor, and will include guest experts on selected topics. Prerequisite: COM 221.

## HU 305

Modern Literature (3,0)

3 Credits

The mainstreams of literature of this century. Course content varies by instructor and is listed in the Schedule of Courses.

Prerequisite: Any course from the HU 140 series.

## HU 310

American Literature (3,0)

3 Credits

A survey of intellectual backgrounds, major works, and literary trends in American literature. Course content varies by instructor and is listed in the Schedule of Courses.

Prerequisite: Any course from the HU 140 series.

## HU 315

Drama Seminar (3,0)

3 Credits

Students are exposed to the theater arts and especially to performance. They acquire acting skill through class exercises and performance assignments. Dramatic literature is studied with special attention given to its stage applications. Students may participate either as actors or technicians in the theatrical production, which entails out-of-class rehearsal.

Prerequisite: COM 219.

#### HU 319

Advanced Speech (3,0)

3 Credits

This course continues the study of oral communication with emphasis on effective public speaking. It includes the analysis and practice of modern and traditional methods of persuasion within and beyond the classroom.

Prerequisite: COM 219.

#### HU 320

Aesthetics of Visual and Musical Arts (3,0)

3 Credits

Provides a survey of the major artistic monuments of Western culture and discusses the methods by which artistic productions are analyzed.

Prerequisite: Any course from the HU 140 series.

## HU 321

Mythology (3,0)

3 Credits

This course introduces the study of the myths of humankind, both ancient and modern, using perspectives and methods from archeology, anthropology, psychology, literature, and film. It explores what myths reveal about the human psyche and about historical and modern cultures. It builds facility in symbolic thinking and critical understanding of how this thinking influences contemporary literature, art, film, communication, and politics.

Prerequisite: Any course from the HU 140 series.

#### HU 325

#### Exploring Film (3,0)

3 Credits

A survey of the art of the film. History of the cinema. Basic elements, photography, continuity and rhythm, movement, imaging, music and sound, script writing, directing, editing, acting, great film artists/directors, cinematographers, actors, etc.

Prerequisite: Any course from the HU 140 series.

#### HU 330

Values and Ethics (3,0)

3 Credits

This course focuses on the process of practical ethics as a way of resolving moral conflict and of understanding professional responsibility in a multiculturally diverse society without devaluating specific viewpoints of ethical or metaphysical theory, ideology, or religion. Students will use proposals, value judgments, observation statements, assumptions,

and alternate-world assumptions in arguing contemporary issues of moral importance. With this basic moral logic, students will resolve issues in terms of rights, responsibilities, and the community of rational beings in terms of consequences and contingencies and in terms of habituated virtues and character. Free and unrestricted discourse will be encouraged to let students find common ground in diversity.

Prerequisite: Any course from the HU 140 series.

## HU 335

Technology and Modern Civilization (3,0) 3 Credits

A humanistic analysis of technology, with special attention to its influence on modern American culture in a global context. Topics include the history and development of technology, the influence of technology on certain philosophies such as determinism and utilitarianism, the influence of technology on the ecosphere, and the depiction of technology in imaginative literature.

**Prerequisite:** Any course from the HU 140 series.

#### HU 338

Traversing the Borders: Interdisciplinary Explorations (3,0)

3 Credits

This course entails the study of different approaches to gathering, analyzing, and interpreting information. Special attention is directed to recognizing connections between the boundaries of traditional disciplines. Study also involves in-depth research into a single reality-altering event. Investigation focuses on how people trained in different ways of thinking participate in and contribute to their society and the world by shaping new cultural meanings.

#### HU 341

World Philosophy (3,0)

3 Credits

This course focuses on an investigation of some of the central problems of philosophical inquiry such as what we can know and what we cannot know, how we reason, who we are, why we are here, and what we can hope for. Freedom, beauty, knowledge and logical thinking, mind, morality, god or gods, religion, truth, death, and existence might be explored using a variety of sources, including but not limited to contemporary thinkers of the European and the Anglo-American traditions. This course is designed to challenge assumptions and to help students deal with contemporary philosophical issues.

**Prerequisite:** Any course from the HU 140 series.

#### HU 345

Comparative Religions (3,0)

3 Credits

A survey of the major religions of the world, including Judaism, Christianity, Islam, Hinduism, Buddhism, and Confucianism, as well as a brief examination of the development of religion as a vital aspect of humanity's experience in history. Prerequisite: Any course from the HU 140 series.

HU 355

Creative Writing (3,0)

3 Credits

The course culminates the interpretive and expressive elements of communications classes. The study, practice, and use of a personal style of creative composition and examples of contemporary literature and submittal of publications are included in this course.

**Prerequisite:** Any course from the HU 140 series.

#### HU 361

Interpersonal Communication in the Work Group (3,0)

3 Credits

Examination of interpersonal and small-group communication topics to focus on maximizing decision making in work groups. Students are assigned to simulated consensus-driven groups. Evaluation is based on the quality of the groups' decision making, exams, class participation, and presentation of the groups' findings in a public setting.

Prerequisite: COM 219.

## HU 362

Communication and Organizational Culture (3,0) 3 Credits

Theory, survey, and application of research methods for the analysis of communication. Instructors may choose to apply methods in a variety of contexts, such as in-house publications, internal communication, speeches, and interview communication.

Prerequisites: COM 219 and COM 221.

#### HU 363

Communication and Society (3,0)

3 Credits

An examination of human communication in a variety of cultural settings. Topics vary from semester to semester. Communication behavior is viewed expansively to include verbal discourse, symbolic imagery, nonverbal communication, literature, music, and other art forms. Focus is on understanding communication behavior as symbolic action, as constructive of social reality, and as a means for entry into cultural and subcultural group experience.

Prerequisite: Junior standing or permission of professor.

# HU 370

Advanced English Grammar (3,0)

3 Credits

This course introduces students to concepts of grammatical theory mainly at the level of syntax. Avoiding the niceties of linguistic distinctions, the course will introduce the student to useable concepts and terms that are also echoed in contemporary style checkers. *Prerequisite: Junior standing.* 

HU 375

The Nature of Language (3,0)

3 Credits

This course provides a practical investigation into how people use language functions as a system of meaning. The diversity, complexity, and intrinsic fascination of this most human of behaviors is studied largely with reference to the English language. Topics include popular ideas about language, language and identity, language structure and system, language media, language acquisition and learning, language and the brain, and world languages.

Prerequisite: COM 221 or COM 222.

# HU 415

#### Non-Verbal Communication (3,0)

3 Credits

This course entails the study of communication behaviors and processes, not involving the expression of written or spoken words, which contribute information to a message. Special attention is directed to the study of voice qualities; facial expression and body language; space, personal distance, and touch; the use of time and objects; and personal appearance. Study also involves nonverbal communication in applied settings, as well as research strategies for observing, measuring, and understanding non-verbal phenomena.

**Prerequisites:** COM 219, equivalent Speech Communications course. (Also offered as COM 415. Students receive either Communication or Humanities credit, but not both.)

## HU 420

#### Applied Cross-Cultural Communication (3,0) 3 Credits

An examination of the challenges to communicating across the variety of subcultures present in work environments. Ethnicity, nationality, gender, physical impairment, and sexuality are among the areas of difference often present in business and professional environments that may influence the establishment of cooperative working relationships. Means for analyzing and developing strategies to transcend and make positive use of subcultural differences will be considered.

Prerequisites: COM 219, COM 221.

#### HU 475

Senior Thesis

3 Credits

As the culmination of the student's experience in the interdisciplinary aerospace studies major, senior thesis requires the student to complete documented research under the guidance of the course instructor, involving subject matter that is demonstrably tied to at least two of the student's three chosen minor fields of study. A series of seminar discussions or extended individual consultations with the course instructor may accompany the guided writing of the thesis. Additional faculty may be interviewed or consulted during the thesis project.

#### HU 480

Senior Thesis Research (1,0)

1 Credit

Students will select a thesis committee and research problem, conduct appropriate research, and write and defend a thesis proposal and a full sentence outline. Course lectures will be integrated with facultyguided workshops; topics include an overview of the thesis process, the development of a specific and contentious research problem, organization and format of the required thesis documents, citation standards, and appropriate academic language.

Prerequisite: COM 221 or COM 222.

## HU 485

#### Senior Thesis Writing

2 Credits

Students using the work completed in HU 480, Senior Thesis Research, write their senior thesis in a workshop environment, defending the thesis at the end of the semester. Topics include problem-solution organization, documentation, argumentation, and successful presentation strategies. Prerequisite: HU 480.

#### HU 299, 399, 499

Special Topics in Humanities 1-6 Credits

Individual independent or directed studies of selected topics in the humanities.

Prerequisites: Consent of instructor and approval of the department chair.

# Information Technology

## IT 109

Introduction to Computers and Applications (3,0) 3 Credits

Introduction to computers and an overview of PC applications. Computer literacy is presented through lectures on the computer process, the impact of computers on society, emerging technologies, and how to make hardware and software purchasing decisions. A hands-on overview of the most popular computer applications such as word processing, spreadsheet, database, electronic mail, and Internet is provided.

**Prerequisite:** Proficiency in college preparatory mathematics.

## IT 210

Web Page Authoring and Design (3,0) 3 Credits

This course will address the organization of the Internet, addressing, routing, DNS, and use of Internet applications. It will review such applications as FTP, telnet, and advanced Web searching methodology. This course covers Web page authoring and design techniques using both HTML and WYSIWYG authoring software. Students will study, create, and refine Web pages online as well as create Web graphics. Lastly, legal and ethical issues related to the Internet and emerging technologies are discussed. Prerequisite: IT 109 or BA 120, or BA 221 or CS 223, or approval.

#### IT 220

Introduction to Networking (3,0)

3 Credits

Introduction to networking covers each of the seven layers of the OSI reference model, MAC and IP addressing, identification of IP class addressing schemes including subnet masks, network wiring standards, and TCP/IP network layer protocols.

*Prerequisite:* IT 109 or BA 120 or BA 221 or approval.

#### IT 310

Web Site Management (3,0)

3 Credits

The course addresses effective Web site design including page layout, user interface design, graphic design, content flow, and site structure. Additionally, students will learn the optimal use of keywords and search engine positioning to maximize page exposure. Web site management including security and Intranet management will be discussed. The use of design standards and templates will teach students to emphasize site consistency. Students will design and create a major Web site with multiple pages and cross-linked structure.

Prerequisite: IT 210.

#### IT 320

Network Configurations (3,0)

3 Credits

Introduces the four router elements, configuration vehicles, user and privileged mode commands, configuring IP addresses, and monitoring/troubleshooting of router functions. More advanced topics include LÄN switching theory, VLANs, LAN switched design, Novell IPX, and threaded case studies. Prerequisite: IT 220.

# IT 330

Programming for the Web (3,0)

#### 3 Credits

This course introduces programming the Common Gateway Interface for Web pages using scripting languages. The emphasis is on the fundamentals of programming and creating interfaces to handle HTML form data. Students will create basic scripting programs with Web interfaces, learn to adapt existing code, and process data flows from online forms with basic database structures.

Prerequisite: CS 118 or CS 223 or IT 210 or programming experience in a high-level language.

## IT 340

WAN Theory and Design (3,0)

3 Credits

WAN theory and design covers WAN technology, PPP, frame relay, ISDN. It further discusses network troubleshooting, national SCANS skills, and threaded case studies.

Prerequisite: IT 320.

# Languages

## LAR 101

Arabic I (3,0)

3 Credits

Elementary oral-aural introduction to Arabic, including such topics as courtesy phrases, basic vocabulary, and patterns for questions and answers. Not open to students with two or more years of high-school instruction or the equivalent, or native speakers of the language.

# LAR 102

Arabic II (3,0)

3 Credits

A continuation of Elementary Arabic I.

Prerequisite: LAR 101 or permission of the instructor.

# LCH 101

Mandarin Chinese I (3,0)

3 Credits

Introduction to Mandarin Chinese language, including the pronunciation system (pin yin), basic grammar, traditional character writing and reading, speaking simple sentences, as well as cultural contexts inseparable from the language. Open only to those without prior knowledge of Mandarin Chinese or with consent of instructor.

# LCH 102

Mandarin Chinese II (3,0)

3 Credits

A continuation of Mandarin Chinese I. **Prerequisite:** Satisfactory completion of Mandarin Chinese I or consent of instructor.

# LCH 201

Mandarin Chinese III (3,0) 3 Credits

A continuation of LCH 102 with emphasis on communicative abilities in listening, speaking, reading, and writing.

*Prerequisite:* Satisfactory completion of Mandarin Chinese II or consent of instructor.

# LCH 202

Mandarin Chinese IV (3,0) 3 Credits

A continuation of LCH 201. **Prerequisite:** satisfactory completion of Mandarin Chinese III or consent of instructor.

# LFR 101

French I (3,0)

#### 3 Credits

Elementary oral-aural introduction to French including such topics as courtesy phrases, basic vocabulary, and patterns for questions and answers. Not open to students with two or more years of high school instruction or the equivalent, or to native speakers of the language.

# LFR 102

French II (3,0)

3 Credits

A continuation of LFR 101.

Prerequisite: LFR 101 or permission of the instructor.

## LGE 101

German I (3,0)

3 Credits

Elementary oral-aural introduction to German including such topics as courtesy phrases, basic vocabulary, and patterns for questions and answers. Not open to students with two or more years of high school instruction or the equivalent, or to native speakers of the language.

# LGE 102

German II (3,0)

3 Credits

A continuation of LGE 101. *Prerequisite:* LGE 101 or permission of the instructor.

## LSP 101

Spanish I (3,0)

3 Credits

Basic grammar and reading. Introduction to conversation. Not open to students with two or more years of high school Spanish or the equivalent.

## LSP 102

Spanish II (3,0) 3 Credits A continuation of LSP 101.

# Mathematics

#### MA 005

Beginning Algebra (3,1) 3 Credits

> Fundamentals and theory of algebra including exponents, radicals, factoring, linear equations, rational expressions, quadratic equations, polynomial arithmetic, and solutions to applied problems. One hour lab session per week. (Credit not applicable to any degree.) Required of all students who placed in this course.

## MA 006

Intermediate Algebra (3,1)

3 Credits

An intermediate-level algebra course. Topics include fundamental concepts of algebra; linear equations and inequalities; polynomials; rational expressions; exponents and radicals; quadratic equations; functions and graphing; systems of linear equations and inequalities. One-hour lab session per week. (Credit not applicable to any degree.)

Prerequisite: MA 005 or placement.

## MA 106

Basic Algebra and Trigonometry (3,0)

3 Credits

A study of the basic laws of fractions, exponents, radicals, inequalities, quadratic equations, complex numbers, and the elements of trigonometry.

# MA 111

College Mathematics for Aviation I (3,0)

3 Credits

A pre-calculus course designed for the student of aviation. Review of the fundamentals of algebra; linear equations and inequalities; quadratic equations; variation; polynomial, rational, exponential, logarithmic, and trigonometric functions; radian measure; right triangle solutions, vectors, and the laws of sines and cosines.

Prerequisite: MA 006, MA 106, or placement.

# MA 112

College Mathematics for Aviation II (3,0) 3 Credits

Basic calculus designed for the student of aviation. Differentiation and integration of algebraic functions; applications to velocity, acceleration, area, curve sketching, and computation of extreme values. *Prerequisite: MA* 111.

# MA 120

Quantitative Methods I (3,0)

3 Credits

An algebra methods course with applications to business and economics. Operations, relations, functions, modeling, and problem solving; systems of linear equations and inequalities.

Prerequisite: MA 006 or placement.

## MA 140

College Algebra (3,0)

3 Credits

Fundamentals of exponents, radicals, linear, quadratic, and absolute value equations, inequalities, and complex numbers. Introduction to functions, curve sketching, elementary theory of equations, sequences and series, matrix algebra, and systems of equations.

Prerequisite: MA 006, MA 106, or placement.

# MA 142

Trigonometry (3,0)

3 Credits

Trigonometric functions and their graphs; identities; radian measure with applications; compound, half, and double angle identities; solving elementary trigonometric equations, right and oblique triangles; law of sines and cosines; exponential, logarithmic, and inverse trigonometric functions; vectors and trigonometric form of a complex number.

*Prerequisite:* MA 006, MA 106, or placement. *Corequisite:* MA 140.

# MA 145

College Algebra and Trigonometry (5,0)

5 Credits

Fundamentals of exponents, radicals, linear and quadratic equations, inequalities, elementary theory of equations, sequences and series, functions, exponential, logarithmic, and trigonometric functions, radian measure, trigonometric identities and equations, vectors, laws of sines, cosines, solutions of right triangles, and complex numbers.

Prerequisite: MA 006, MA 106, or placement.

## MA 220

Quantitative Methods II (3,0)

3 Credits

An introduction to the methods and concepts of calculus with applications to business and economics; marginal functions, graphing, extreme values, and area problems. A brief introduction to descriptive statistics.

Prerequisite: MA 111 or MA 120.

## MA 222

Business Statistics (3,0)

3 Credits

Measures of central tendency and dispersion; histograms; algebra of probability; sample spaces; dependent events; Bayes' Theorem with applications; binomial, Poisson, normal distributions, and their interrelationships; sampling distributions; hypothesis testing; confidence intervals.

Prerequisite: MA 111 or MA 140.

## MA 241

Calculus and Analytical Geometry I (4,0)

4 Credits

Graphs and functions; limits and continuity; differentiation and integration of algebraic and elementary trigonometric functions; applications of first and second derivatives.

*Prerequisite:* MA 140 or MA 145 or equivalent. *Corequisite:* MA 142.

## MA 242

Calculus and Analytical Geometry II (4,0) 4 Credits

Differentiation and integration of transcendental functions; special integration techniques; polar coordinates; applications of the definite integral; numerical methods.

Prerequisite: MA 241.

# MA 243

Calculus and Analytic Geometry III (4,0) 4 Credits

Solid analytic geometry; vector functions in three dimensions; elements of infinite series; partial differentiation; directional derivative and gradient; multiple integrals.

Prerequisite: MA 242.

# MA 244

Combined Calculus (5,0)

5 Credits

Covers all the topics currently in MA 241 and MA 242.

Prerequisite: One year of calculus.

## MA 245

Applied Differential Equations (3,0) 3 Credits

Applied treatment of ordinary differential equations; Laplace transforms; matrix algebra and applications; computer techniques; numerical methods; least squares fit; normal distribution and applications.

**Prerequisites:** CS 210, MA 242. (Not for Bachelor of Science degree in Aerospace Engineering credit.)

## MA 320

Decision Mathematics (3,0)

3 Credits

The mathematical concepts and applications in mathematical model building and problem solving. Included are mathematical areas that are basic to decision theory.

**Prerequisite:** MA 211 or MA 222. (Not open to engineering students.)

# MA 345

Differential Equations and Matrix Methods (4,0) 4 Credits

Treatment of ordinary differential equations to include principal types of first and second order equations; methods of substitution on simple higher order equations; linear equations and systems of linear equations with constant coefficients; methods of undetermined coefficients and variation of parameters; Laplace transforms; series solutions; linear algebra and matrix methods of solutions; applications to physics and engineering.

Prerequisite: MA 243.

# MA 350

Partial Differential Equations (3,0)

3 Credits

Physical models leading to partial differential equations. Fourier series and Fourier transforms. Solution of linear partial differential equations, including solutions of the wave, heat and Laplace's equation. *Prerequisite: MA 345.* 

## MA 404

Statistics and Research Methods (3,0)

3 Credits

Elements of probability theory including finite probability spaces, conditional probabilities, independence, correlation, Bayes' Theorem, and Gaussian random variables. Statistical methods including contingency tables, regression, hypothesis testing. Experimental design. Ethical considerations in experimentation. Nonquantitative research methodologies. Numerical methods including the introduction of at least one computer-based statistics package.

## MA 412

Probability and Statistics (3,0)

3 Credits

Finite sample spaces; conditional probability and Bayes' Theorem, discrete and continuous random variables and their functions; expected value, variance, and standard deviation; systematic study of the major discrete and continuous distributions; moment generating functions; hypothesis testing and estimation.

Prerequisite: MA 242.

# MA 432

Linear Algebra (3,0)

3 Credits

Review of vector and matrix operations including matrix inverses, eigenvectors, and eigenvalues. Equations of lines and planes, vector spaces including basis and dimensions, linear transformations, change of basis, diagonalization of matrices, inner products and orthonormal bases, applications. *Prerequisite:* MA 245 or MA 345.

# MA 438

Numerical Analysis I (3,0)

3 Credits

Floating point arithmetic, error analysis, algorithms in interpolation, integration, differentiation, matrix algebra, approximation and solution of equations, use of numerical software packages.

Prerequisites: CS 210 or CS 215, MA 245 or MA 345.

# MA 441

Advanced Engineering Mathematics I (3,0) 3 Credits

Line and surface integrals; vector fields with the study of Green, Gauss, and Stokes Theorems; applications of vector field theory; Fourier series. *Prerequisite: MA* 345.

# MA 442

Advanced Engineering Mathematics II (3,0) 3 Credits

The solution of linear differential equations with variable coefficients; study of the derivation, characteristics, and solutions of partial differential equations; Fourier series, Fourier transform, Laplace transform, and Green's function; applications in science and engineering. *Prerequisite: MA 441.* 

# MA 443

Complex Variables (3,0)

3 Credits

Algebra of complex numbers; complex functions, analytic functions; mapping by elementary functions; conformal mappings and their applications; additional topics may include complex integration, power series expansion.

Prerequisite: MA 441.

## MA 444

Scientific Visualization (3,0)

3 Credits

Scientific visualization is the representation of data graphically as a means of gaining understanding and insight into the data. This course will introduce different aspects of scientific visualization: computer graphics and related mathematics concepts, application packages for interactive display and analysis of data.

Prerequisites: CS 315 and CS 344.

# MA 453

High Performance Scientific Computing (3,0)

3 Credits

This course is an introduction to parallel computing in computational mathematics and sciences with practical applications. We start with an overview of parallel computing and study the problem of program efficiency on parallel computers. Then we introduce two major programming paradigms: shared memory and message passing. The last third of the course will focus on applications of parallel computing in the sciences (Engineering, Physics, Mathematics, etc.).

Prerequisites: CS 375 and MA 432.

# MA 488

Numerical Methods in Fluids (3,0)

3 Credits

This course explores the theory and applications of numerical methods in fluid mechanics. The topics covered will include numerical methods for incompressible flows; primative variable and vorticitystream function on formulation; numerical treatment for inviscid and viscous flows, including restricted to incompressible flow. Emphasis will be placed on numerical methods based on finite difference, finite volume, or finite element formulations.

*Prerequisite:* MA 350 and WX 201. *Corequisite:* ES 312.

#### MA 490

Capstone Project (1,6)

3 Credits

This course is focused on the development of a functioning software product as it applies to a computational problem in the area of aviation and aerospace. Also, material on business practices, professional practices, and ethics is included. Students, working in teams, are involved in management and planning, analysis and specification, design, implementation, and testing of a software system. Project work is assessed using modern industrial software standards and review techniques. Laboratory work includes team building, project reports, walk-throughs and inspections, design activities, process analysis, and acceptance tests.

Prerequisites: SE 300, MA 444 or MA 453.

#### MA 299, 399, 499

Special Topics in Mathematics

1-6 Credits

Individual independent or directed studies of selected topics in mathematics.

**Prerequisites:** Consent of instructor and approval of the department chair.

# Mechanical Engineering

## ME 200

Machine Shop Laboratory (0,3)

1 Credit

Introduction to machine shop techniques to include familiarization with riveting, sheet metal forming, welding, and machining.

## ME 302

Introduction to Robotics (3,0)

3 Credits

This course is an introduction to robotics with emphasis on the mathematical tools for kinematics and dynamics of robot arms. Topics include the geometry and mathematical representation of rigid body motion; forward and inverse kinematics of articulated mechanical arms; trajectory generation, splines, interpolation; manipulator dynamics; position sensing and actuation; and topics in manipulator control. Coursework includes weekly problem sets and computational laboratories (using the Matlab numerical programming environment), a mid-term examination, and a final examination. *Prerequisite:* ES 204.

Corequisites: AE 430 or EE 401/402.

## ME 303

Vehicle Dynamics (3,0)

3 Credits

This course covers design considerations for highperformance vehicles such as competition automobiles and high-speed mass transit vehicles. Considered are propulsion, aerodynamics, stability, down force enhancement systems, braking and handling. Engines for various vehicles are compared, such as the conventional internal combustion engine, the rotary or Wankel, for competition applications and long life requirements such as traction engines for rail applications. Also investigated are crash safety issues for both mass transit and competition. Guided vehicles such as mass transit trains and the Intelligent Transportation System (ITS) are investigated. Future technologies such as magnetically levitated and very high-speed mass transit systems are analyzed.

**Prerequisites:** ES 202, ES 204, and ES 305, or consent of the instructor.

#### ME 304

Introduction to Machine Design (3,0)

3 Credits

Detail design of machine components; application of analytical methods in the design of simple machines. Failure mode analysis, theories of failure, yield, fracture, deflection, and fatigue analysis of machine elements. Introduction to computer methods of stress and deflection analysis using finite element analysis. *Prerequisites:* ES 202, ES 204.

#### ME 305

Machine Design Laboratory (0,3)

1 Credit

A companion laboratory to ME 304. *Corequisite: ME* 304.

#### ME 306

Robotic Mechanisms(3,0)

3 Credits

This course studies the application and design of robotic systems. Rover drives, suspension systems, tracked vehicles, gimbal-mounted cameras/sensors and walking robots are covered with an emphasis on space and aerial robotic applications. Several handson projects will be conducted and a final design project is required.

Prerequisite: ME 204.

## ME 400

Vibration & Acoustics (3,0)

#### 3 Credits

Basic concepts of vibration; free and undamped vibration; energy methods and Rayleigh's method for determination of natural frequencies; viscously damped vibration; various damping mechanisms; torsional vibration; harmonically excited vibration; transient vibration; multi degrees of freedom systems; rotor dynamics; basic principles of acoustics and wave propagation; electroacoustics; transducers, noise measurements; applications to land, airborne, and space vehicle acoustics generated by a structure's vibration or by aerodynamic sources.

*Prerequisites:* MA 345, ES 202 and ES 204, or approval of the instructor.

#### ME 401

Advanced Fluid Dynamics (3,0)

3 Credits

Development of application of Navier-Stokes equations, estimation of drag and lift, isentropic flow, normal and oblique shock waves, Fanno and Rayleigh flow, turbomachinery, introduction to computational fluid dynamics, application of CFD software. *Prerequisite:* ES 206.

## ME 402

Robotic Arms (3,0)

3 Credits

This course is an introduction to robotics with an emphasis on kinematics and dynamics of robotic arms. The Space Shuttle arm and the Mars rover arms will be analyzed. Topics include forward and inverse kinematics, trajectory generation, interpolation, and position sensing. Students will complete a project where they program a robotic arm and/or robotic welder.

Prerequisite: ES 204.

Corequisites: EE 401, ME 306.

#### ME 403

Thermal Power Systems (3,0)

#### 3 Credits

Availability and evaluation of thermodynamic properties. The thermodynamics of compressible flow. Thermodynamic power and refrigeration cycles and systems; psychometrics and environmental control; mixtures of ideal gases; introduction to combustion; internal combustion engines, gas turbines, fuel cells; and direct energy conversion. Design and optimization of power systems and climate control with applications to land vehicles, robotics, aircraft, and spacecraft.

Prerequisites: ES 305, MA 345.

#### ME 404

Mechatronics (3,0)

3 Credits

This course includes the application of microprocessors to robotic systems with control. This course emphasizes the integration of aerospace, mechanical, electrical, and computer systems in robotics. Design and integration of microcontrollers, actuators, motors, power systems, and sensors are studied with significant group oriented design experiments. Highlevel graphical programming is introduced. Simple autonomous algorithms such as line tracking, edge detection and path planning are examined with and without feedback control.

Prerequisites: EE 401, ME 306.

## ME 405

Vehicle Power Systems (3,0)

3 Credits

Modern analytical approach to the design and performance analysis of advanced internal combustion engines. Study of thermodynamics, fluid flow, combustion, and heat transfer. Engines for various vehicles are compared (such as the conventional internal combustion engine, the rotary or Wankel), for competition applications and long life requirements such as traction engines for rail applications. Fuels and combustion, exhaust flows, emission and air pollution, fuel cells systems, hybrid vehicles. Ideas from aerospace technologies are implemented, such as jet engines and gas turbines for powering vehicles, and mass transit. Also, future technologies such as magnetically levitated and very high-speed mass transit systems are analyzed. Application of course techniques to engine research projects.

Prerequisite: ES 305.

## ME 406

Robotics II (3,0)

3 Credits

This course studies the applications and design of robotic systems. Particular emphasis is placed on aviation and space applications of robotics. Typical robotic motion is investigated as well as the requirements for control systems for the needed accuracy, repeatability, and stability. Sensors such as position, force, and acceleration are explored and the signal conditioning circuits and analog-to-digital conversion required for interfacing these sensors. Activating devices such as electric motors, linear actuators, and other motion devices are analyzed. Systems are modeled and control laws are developed. Software for computer-generated control laws are studied. *Prerequisite: ME 302.* 

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## ME 407

Preliminary Design of Robotic Systems with Laboratory (3,3)

4 Credits

Mechanical design principles are developed and applied for robotic applications. The topic is selected and approved by the Mechanical Engineering Department. Principles of conceptual and detailed mechanical design, and component design, manufacture, and production are covered. A complete system is designed, resulting in a complete set of specifications, supporting analysis, drawings, and performance report. For senior undergraduate students only.

## ME 409

Vehicle Aerodynamics (3,0)

3 Credits

Aerodynamic forces on land vehicles. Design requirements for lift, drag, stability, and safety for passengers. Cars, high-performance vehicles, commercial, and motorcycles. Noise control, heating, ventilation, and air conditioning. Engines for various vehicles are compared (such as the conventional internal combustion engine, the rotary or Wankel), for competition applications and long life requirements such as traction engines for rail applications. Fuels and combustion, exhaust flows, emission and air pollution, fuel cells systems, hybrid vehicles. Ideas from aerospace technologies are implemented, such as jet engines for powering vehicles and the use of computational fluid dynamics codes to predict the aerodynamic performance of such vehicles. Also, future technologies such as magnetically levitated and very high-speed mass transit systems are analyzed.

Prerequisites: ES 201, ES 204, ES 206, ES 305.

## ME 410

Advanced Machine Design (2,0)

2 Credits

Design and analysis of mechanics system, for fluctuating loading. Fatigue analysis. Application of design fundamentals to mechanical components, and integration of components to form systems. Fatigue failure of systems. Mechanical design of such systems as bearings, transmission gears, springs, joints, brakes, and clutches. Indeterminate systems.

Prerequisites: ES 320, ME 300.

## ME 413

Preliminary Design of High Performance Vehicles with Laboratory (3,3)

4 Credits

Mechanical design principles are developed and applied for high performance vehicles. The topic is selected and approved by the Mechanical Engineering Department. Principles of conceptual and detailed mechanical design, and component design, manufacture, and production are covered. A complete system is designed, resulting in a complete set of specifications, supporting analysis, drawings, and performance report. For Senior undergraduate students only.

## ME 415

Modeling and Numerical Simulations of Energy and Environmental Systems (3,0)

#### 3 Credits

The course introduces students to the basic methods of numerical modeling for typical physical problems encountered in solid mechanics, thermal/fluid sciences, energy, and environmental systems. Students will learn how to formulate a model in terms of analgebraic or differential equation. Problems that can be solved analytically will be chosen initially and solutions will be obtained by appropriate discrete methods. Basic concepts in numerical methods, such as convergence, stability, and accuracy, will be introduced. Various computational tools will then be applied to more complex problems, with emphasis on finite element and finite difference methods, finite volume techniques, boundary element methods, and gridless Lagrangian methods. Methods of modeling convective nonlineariaties, such as upwind differencing and the Simpler method, will be introduced. Discussion and structural mechanics, internal/external fluid flows, and conduction and convection heat transfer. Steady state, transient, and eigenvalue problems will be addressed with emphasis on aerospace power and environmental systems.

#### ME 416

Robotics III (2,0)

2 Credits

This course builds on the theory of mechanisms and kinematics associated with Robotics I and II and expands on those concepts to design and analyze mobile robots as they are being used to explore planets and other inaccessible areas. The focus will be on locomotion, sensors and perception, navigation and state estimation, and environment modeling. Safety and reliability and other aspects of mobile robot design such as energy supply will be studied. Finally the student will incorporate the learned material into the mobile robots available in the space systems laboratory.

Prerequisites: ME 306, AE 430.

## ME 417

Advanced Propulsion (3,0)

3 Credits

Jet engines are analyzed in depth using the fundamental principles developed in AE 408 and by extensive computer programs. Parametric engine cycle analysis will investigate both ideal and engines with losses. The performance of a particular (actual) jet engine will be analyzed to determine how its performance is affected by operational conditions (altitude, throttle positions). In addition to the turbojet, turbofan, turboprop, and turboshaft family of jet engines, the scramjet will be analyzed.

Prerequisite: AE 408.

## ME 421

Clean Energy Systems (3,0)

3 Credits

This course will emphasize energy systems for both stationary and transportation applications. General energy requirements will be discussed for industrialized societies and the effects of waste energy and undesired byproducts. Clean energy process and minimizing the environmental effects. Examples of energy systems to be considered are fuel cells, wind energy, wave energy, geothermal energy, and solar energy.

## ME 422

Vehicle Safety and Structural Design (3,0) 3 Credits

Emphasis is on body concept for design using first order modeling of thin walled structural elements. Practical application of solid/structural mechanics is considered to design automotive bodies for global bending, torsion, vibration, crashworthiness, topology, material selection, packaging, and manufacturing constraints. Also investigated are crash and safety issues for both mass transit and the Intelligent Vehicle Highway System (IVHS) are investigated. *Prerequisites:* ES 202, ES 204.

#### ME 423

Senior Design of High Performance Vehicles (3,0) 3 Credits

This is a continuation of the preliminary design course and is the capstone course for the degree.

#### ME 424

Automation and Rapid Prototyping (3,0)

3 Credits

Participants will study rapid prototyping and automated fabrication including the generation of suitable CAD models, current rapid prototyping fabrication technologies, and automation. The rapid prototyping processes will be illustrated by the design and fabrication of parts by the students.

Prerequisite: ME 304.

## ME 425

Micro-Electrical-Mechanical Systems (3,0) 3 Credits

Scaling of micro-mechanical devices. Mechanical properties of MEMs materials. Flow physics. MEMs fabrication. Inertial sensors. Surface micro-mechanical mechanisms. Micro-robotics. The focused areas will include nano-structured materials (particularly nano-composites and multifunctional nano-materials), nano-fabrication, infrared and night vision system, and micro-crafts.

**Prerequisites:** Senior standing in an engineering program.

## ME 426

Propulsion III (2,0)

2 Credits

Engines to provide the propulsion for general aviation aircraft are analyzed. While the standard Otto Cycle engines using avgas have served general aviation well, the fuel crisis and the environmental issues around the over 14,000 suburban airports in the United States have resulted in numerous proposals for new engines. The course will study the various options: electrical, diesel, rotary, turboprop, turbofan, as well as modifications to the conventional sparkignition engine.

Prerequisites: ES 305, AE 408.

## ME 427

Senior Design of Robotic Systems (3,0) 3 Credits

This is a continuation of the preliminary design course and is the capstone course for the degree.

## ME 428

Design for Manufacturing and Assembly (3,0) 3 Credits

Manufacturing processes and life cycle design for the aerospace industry. Tolerances and materials properties. Design for manufacturing and associated costs for various manufacturing processes (machining, casting, molding, stamping, forming, forging, and extrusion) with aviation-related case studies. Design for product assembly and total assembly cost with case studies. Selection of materials and processes using design for manufacturing guidelines, standards, and tolerance fittings. Simulations using computer graphics software. Design for manufacturing course project.

*Prerequisites:* ME 300, MA 345, MA 412, and junior or senior status.

## ME 430L

Control Systems Laboratory (0,3) 1 Credit

A companion laboratory for AE 430.

# Military Science Army ROTC

## MSL 101

Basic Military Science I (1,0)

1 Credit

A study of the defense establishment and the organization and development of the U.S. Army. A study of the roles the active Army forces, the Army Reserve Forces,, and the Army National Guard play in our nation's defense. A study of the military courtesy, customs, and traditions of the service. A historical perspective of the role of the different branches of the U.S. Army and the role they have played in the freedom of our nation. An introduction to physical readiness training. Course includes lectures and laboratory. Field training exercises normally include M16-A1 rifle firing, rappelling training, and airmobile helicopter operations.

Corequisite: MY 103 Laboratory.

## MSL 101L

Basic Military Science I Laboratory (0,1.5) 0 Credit

Leadership laboratory with emphasis on military leadership and small unit tactics. Students develop leadership abilities through hands-on practical experiences. Training is introductory in scope and includes operations and tactics and land navigation subjects. Practical training exercises familiarize students with the field environment and field survival skills. The Army Physical Fitness Test (APFT) is administered to assess the state of physical development.

## MSL 102

Basic Military Science II (1,0)

1 Credit

Continued emphasis on physical readiness training. Course includes lecture and laboratory. Field training exercises normally include M16-A1 rifle firing, rappelling training, and airmobile helicopter operations. *Corequisite:* MY 104 Laboratory.

## MSL 102L

Basic Military Science II Laboratory (0,1.5)

0 Credit

Leadership laboratory with emphasis on military leadership and small unit tactics. Students develop leadership abilities through hands-on practical experiences. Training continues the leader development process while remaining introductory in scope and develops basic operations and tactics and land navigation skills acquired in MY 103 Laboratory. Practical training exercises continue cadet field orientation with the focus on individual training. Special topics, including stream-crossing techniques, field survival skills, and bivouac techniques, are covered. The Army Physical Fitness Test (APFT) is administered to assess the state of physical development.

## MSL 201

Basic Military Leadership I (1,0)

#### 2 Credits

A review of the customs and traditions of the service. The fundamentals of leadership development and the importance of understanding the principles that are important to effective leadership. This includes focus on goal setting, communication, problem solving, decision making, and group process. The course requires mandatory physical training and includes lecture and laboratory.

Corequisite: MY 203 Laboratory.

#### MSL 201L

Basic Military Leadership I Laboratory (0,1.5) 0 Credit

Leadership laboratory with emphasis on military leadership and small unit tactics. Students develop leadership abilities through hands-on practical experiences. Training continues the development of cadet leadership and critical skills while remaining basic in scope and includes operations and tactics, land navigation, first aid, and general military subjects. Practical training exercises stress development of basic skills with the focus on soldier-team development at the squad/team level. The Army Physical Fitness Test (APFT) is administered to assess the state of physical development.

#### MSL 202

Basic Military Leadership II (1,0) 2 Credits

The fundamentals of military geography and their application in the use of navigational aids for the military forces. A study of preventive medicine countermeasures and first-aid techniques that every leader must know. The course requires mandatory physical training and includes both lecture and leadership laboratory. Two weekend training exercises normally include M16-A1 rifle firing, rappelling training, and airmobile helicopter operations.

*Corequisite:* MY 204 Laboratory.

#### **MSL 202L**

Basic Military Leadership II Laboratory (0,1.5) 0 Credit

Leadership laboratory with emphasis on military leadership and small unit tactics. Students develop leadership abilities through hands-on practical experiences, strong focus on ethics, communication skills, time management, and leadership values. Training continues basic skills acquired in MY 203 Laboratory and includes operations and tactics and land navigation. Practical training exercises continue development of basic skills with the focus on soldier-team development at the squad/team level. The Army Physical Fitness Test (APFT) is administered to assess the state of physical development.

#### MSL 301

#### Officership I (3,0)

#### 3 Credits

This course examines the foundations of officership, and the character, responsibilities, and status of being a commissioned officer. It is dynamic, challenging, and stressful, for it is the course that emphasizes the warrior ethic. The course covers a wide spectrum of subjects, from training in common military skills to fostering a value system that emphasizes service to the nation, readiness to persevere in the face of obstacles, and willingness to make personal sacrifices in pursuit of the greater good. This course includes lecture, advanced leadership laboratory, physical training, and practical field training exercises.

**Prerequisites:** Completed basic military science (or given constructive credit) and be a contracted Army ROTC cadet.

Corequisite: MY 303 Laboratory.

#### **MSL 301L**

Officership I Laboratory (0,2.5)

0 Credit

Leadership laboratory with emphasis on military leadership and small unit tactics. Students develop leadership abilities through hands-on practical experiences. Training continues development of cadet competencies and confidence through intermediate leadership and technical/tactical instruction. Practical training exercises are supplementary in scope and include operations and tactics, land navigation, and weapons training. Special topics including tactical bivouac techniques, individual tactical techniques, tactical foot march techniques, squad tactics, and small unit patrolling are covered. The Army Physical Fitness Test (APFT) is administered to assess the state of physical development.

## MSL 302

#### Officership II (3,0)

3 Credits

A continuing development of the processes that distinguish commissioned military service from other professional endeavors. The main emphasis of this class will be the preparation of cadets for the six-week advanced camp they normally attend at the end of the junior year. Here their capability to conceptualize, innovate, synthesize information, and make sound decisions while under stress will be evaluated. This course includes lecture, advanced leadership laboratory, enhanced physical training, and practical field training exercises.

Prerequisite: MY 303.

Corequisite: MY 304 Laboratory.

## MSL 302L

Officership II Laboratory (0,2.5) 0 Credit

Leadership laboratory with emphasis on military leadership and small unit tactics. Students develop leadership abilities through hands-on practical experiences. Training continues development of intermediate leader and critical skills in preparation for Advanced Camp. Practical training exercises focus on soldier-team development at squad/patrol level. Training is supplementary and includes tactics, land navigation, and weapons subjects. Special topics include tactical bivouac techniques, small unit patrolling, a mini-STRAC exercise, and drownproofing. The Army Physical Fitness Test (APFT) is administered to assess the state of physical development.

## MSL 401

Advanced Military Leadership I (3,0) 3 Credits

A study of military professionalism with emphasis on command and staff relationships, organizational functions, and duties of various staff officers who assist in the leadership of the organization. A study of personnel and logistical systems and the role they play in helping the organization optimize operations and improve life in the Army community. Training in staff briefings will be used as an introduction to military procedures. This course includes lecture, laboratory, and physical readiness training.

*Corequisite:* MY 403 Laboratory.

## MSL 401L

Advanced Military Leadership I Laboratory (0,2.5) 0 Credit

Leadership laboratory with emphasis on military leadership and small unit tactics. Students develop leadership abilities through hands-on practical experiences. Training culminates the leader development process at the pre-commissioning level. Training is supplementary and includes operations and tactics, land navigation, and radio wire communication subjects. Students perform as subject matter experts and are responsible for conducting and evaluating training. The Army Physical Fitness Test (APFT) is administered to assess the state of physical development.

## MSL 402

Advanced Military Leadership II (3,0)

3 Credits

A study of ethics and professionalism in the military and the role they play in carrying out the defense policy of the United States. The fundamentals of military law, its impact on the American military society, and its place in the jurisdictional system. A history of the military courts martial as it relates to the jurisdictional process of American society. A study of the Law of Land Warfare and its relationship to the conduct of soldiers in combat. This course includes lecture, laboratory, and physical readiness training. *Corequisite: MY* 404 Laboratory.

#### **MSL 402L**

Advanced Military Leadership II Laboratory (0,2.5)

0 Credit

Leadership laboratory with emphasis on military leadership and small unit tactics. Students develop leadership abilities through hands-on practical experiences. Training culminates development of leader skills emphasizing the transition from cadet to second lieutenant. Expands the frame of reference and gradually shifts it to orient on future assignments as an officer. Training is supplementary and includes operations and tactics, land navigation, and radio wire communication subjects. Students perform as subject matter experts and are responsible for conducting and evaluating training. The Army Physical Fitness Test (APFT) is administered to assess the state of physical development.

## MSL 199-499

Special Topics in Military Science (3,0) 1-3 Credits

Individual independent or directed studies of selected topics in general military science.

**Prerequisites:** Consent of instructor and approval of professor of military science.

## Naval Science

## NSC 100

Naval Science Lab

0 Credit

Military drill, cruise preparation, customs, traditions and special areas of knowledge required of commissioned officers in the Navy and Marine Corps. Required for all midshipmen.

## NSC 101

Introduction to Naval Science (2,0)

2 Credits

Introduction to the naval service with emphasis on the mission, organization, regulations, and components of the Navy and Marine Corps. Must be completed during the freshman year. Required for all midshipmen.

#### NSC 102

Seapower and Maritime Affairs (3,0) 3 Credits

This course provides an understanding of the significance of sea power throughout history from the Phoenicians to the post-Cold War era and the War on Terrorism. Included is discussion of how naval forces constitute a vital component in promoting the national interests, policies, and overall military strategy of the United States. Midshipmen with the exception of Nurse Corps options are required to take this course in the spring of the first year. Nurse Corps option midshipmen may take the course during their second year.

#### NSC 201

Principles of Naval Leadership and Management (3,0)

3 Credits

Theory and principles of management, focusing on the officer-manager as an organizational decision maker. Includes interpersonal skills, behavior factors, and group dynamics. Required for all midshipmen. *Prerequisite:* NSC 100.

#### NSC 202

Navigation (3,0)

#### 3 Credits

This course provides a comprehensive study of ship navigation theory, principles, and procedures. Included is coverage of the international and inland rules for navigation, celestial and electronic navigation, piloting, dead reckoning, tides, weather, and use of navigational equipment, publications, and charts. Midshipmen with the exception of Nurse Corps and Marine Corps options are required to take this course.

Corequisite: NSC 202L.

#### **NSC 202L**

Navigation Laboratory

1 Credit

Laboratory work in piloting and celestial navigation to complement Naval Science 202. One hour per week. Required for all Navy option midshipmen. Not required for Nurse Corps and Marine Corps option midshipmen. (Fall term only.)

#### NSC 301

Naval Engineering (3,0)

3 Credits

Naval ship systems to include hydrodynamic forces, stability, compartmentalization, electrical, and auxiliary systems. Theory and design of steam, gas turbine, and nuclear propulsion. Shipboard safety and firefighting.

**Prerequisites:** MA 111 or higher and PS 103. Required for Navy option midshipmen; not required for Nurse Corps and Marine Corps option midshipmen.

#### NSC 302

Naval Weapons Systems (3,0)

3 Credits

An introduction to the theory of weapons systems through the study of the fundamental principles of sensor, tracking, computational, and weapons delivery subsystems. Explosives, fusing, and naval ordnance. Required for all Navy option midshipmen. Not required for Nurse Corps or Marine Corps option midshipmen.

#### NSC 310

Evolution of Warfare (3,0)

3 Credits

Survey of military history emphasizing principles of warfare, strategy and tactics, and significant military leaders and organizations. May be taken in the sophomore or junior year. Required for all Marine Corps option midshipmen. Not required for Navy option or Nurse Corps midshipmen.

#### NSC 311

#### Amphibious Warfare (3,0)

3 Credits

The history of amphibious warfare emphasizing doctrine and techniques. May be taken in the junior or senior year. Required for all Marine Corps midshipmen.

## NSC 401

Naval Operations & Seamanship (3,0)

3 Credits

This course provides an understanding of organizational interrelationships between authority, responsibility, and accountability, the concept of naval command and control, and concepts and philosophies of joint operations. Included is the study of ship handling, relative motion, basic forms of naval communications, and U.S. and adversarial weapons systems and platforms. Midshipmen with the

exception of Nurse Corps and Marine Corps options are required to take this course. (Spring term only.) Corequisite: NSC 401L

## NSC 401L

Naval Operations and Seamanship Laboratory 1 Credit

Laboratory work in maneuvering board (vector analysis) and communications, and conflict resolution to complement NSC 401. One hour per week. Required for all Navy option midshipmen. Not required for Nurse Corps and Marine Corps option midshipmen.

## NSC 402

Principles of Naval Management II/ Leadership and Ethics (3,0)

3 Credits

Integration of professional competencies and qualities of effective leadership with emphasis on moral and ethical responsibilities, accountability, communications, and military law for the junior officer. Required for all midshipmen.

# Physical Science

## PS 101

Basic Chemistry (3,1.5)

3 Credits Elementary chemical theory. Covers basic atomic theory, elements, compounds, and mixtures, calculation of weight and weight volume relationships, and basic descriptive chemistry. One 1.5-hour laboratory session per week. (Cannot be used for credit in chemistry toward a degree in Aerospace Engineering.) Passing grade required for Lab. Students who take PS 108 may not also take PS 101.

Prerequisite: MA 111 or corequisite: MA 140.

## PS 102

Explorations in Physics (3,0)

3 Credits

Survey course in elementary physics. Stress will be placed on basic concepts, principles, and history of the development of physics. Presentations will include selected topics in mechanics, heat, light, sound, electricity and magnetism, and modern physics. (Cannot be used for credit in physics toward degrees in Computer Science, Engineering Physics, Civil, Aerospace, or Electrical Engineering, or Aeronautical Science.)

Prerequisite: MA 111.

## PS 103

Technical Physics I (3,0)

3 Credits

A course in elementary physics. Stress will be placed on basic physics principles. Problem solving and problem-solving logic will be an important, integral part of this course. Topics will include Newton's Laws, projectile motion, circular motion, work, energy, conservation laws, momentum. (Cannot be used for credit in physics toward degrees in Computer Science, Engineering Physics, Civil, Aerospace, or Electrical Engineering.)

Prerequisite: MA 111 or MA 140.

Corequisite: MA 112 or MA 241.

Corequisite: PS 103L.

#### PS 103L

Technical Physics I Laboratory (0,1)

0 Credit

Techniques for data analysis and laboratory methods in the context of experiments dealing with Newton's laws, energy, and rotational motion. This laboratory is designed to complement PS 103.

Corequisite: PS 103.

## PS 104

Technical Physics II (3,0)

3 Credits

Application of basic physics principles discussed in PS 103. Other areas will include fluids, properties of matter, thermodynamics, wave motion, sound, simple harmonic motion, kinetic theory, basic electromagnetic theory, and elementary circuits. (Cannot be used for credit in physics toward degrees in Computer Science, Engineering Physics, Civil, Aerospace, or Electrical Engineering.)

*Prerequisites:* PS 103, MA 112, or MA 241. *Corequisite:* PS 104L.

## PS 104L

Technical Physics II Laboratory (0,1)

0 Credit

Techniques for data analysis and laboratory methods in the context of experiments dealing with oscillatory motion, sound, heat, fluids, and electricity. This laboratory is designed to complement PS 104. *Corequisite:* PS 104.

General Chemistry I (3,3)

4 Credits

Fundamental principles of chemistry that include nomenclature, stoichiometry, atomic structure, periodic relationships, chemical bonding, geometry of molecules, properties of gases, solutions, and an introduction to organic chemistry. Laboratory includes both descriptive and quantitative work.

**Prerequisites:** High school chemistry or PS 101 and MA 140 or MA 111 or MA 120 or their equivalents.

## PS 106

General Chemistry II (3,3)

4 Credits

Chemical principles that include thermodynamics, acids and bases, rates of reaction, electrochemistry, organic chemistry, synthetic materials. *Prereauisite: PS* 105.

PS 107

Elements of Biological Science (3,0)

3 Credits

An introductory science course in general biology. Emphasis is placed on human anatomy, and on the chemical and biological foundations of human physiology. Provides background material that supports life science applications courses. Required for the minor in Aerospace Life Sciences.

## PS 107L

Biological Science Laboratory (0,3)

1 Credit

Students will perform fundamental experiments to supplement discussions of selected topics in PS107 (Elements of Biological Science). Experiments will include use of the compound microscope to examine living and non-living cells and tissues, studies of DNA and chromosomes during mitosis and meiosis, and other types of biologically important compounds, and cell structure and transformation. Students will also measure their own pulse rate, blood pressure, and respiratory capacity. *Corequisite:* PS107.

## PS 108

Contemporary Chemistry (3,1)

3 Credits

Elementary chemical theory. The origins and development of chemistry with an overview of the present applications of chemistry and its future potential in human affairs. Applications to scientific decisionmaking in the business and industrial environment. One one-hour laboratory session per week. Students who take PS 108 may not also take PS 101.

## PS 111

Plant Biology (3,3)

4 Credits

This course will study the principles and processes associated with the biology of plants, including a survey of fungi, green protista, and plants. Major emphasis on vascular plants, evolutionary origins, and ecological adaptations. One three-hour laboratory session per week.

## PS 112

Animal Biology (3,3)

4 Credits

This course will study the principles and processes found in the animal kingdom, including a survey of the major animal groups. Major emphasis is on structure, diversity, phylogeny, and ecological adaptations. One three-hour laboratory session per week.

## PS 140

Chemistry for Engineers (4,0)

4 Credits

Chemical stoichiometry, states of matter, solutions, thermodynamics, rate of reaction, equilibrium, oxidation-reduction, corrosion, organic compounds, and polymers.

*Prerequisite:* High school chemistry or PS 101. *Corequisite:* PS 141.

## PS 141

Chemistry for Engineers Laboratory (0,3)

1 Credit

One three-hour laboratory session per week, with experiments paralleling the material of PS 140. *Corequisite:* PS 140.

## PS 142

Introduction to Environmental Science (3,0)

3 Credits

An introductory course that stresses the interrelations of all aspects of the living and the nonliving world. Introduces the student to key concepts and principles that govern how nature works and the application of these concepts and principles to possible solutions to environmental and resource problems.

Physics for Engineers I (3,0) 3 Credits

Vectors and scalar quantities, geometrical optics, kinematics, Newton's Laws of Motion, work, workenergy, conservation of energy, conservation of momentum, center of mass and its motion. *Corequisite:* MA 241.

#### PS 160

Physics for Engineers II (3,0)

3 Credits

Special theory of relativity, rotational motion, simple harmonic motion, waves, fluids, heat, kinetic theory, thermodynamics.

*Prerequisite: PS* 150. *Corequisite: MA* 242.

#### PS 208

#### Physics II (3,0)

3 Credits

Fluids, temperature, heat, first and second laws of thermodynamics, wave motion, acoustics.

Prerequisites: MA 242, PS 215, PS 216.

Corequisite: MA 243.

#### PS 210

Physics II Laboratory (0,3)

1 Credit

One three-hour laboratory session per week with experiments chosen primarily from wave motion, transverse and longitudinal waves, superposition of waves, traveling waves, and standing waves.

## PS 215

Physics I (3,0)

3 Credits

Estimations, order of magnitude analysis, Newton's Law, gravitation, kinematics, work and energy, momentum, rotation, harmonic motion.

Prerequisite: MA 241.

Corequisites: MA 242, PS 216.

#### PS 216

Physics I Laboratory (0,3)

1 Credit

One three-hour laboratory session per week, with experiments chosen primarily from mechanics. *Corequisite:* PS 215.

## PS 219

Physics III (3,0)

3 Credits

Static electricity, Gauss's Law, potential, Ohm's Law, direct current circuits, magnetic fields, induced electromotive force, inductance, EM waves, the nature of light, images formed by mirrors and lenses and optical instruments.

Prerequisites: MA 243, PS 208. Corequisite: PS 220.

#### PS 220

Physics III Laboratory (0,3)

1 Credit

One three-hour laboratory session per week with experiments chosen primarily from thermodynamics, electricity and magnetism, and geometric optics. *Prerequisites: MA* 243 and *PS* 208.

Corequisite: PS 219.

#### PS 240

Natural History of the Region (3,3)

4 Credits

This course focuses on the geology, paleohistory, flora, fauna, and ecosystems of the region. The course covers such topics as the relationship between slope, elevation, topography, and plant communities.

## PS 250

Physics III for Engineers (3,0)

3 Credits

Gravitational fields, electric fields and magnetic fields, Gauss's law, electric potential, linear accelerators, cyclotrons, capacitors, Ohm's law, Kirchoff's laws, Ampere's law, Faraday's law, Lenz's law, Maxwell equations, selected topics from modern physics.

Prerequisites: MA 242, PS 160.

#### PS 253

Physics Laboratory for Engineers (0,3)

1 Credit

One three-hour session per week. Experiments will vary from semester to semester, but will be chosen from laboratory report writing workshop, error analysis, damped harmonic oscillations, spectrometers, optics, fiber optics, atomic physics, thermodynamics, and R-C circuit theory.

Corequisite: PS 250.

Physics Laboratory Practicum (0,1)

0 Credit

Required, noncredit course. Requires the student to direct the operation of a basic laboratory for one semester. Includes laboratory preparation, laboratory discussion, and grading of laboratory reports. *Prerequisite:* COM 219.

## PS 301

Astronomy (3,0)

3 Credits

A descriptive course dealing with the structure and evolution of the physical universe. Topics include the solar system (Earth, Moon, Sun, and planets), stars, black holes, galaxies, quasars, cosmology, and exobiology. Planetarium trips and night observing sessions optional.

Prerequisite: PS 102 or PS 103 or PS 150 or PS 215.

#### PS 302

Evolution of Scientific Thought (3,0)

3 Credits

Traces the development of science from the earliest times through the modern period, with particular emphasis given to our changing concepts of nature and of science itself. (Also offered as SS 302. Students receive either Social Sciences elective credit or Physical Sciences elective credit, but not both.)

**Prerequisites:** Either HU 140 or HU 141 or HU 142 and either PS 101 or PS 102 or PS 103 or PS 150 or PS 215.

## PS 303

Modern Physics (3,0)

3 Credits

Modern concepts in physics including optics. Topics include refraction, diffraction, and scattering of electromagnetic radiation, special relativity, wave-particle duality, the uncertainty principle, quantum theory of atomic structure, X-rays, lasers, and nuclear reactions.

Prerequisites: PS 219 and PS 220.

## PS 304

Environmental Science (3,0)

3 Credits

A survey course in the environmental problems arising from human use and abuse of the environment. Ecological, economic, sociologic, and technologic principles will be applied to the management control of pollution of the atmosphere and water sources of the Earth.

Prerequisites: PS 101 or PS 140 and PS 141.

#### PS 305

Modern Physics Laboratory (0,3)

1 Credit

Experiments in atomic and nuclear physics, including spectroscopy, nuclear particle analysis, X-ray analysis, and laser applications.

Corequisite: PS 303.

#### PS 306

Consumer and Hazardous Waste (3,0)

3 Credits

Introduction to sources, characteristics, and concerns of hazardous materials in environmental systems. Examination of general approaches toward site assessment, risk analysis, site remediation, and other issues pertinent to hazardous waste management. Development of environmental literacy is emphasized.

**Prerequisite:** One year of high school chemistry or concurrent enrollment in PS 105 or PS 106.

#### PS 308

Atmospheric Environmental Studies (3,0) 3 Credits

Overview of atmospheric environmental topics on local and regional issues as well as global change issues. Introduction to the chemistry of atmospheric pollution. Examination of sources of air pollution especially from the aerospace industries. Includes discussion of monitoring, regulation, and control of air pollution.

**Prerequisites:** PS 108 or equivalent, PS 142, or permission of instructor.

## PS 309

Principles of Ecology (2,3)

3 Credits

This course is designed to provide practical experience in the scientific measurement of environmental parameters. Experience in collecting and identifying plants and animals in the different ecosystems will be developed by field and laboratory work.

*Prerequisites:* PS 107, PS 108, or equivalent (PS 101 or PS 140), and PS 142, or permission of instructor.

Air Quality and Sound Pollution (3,0)

3 Credits

The examination of the fundamental principles that govern air quality, its pollution, and its management. Also the fundamental principles associated with sound pollution and its management.

Prerequisites: PS 105, PS 106, PS 142, and WX 201.

#### PS 311

Water Quality (3,0)

3 Credits

The hydrologic cycle, with emphasis on atmospheric, land surface, shallow subsurface, and groundwater processes. Examination of physical, chemical, and biological properties of these aquatic systems and the effects of common pollutants. Development of environmental literacy is emphasized.

Prerequisites: PS 105, PS 106, and PS 142.

## PS 312

Plant Identification (2,3)

3 Credits

This course is designed to provide practical experience in identification of local flowering plants through the use of regional floras and recognition of common plant families. Elements of plant collection, identification, and herbarium techniques will be taught through classroom lectures and field and lab work. Students will be required to prepare their own plant collection.

Prerequisite: PS 111.

#### PS 313

Riparian Ecology (2,3) 3 Credits

> The analysis of the structure, function, and classification of riparian habitats with special emphasis on Southwestern waterways. Evaluation of limnological, floral, and geomorphic resources that create specific riparian habitats will be covered.

## PS 314

Environmental Chemistry (3,3)

4 Credits

This course is an introduction to the chemistry of natural systems, including cycling of elements, complex equilibria, oxidation and reduction, atmospheric chemistry, nuclear processes, energy use, and toxic substances. Laboratory work includes wet and instrumental analyses related to environmental analytical chemistry.

Prerequisite: PS 106.

#### PS 320

Classical Mechanics (3,0)

#### 3 Credits

Fundamentals of mechanics, oscillatory motion, systems of particles, varying mass, motion under central forces, motion in three dimensions, gyroscopic motion, generalized coordinates, normal coordinates, Lagrangian and Hamiltonian formulations. Students will write some simple computer programs.

Prerequisites: ES 204, MA 345, PS 219.

Corequisite: PS 303.

#### PS 400

Senior Physics Laboratory I (2,3)

3 Credits

Study of geometrical and physical optics including plane waves, mirrors, lenses, emission and absorption line spectroscopy, diffraction gratings, lasers and interferometers.

Prerequisite: PS 305.

## PS 401

Astrophysics (3,0)

3 Credits

Study of the basic physical processes operating in the astronomical environment, stellar structure and evolution, the interstellar medium, galaxies, and cosmology. Astrophysical concepts are emphasized, thus underlining the common features operating in many astronomical systems.

Prerequisites: MA 345, PS 303.

#### PS 402

Environmental Quality Laboratory (0,3)

1 Credit

A laboratory course using field techniques and equipment commonly found in environmental workplace. Projects and demonstrations will use local flight-line and airport municipalities as examples.

Prerequisites: PS 306 and PS 310.

## PS 403

Wildlife and Airports (3,0)

3 Credits

An examination of the problems and solutions associated with wildlife and their impact on airport safety. Special emphasis on problems correlated with birds. *Prerequisite: PS* 309.

Atomic/Nuclear Physics (3,0)

3 Credits

Multi-electron atoms, X-rays and gamma rays, radiative transitions in the atom and the nucleus. Basic properties of nuclei, systematics of nuclear stability, dynamics of nuclear reactions, nuclear models, and nuclear forces. Introduction to particle physics and its applications to cosmic rays, stellar energy, and the formation of the elements.

Prerequisite: EP 455.

## PS 408

Astrophysics II (3,0)

3 Credits

Radiative transfer in astrophysical environments; stellar atmospheres, stellar interiors, and gaseous nebulae. Emission and absorption processes. Interaction of radiation with matter.

**Prerequisites:** MA 345, PS 401 or permission of the instructor.

## PS 410

Senior Physics Laboratory IIa (2,3)

3 Credits

Binary stars, spectroscopic binaries, proper motion, galaxy rotation curves, image processing. *Prerequisites:* PS 400, PS 401.

## PS 412

Particle Physics and Cosmology (3,0)

3 Credits

Study of the evolution of the universe including large-scale structure, Big Bang cosmology, general relativity, and the search for dark matter. *Prerequisites: MA* 441, *PS* 405.

## PS 414

Senior Physics Laboratory IIb (2,3)

3 Credits

Measurements of nuclear and particle systems using high-precision detectors and high-speed data acquisition.

Prerequisites: PS 303, PS 305, PS 400.

## PS 199, 299, 399, 499

Special Topics in Physical Science

1-4 Credits

Individual independent or directed study of topics in the fields of the physical sciences impinging on aerospace development or practices that are of current or anticipated interest.

*Prerequisite:* consent of instructor and approval of the department chair.

# Psychology

## PSY 101

Introduction to Psychology (3,0)

3 Credits

A survey of the biopsychosocial continuum and the intrapsychic, interpersonal, and organizational factors affecting human behavior. A primary feature of the course is its focus on the scientific method as the route to psychological knowledge. Students study the rationalist, empiricist, and experimental foundations of the scientific method and how these foundations can be critiqued. Topics include sensation, perception, learning, memory, personality, psychopathology, physiological psychology, and social processes. Emphasis is placed on the application of the basic principles of psychology to engineering, aviation, public policy, and business.

## PSY 310

#### Sensation and Perception (2,1)

3 Credits

How organisms sense and perceive the environment. Topics discussed include types of stimuli affecting the sensory receptors, the anatomy and physiology of the sensory systems responding to those stimuli, and current knowledge and theories about perceptual abilities. Laboratory/research experience is included. The laboratory will include experimental investigations and demonstrations of sensory and perceptual phenomena. Vision, audition, taste, smell, the skin senses, and balance will be included. **Prerequisite:** PSY 101.

## PSY 312

Research Analysis in Psychology (3,2)

#### 4 Credits

This course is an elementary program in data analysis and statistics. The focus is on basic statistical concepts for the social sciences. Although computer data analysis is a component of the course, it is secondary to statistical theory and computational procedures. The body of the course covers parametric procedures including t-tests, analysis of variance, corelational techniques, descriptive statistics, and frequency distributions. Some attention is devoted to nonparametric analysis. The emphasis is on decisions to choose the appropriate statistical technique and computational work. Statistical computations using computer software will be covered. Data setup and analysis, as well as graph generation and statistical output interpretation, will be focused on.

Prerequisites: MA 111 or MA 140, PSY101.

## PSY 315

Cognitive Psychology (3,0)

3 Credits

Contemporary theories of human information processing. Major topics include attention, mental representations, categorization, short-term and long-term memory, psycholinguistics, reasoning, problem-solving, judgment, and decision making.

Prerequisite: PSY 101.

#### PSY 320

Aviation Psychology (3,0) 3 Credits

A study of the complexities of human factors research in aviation. Drawing extensively on such diverse areas as human physiology, basic learning theory, aviation safety, and pilot training. The course surveys the study of human behavior as it relates to the aviator's adaption to the flight environment. *Prerequisite: PSY* 101.

#### PSY 322

Research Design (3,1)

4 Credits

This is a research design course that incorporates research design practices with direct experience in the laboratory that includes data collection and analysis and the description of research findings. The course includes coverage of various research models including surveys, scaling techniques, field studies, case studies, and experimentation. Techniques commonly used by Human Factors professionals are presented with considerable attention devoted to designing experiments. Concepts in controlling, manipulating, and measuring dependent and independent variables and the elimination of experimental confounds are applied to the experimental context. Topics such as sampling techniques, construct and content validity, reliability, error variance, sampling error, and ethical concerns are discussed. The course culminates in the design, conduct, analysis, and reporting of an experiment.

Prerequisite: PSY 30X.

#### PSY 335

Physiological Psychology (2,1)

3 Credits

A study of the neural and biochemical bases of behavior with special emphasis on sensory processing, motivation, emotion, learning, and memory. Both experimental analysis and clinical implications are considered. Activities are conducted on the anatomy and physiology of the nervous system, and on the development, evolution, and function of behavior. *Prerequisite: PSY* 101.

#### PSY 340

Industrial-Organizational Psychology (3,0) 3 Credits

A survey of major topics in industrial-organizational psychology, with emphasis on organizational and personnel psychology applied to business, industry, and government. An examination and critical review of theories and research in selected areas of organizational behavior. Emphasis is on intrapersonal behavior, such as motivation, job stress, and job satisfaction.

Prerequisite: PSY 101.

#### PSY 345

Training and Development (3,0)

3 Credits

A review of the principles and techniques applicable to training and training development. *Prerequisite: PSY* 101.

#### PSY 350

Social Psychology (3,0)

3 Credits

This course examines the interactional forces between groups and the individual in society. Since the major focus of the course is on social interactions, such diverse topics as group dynamics, interpersonal relationships, prejudice, discrimination, and antisocial behavior will be considered. Special attention is given to the topic of stress in the aviation environment.

Prerequisite: PSY 101.

#### **PSY 400**

Introduction to Cognitive Science (3,0)

3 Credits

An introduction to the science of the mind from the perspective of cognitive psychology, linguistics, neuroscience, philosophy, and artificial intelligence. The focus is on the similarities and differences in the approach taken by researchers in these different fields in their study of cognitive mechanisms. Issues to be addressed: What does it mean to be able to think? What kind of computational architecture is most appropriate to describe cognitive mechanisms? Is the mind an emergent property of the brain? What kind of hardware is required for thinking to occur? Can a computer have a mind? *Prerequisite: PSY 315.* 

# **Regional Studies**

## RS 200

Modern Asia (3,0)

3 Credits

A survey course of the major political, economic, cultural, and historical changes in Asia since the 19th century. A regional and/or thematic focus may be created depending on the instructor's expertise. For example, an instructor may focus on East Asia rather than South Asia, on history rather than economy.

*Prerequisites:* HU 14X and sophomore standing or consent of instructor.

#### RS 300

**Observing Asian Cultures (3,0)** 

3 Credits

An interdisciplinary course that takes an anthropological, philosophical, and geographical approach to traveling in Asia. Topics include geographical changes in Asia, philosophical issues of travel, and the theory and methodology of studying other cultures and societies. The course culminates in an optional yet strongly recommended field trip to an Asian country.

**Prerequisite:** sophomore standing or consent of the instructor.

## RS 305

#### Asian Literature (3,0)

3 Credits

Asian literature in translation. Representative readings are chosen from ancient times to the present, from poetry to prose, from female writers to male writers, from South Asia to East Asia. Synthesis of major literary themes and development, as well as the cultural contexts for literature, is an important part of the course. The course uses both books and films as study material. A regional and/or thematic focus may be created depending on the instructor's expertise. For example, an instructor may focus on East Asia rather than South Asia, on prose rather than drama.

*Prerequisite:* Sophomore standing or consent of the instructor.

# Software Engineering

## SE 300

Software Engineering Practices (Daytona Beach 3,3) (Prescott 3,0)

4/3 Credits

This variable credit course introduces students to the fundamental principles and methodologies of largescale software development. Students learn about the theory and practice of software engineering and work as part of a team on a full life-cycle software project that includes planning, software specification, software design, coding, inspections, and testing. For students attending the Daytona Beach campus, a closed laboratory is required, and includes activities that guide project teams through a software development process and support team project activities such as team building, planning, requirements analysis and specification, design, testing, and the use of tools.

Prerequisite: CS 225.

## SE 310

Analysis and Design of Software Systems (3,0) 3 Credits

This course focuses on the fundamental methods employed in the analysis and design of software systems. Analysis is the process of determining a complete and consistent set of system requirements. Design is the process of producing a system architecture, both logical and physical, and determining an appropriate way to construct the software. The result of these processes is a documented model of the desired system. The student will learn and practice methods appropriate for both object-oriented and procedural systems.

Prerequisites: CS 315, SE 300.

## SE 320

Software Construction (3,0)

3 Credits

This course provides the student with advanced instruction in programming with an object-oriented programming language. The course objective is proficiency in use of a language widely used for general purpose software development. In addition, the student will be introduced to tools and processes appropriate for employing this language in a significant software development environment. Students attending this course must already be proficient in the use of one major programming language and have knowledge of basic software engineering practices. *Prerequisites:* CS 315, SE 300.

## SE 410

#### Formal Software Modeling (3,0)

3 Credits

This course focuses on the study of formal concepts and techniques used to model and analyze software artifacts (requirements, design, and code). The course includes a survey of mathematical modeling techniques used in software engineering. Course activities include reading, discussion, and exercises concerned with the use of formal mathematical models in software engineering (for example, work on a formal specification project, study of concepts and technology of formal model checking, use of a formal modeling tool, and presentations on articles about recent work in application and research in formal methods).

Prerequisites: CS 222, SE 300.

#### SE 420

Software Quality Assurance (3,0)

3 Credits

This course exposes the student to the key concepts and practices in software testing and quality assurance. The objective of this course is to introduce students to the concepts of Software Quality through testing, inspection, and walkthrough. The process of software testing and different testing techniques and methodologies will be covered. This course also covers topics related to the management of a testing project. Finally, different software-testing tools and their advantages and disadvantages will be discussed.

Prerequisite: SE 300.

## SE 450

Software Team Project I (2,3) 3 Credits

This is the first course in the sequence of a twocourse senior project (SE 450 and SE 451). The senior project sequence of courses is the continuation of SE 300. They provide for additional student activities with the management, analysis, design, implementation, and testing of a software system. Students work in teams and use a defined software process to develop or modify a software product. Project work is assessed using industrial software standards and review techniques. The senior project sequence is considered the capstone course for undergraduate students in software engineering. The first course in this sequence (SE 450) emphasizes the early stages of the software development life cycle (requirements, analysis, and design). The artifacts developed during this course will be used as the foundation for further development during the second course in the sequence (SE 451).

Prerequisites: Senior standing, SE 310, SE 320.

#### SE 451

Software Team Project II (1,6)

3 Credits

This is the second course in the senior project sequence (SE 450 and SE 451). This is the continuation of SE 450. This course provides for additional student activities with the management, analysis, design, implementation, and testing of a software system. Students work in teams and use a defined software process to develop or modify a software product. Project work is assessed using industrial software standards and review techniques. The senior project sequence is considered the capstone course for undergraduate students in software engineering. The second course in this sequence (SE 451) emphasizes the later stages of the software development life cycle (design, implementation, testing, and maintenance). The artifacts developed during the first course (SE 450) will be used as the foundation for further development during this course (SE 451). Prerequisites: SE 410 and SE 450.

Corequisite: SE 420.

#### SE 299, 399, 499

Special Topics in Software Engineering 1-6 Credits

Individual independent or directed studies of selected topics in software engineering. *Prerequisite: Consent of the instructor and the department chair.* 

# Safety Science

## SF 201

Introduction to Health, Occupational, and Transportation Safety (3,0)

3 Credits

This course introduces the student to the field of safety and covers basic health, safety, and regulatory issues that apply to aviation and non-aviation business in the United States. Included is a comprehensive health and safety overview of legislative development and enactment of appropriate statutes, regulations, and laws. This course also provides an introduction to hazard recognition, reporting, analysis, and control used in risk management and accident prevention. Additional topics include accident investigation, safety data statistics, ergonomics, security and emergency preparedness, safety culture, aircraft systems, air traffic control, and workers' compensation. This course reviews theories, applications, and practices of the field of safety.

#### SF 205

Principles of Accident Investigation (3,0) 3 Credits

This course is an introduction to the process required for the investigation of accidents. Topics will include different methods of accident investigation, such as root cause analysis and Management Oversight Risk Tree (MORT), among others. Further topics will include filing appropriate accident reports and applications of corrective actions.

#### SF 210

Introduction to Aerospace Safety (3,0)

3 Credits

This course provides an introduction and overview of the theories, concepts, applications, and practices of the field of aerospace safety. This course is designed for the beginning aviation safety student and covers topics such as human factors, mechanical factors, accident investigation, safety programs, and safety statistics.

## SF 311

Industrial Security (3,0)

3 Credits

This course reviews the fundamentals of security and emergency planning and management. The nature, scope, and essential elements of security in the workplace are discussed with emphasis on personal protection and to a limited extent property protection. The workplace includes selected aviation and industrial settings. Students develop and/or evaluate security programs for selected industries.

*Note:* Also offered as HS 302, Fundamentals of Occupational Safety.

## SF 315

Environmental Compliance and Safety

3 Credits

This course examines matters associated with health and safety relating to the environment including air and water quality and sanitation. The course concentrates on hazardous materials, their storage, handling, and transportation by air, rail, marine, and highway. Additional study includes waste management and cleanup as well as a detailed study of environmental laws, regulations, and the protection of workers involved in activities associated with hazardous materials.

## SF 316

Workers' Compensation, Insurance, and Risk Management (3,0)

3 Credits

Loss control activities related to workers' compensation and injury prevention practiced by major insurance companies are studied. Concepts of measuring, evaluating, and ensuring safety and health hazard risks are addressed. Basics of workers' compensation are covered together with evaluating, quantifying, and managing risk due to safety and health hazards.

## SF 320

Human Factors in Aviation Safety (3,0)

3 Credits

An examination of the major human causative agent in aircraft accidents: the human being. Emphasis is placed on the psychology and physiologic factors that enhance accident probability. Included is a detailed analysis of ergonomics (human engineering) and its influence.

#### SF 330

Aircraft Accident Investigation (3,0)

3 Credits

A detailed evaluation of the methods and procedures involved in aircraft accident investigation. The organization, duties, and procedures of the Aircraft Accident Board are analyzed. The student explores procedures for determining accident causes through analysis for such elements as the function and techniques employed by the trained accident investigator and the role of the specialized laboratory. Analyses are also made of reporting procedures and the allimportant followup work designed to avoid similar or related aircraft accidents.

Prerequisite: SF 201 or SF 210 or approval.

## SF 325

Human Factors and Ergonomics I (3,0)

3 Credits

This course is an introduction to cognitive and physical ergonomics. Topics will include musculoskeletal anatomy and physiology, anatomy and physiology of the perceptual system, and basic introduction to perception, experimental psychology, and cognitive psychology. Applications will include design of both the physical and cognitive interfaces with the work environment.

#### SF 326

System Safety (3,0)

#### 3 Credits

This course will emphasize the specialized integration of safety skills and resources into all phases of a system's life cycle. Topics will include qualitative and quantitative tools and techniques for system analysis and design applied to accident analysis, prevention and mitigation.

Prerequisites: SF 210, MA 222.

## SF 335

Mechanical and Structural Factors in Aviation Safety (3.0)

3 Credits

This course examines the influence that design, manufacturing, metallurgy, and maintenance have on aircraft accidents. A detailed analysis of the failure process will be conducted. Additional topics include stress and design loading, fatigue, corrosion, and the envelope of operation.

Prerequisite: SF 330.

## SF 345

Safety Program Management (3,0) 3 Credits

A study of the principles of the development and management of an effective safety program. The philosophy and historical development of major concepts are examined with particular emphasis on areas of special concern in organizational accident prevention. Students analyze the influence of morale, education, and training, the role of the supervisor, and other substantial program elements of value to the safety manager.

Prerequisite: SF 201 or SF 210 or approval.

## SF 341

# Safety and Security of Airport Ground Operations 3 credits

This innovative course discusses general aviation airport ground operations, particularly from the pilot and ramp worker perspectives. Focus will be on increasing awareness of airport operations and improving airport safety by creating an enhanced awareness of rules, policies, procedures, and potential hazards that affect the safety and security of aircraft, crew, passengers, and others within the airport ground operations environment. Specific topics include aircraft marshaling procedures, airfield security issues, ground vehicle operations, and accident/ incident response and reporting.

#### SF 350

Aircraft Crash and Emergency Management (3,0) 3 Credits

Theories, practices, and techniques used in the response phase of aircraft crashes and emergencies are explored. Designed as a real-world introduction to the field of emergency response at the Code of Federal Regulation (CFR) agency level, the airport response and administration levels, and related and associated entities involved in aircraft mishaps.

#### SF 355

Industrial Hygiene and Toxicology (3,0)

3 Credits

This course examines principles associated with industrial hygiene. Topics include recognition, evaluation, and control of hazards related to noise, vibration, ionizing and non-ionizing radiation, thermal conditions, chemicals, airborne contaminants, cumulative trauma and biological substances. These subjects will be discussed in relation to all regulatory requirements using engineering and non-engineering controls for reducing or eliminating health hazards in the workplace.

Prerequisite: SF 201 or approval.

#### SF 365

Fire Protection (3,0)

3 Credits

This course introduces the basics of fire and fire protection. Students will study the physics, chemistry, characteristics, and behavior of fire, fire hazards of material, fire suppression systems, extinguishing agents, and detection and alarm systems. Primary emphasis will be on transportation-related fire hazards and the regulatory requirements associated with air, rail, marine, and highway modes of transportation.

## SF 375

#### Propulsion Plant Investigation (3,0)

3 Credits

A technical course in aircraft reciprocating and turbine engine fundamentals and relevant accident investigative procedures. Areas of study include basic construction and design with emphasis on major sections, components, and their mechanical relationships. Power plant systems and system mishap investigation is also covered and includes fuel, lubrication, ignition, and start systems. A study of propeller basics and investigative techniques is also included. On-site field investigation as well as engine teardown/disassembly procedures are presented. *Prerequisite:* SF 330.

## SF 380

Internship I (3,0)

3 Credits

This internship is designed to give students handson experience in the field of safety, health, and the environment. Students apply concepts and theories learned in the program to real-world industrial settings. Students develop inspection and auditing procedures, conduct on-site measurements and evaluations of hazards, and formulate comprehensive reports detailing findings and recommendations.

*Prerequisites:* SF 201, SF 315, SF 355, SF 410, or *approval.* 

#### SF 405

Applications in Industrial Hygiene (3,0) 3 Credits

This course advances and expands on the concepts discussed in SF 355 and emphasizes the measurement and evaluation of workplace health hazards. Design and regulatory compliance of environments in office settings and manufacturing environments are addressed. Students develop and/or evaluate industrial hygiene programs for selected industries. *Prerequisite:* SF 355 or approval.

## SF 410

Design of Engineering Hazard Controls (3,0) 3 Credits

This course addresses the application of scientific and engineering principles and methods to achieve optimum safety and health through the analysis and design of processes, equipment, products, facilities, operations, and environments. Subjects will include product design, plant layout, construction maintenance, pressure vessels, and transportation vehicles and systems. These subjects will be discussed in relation to all regulatory requirements.

Prerequisite: SF 201 or approval.

#### SF 420

Analysis of Observational Data (3,0) 3 Credits

Methods for the analysis of observational data are primarily drawn for the discipline of epidemiology. This will include a set of heuristics and quantitative methods used to analyze the distributions of events (diseases, crashes, fatalities, etc.) in populations to infer the causes of those events. This course is a survey of these quantitative methods with an emphasis on occupational applications. Topics will include rates, standardized mortality ratios, methods of assessing agreement, case-control studies, cohort studies, recognizing and assessing causes of error, and advanced techniques in observational data analysis.

Prerequisite: MA 222.

#### SF 425

Human Factors and Ergonomics II (3,0)

3 Credits

This course is an extension of Human Factors and Ergonomics I and will provide greater depth in such topics as biomechanics, work physiology, ergonomics field methods, psychophysical methods, signal detection theory, information theory, and human error/reliability.

Prerequisite: SF 325.

#### SF 435

Aircraft Crash Survival Analysis and Design (3,0) 3 Credits

An in-depth analysis of the accident environment with particular emphasis on the protection of the occupants. The injury mechanisms and causes will be analyzed, as will the physics and kinematics of the impact sequence. The intent of the course is to familiarize the student with what can be done to minimize the effects of an accident.

Prerequisite: SF 335 or approval.

#### SF 440

Design of Engineering Hazard Controls II (3,0)

3 Credits

This course covers all relevant standards and regulations related to construction together with the development and implementation of construction safety programs. OSHA Standards 29 CFR 1926 and work methods design will serve as a basis for this course. *Prerequisite:* SF 201 or approval.

## SF 445

System Safety in Aviation (3,0) 3 Credits

This course entails specialized integration of skills and resources in all phases of the life cycle of a given system in furtherance of accident prevention. Its heritage is systems engineering and management theory but it is amplified to include modern safety practices derived from numerous disciplines. Accordingly, this course reviews the development and implementation of system safety technology in aviation, both civil and military. Students will acquire an understanding of how accident prevention is designed into an aircraft under development, evaluated and enhanced during flight test, and ensured or otherwise controlled during operational use. This learning is juxtaposed with other elements of the total aviation system.

## SF 450

#### Internship II (3,0)

3 Credits

This internship is designed to give students handson experience in the field of safety, health, and the environment. Students apply concepts and theories learned in the program to real-world industrial settings. Students develop inspection and auditing procedures, conduct on-site measurements and evaluations of hazards, and formulate comprehensive reports detailing findings and recommendations. *Prerequisite: SF* 380.

## SF 462

Health, Safety, and Aviation Law (3,0) 3 Credits

This course introduces the student to the legal issues and concerns confronting the health and safety industry. Included is an overview of the historical legal precedence established for the aviation industry, as well as a comprehensive examination of laws, regulations, and legislation that govern the actions and authority of the health and safety professional. This course also provides an introduction to the governing bodies and associations that are tasked with setting the legal standards by which the industry must operate, including the scope and level of their authority.

#### SF 475

Senior Project (3,0)

3 Credits

This course requires senior level students to conduct research in a safety-related topic of his or her choosing under the direction of a faculty member.

#### SF 299, 399, 499

Special Topics in Aviation Safety

1-3 Credits

Individual independent or directed studies of selected topics in aviation or non-aviation safety topics.

**Prerequisites:** Approval of program chair, department chair and consent of instructor, and 12 hours of SF courses.

## Simulation

## SIM 200

Aviation Simulation Systems (3,0)

3 Credits

This course emphasizes the importance of building a simulation system that delivers a flight experience that is realistic to the pilot. The student will develop a thorough understanding of the relationships between fidelity, FAA criteria for simulation approval, and pilot modal interaction with the simulation regarding senses, including proprioceptive, visual, tactile, and aural. Students will conduct an analysis of the need for motion and motion cueing to gain inferences on the associated effects on fidelity.

## SIM 300

#### Flight Dynamics Algorithms

3 Credits

This course will derive the equations of motion of a 6 DOF aerospace vehicle. Stability derivative will be defined mathematically. The equations for static and dynamic stability of the longitudinal and lateral directional motion will be derived. Numerical integration methods in a suitable computer language will be used to solve these equations. Physical understanding of stability derivates will be discussed at length.

Prerequisite: MA 345 or equivalent.

#### SIM 400

Instrumentation for Flight Test (3,0)

3 Credits

Advanced instrumentation setups for aircraft flight testing. The following aircraft quality transducers will be discussed theoretically: accelerometers, rate gyros, strapdown gyro packages, digital pressure transducers, thermocouples, linear displacement transducers, load cells, and RPM transducers. Installation of the above instruments will be discussed. Calibration and errors will be investigated. This course includes a lab for installation and calibration of transducers on an aircraft.

Pre/Corequisites: SIM 300 and MA 345.

#### SIM 402

Introduction to Flight Testing (3,0) 3 Credits

An overview of the role and function of flight testing in the aerospace industry. Major topics will include past, present, and future of flight test, FAA and DOD certification processes, risk management, test planning and reporting, and an overview of the principal flight test methods and procedures for aircraft and engine performance, stability and control, handling qualities, avionics systems performance and integration, human factors evaluation, production and maintenance flight test, homebuilt flight test, and DOD operational flight test. Final project will involve team evaluation of an aircraft using Embry-Riddle simulators, including test planning and reporting. Lab fee required.

Prerequisites: AS 309 or equivalent and SIM 200.

## SIM 404

Fly-By-Wire Aircraft Simulation and Design (3,0) 3 Credits

This course addresses recent advances in automated flight control systems. Fly-by-wire aircraft architecture will be discussed. Aircraft simulations will be used to enhance and stabilize aircraft stability and handling qualities. Strategies such as theta control, c-star, and flight path angle control will be addressed. *Prerequisite: SIM* 300.

#### SIM 406

Aviation Simulation Systems Integration (3,0) 3 Credits

This course addresses recent advances and new applications in the expanding field of telecommunications and computer networks and their relationship with computer-based simulations. Students learn the principles for creating a distributed interactive simulation (DIS) environment that realizes a common operational environment among the systems. The course addresses creation of a DIS environment that is coherent in time and space. Students learn aspects of networking necessary to create real-time seamless simulated flight environments. Topics include: ATM (asynchronous transfer mode), SONET/SDH (synchronous optical network/synchronous digital hierarchy), gigabit ethernet, 10 gigabit ethernet, OSI (open systems interconnection) reference model, TCP/IP (transmission control protocol/Internet protocol) transmission media, network topologies, network protocols, and network performance.

Prerequisite: IT 220 or equivalent.

## SIM 410

Flight Test and Simulation

3 Credits

An interdisciplinary, capstone course in flight-testing and simulation. This course will rely on interdisciplinary groups to perform flight tests and simulation matching for typical FAA certification of aircraft and simulators. Lab fee required.

Prerequisite: SIM 300 or AS 340.

## Global Security and Intelligence Studies

## SIS 100

Introduction to Global Security and Intelligence Studies (3,0)

3 Credits

SIS 100 is the introductory course for the Global Security and Intelligence Studies program. It discusses the whole range of contemporary international issues, from questions of realism versus idealism in foreign affairs, to changes in the nation-state, the implications of climate change, the proliferation of weapons of mass destruction, international development, the rise of China, and international public health. The course requires the student to closely follow breaking international developments and learn to discuss these objectively and analytically. An important emphasis throughout the course is for the student to learn and demonstrate critical thinking and imagination.

## SIS 200

# Introduction to the American Legal System (3,0) 3 Credits

This course will provide a general overview of the legal system in the United States. It is a core course for the GSIS program, designed to give the student a foundation in legal theory and philosophy, the sources of law, the place of the judicial system in the United States, the structure of the courts, original through appellate jurisdiction, judicial review, the role of the legal profession, the structure of civil and criminal cases, the adversarial process, constitutional law and protections, and the application of law to security and intelligence issues.

**Prerequisite:** College-level history or permission of the instructor.

## SIS 312

Global Crime and International Justice Systems (3,0) 3 Credits

This course presents the current status and future trends in global crime and criminal justice systemic approaches to combating global crime. First, the course describes the rise of novel criminal activities in the context of globalization as well as the influence of globalization on pre-existing criminal activities. Second, the course describes globalization's effects on the structure, function, and process of criminal justice systems. Third, the course explores the reciprocal interactive and contextual relationships between global crime and criminal justice systems. The course emphasizes global, multicultural, and world historical perspectives of crime to professionally and personally prepare students for the challenge of 21st century life.

**Prerequisites:** SS 204, SS 235, SS 310; and SIS 200 or permission of the instructor.

## SIS 315

Studies in Global Intelligence I (3,0) 3 Credits

This course will examine the uses of strategic intelligence by world leaders in shaping policy and the effects of strategic intelligence on world events. Issues to be covered include theoretical models of strategic intelligence; intelligence collection, evaluation, analysis, production, and dissemination; intelligence oversight; covert and clandestine operations; intelligence bureaucracies; ethical and moral issues in intelligence; counterintelligence. The course emphasizes strategic intelligence in the business, political, military, scientific, and technological domains.

**Prerequisites:** junior standing or permission of the instructor.

## SIS 317

Political Change, Revolution, and War (3,0) 3 Credits

This course is designed to familiarize the intelligence professional with how major events and systemic changes occur in the international system through wars and revolutions. It also examines political changes that occur in a slower, more evolutionary way. In both cases, the approach is through a study of historical and contemporary examples. The signals that political systems give off as they approach major structural change are examined in some detail, as are the structures of revolutions and conventional and unconventional wars, including asymmetrical wars. Social and economic trends that shape more evolutionary political change are also studied. All forms of change in the international system are of importance to the intelligence analyst, who must warn the policy community of anticipated developments of importance to the government and, subsequently, explain the implications of what has occurred. The course will enable the student to understand predictive analysis and modeling and provide analytical tools with which to deal with changing events.

**Prerequisites:** SS 110 and 235; SIS 315; or permission of the instructor.

## SIS 320

Topics in Global History, Politics, and Culture (3,0) 3 Credits

This course provides the student with an opportunity to focus more deeply on a region of the world, a particular culture or period in history, or a specific international problem. The topic covered by the course in a particular semester will vary according to student and program needs. The regions to be covered on an as-needed basis will include Europe, Latin America, the Middle East, Africa, and Asia. Alternatively, the course could focus on a topic such as Islam in the contemporary world, the weaponization of space, the implications of world migratory patterns, changing issues in international development, or the spread and implications of pandemics. Students may repeat the course in order to study another region or topical area.

**Prerequisites:** SS 110 and 235; or permission of the instructor.

#### SIS 323

Intelligence and Technology (3,0)

3 Credits

This course will examine the whole arena of intelligence and technology, beginning with the World War II period, when science and technology came to play a critical role in intelligence. The course will cover technical intelligence collection methodologies and systems, the use of aircraft and space-based vehicles as collection platforms for photo-optical and digital imagery, radar imaging, infrared and multi-spectral imagery, signals intelligence, etc. The course will provide a technical understanding of these methodologies, as well as an analysis of their place in all-source collection. The course will also examine the current development and implications of intelligence technologies, such as the emergent UAV systems.

Prerequisite: SIS 315 or permission of the instructor.

#### SIS 325

History of Terrorism (3,0) 3 Credits

This course will introduce the student to the history of terrorism, from the 19th century up to the present day. It will evaluate the causes of terrorism, the capabilities and limitations of terrorist groups, the requisites of effective counterterrorism responses, and the future prospects of terrorism. It will address the implications of terrorism and asymmetrical warfare for U.S. national security, including the possible use of weapons of mass destruction. The constitutional and legal implications of counterterrorist strategies will also be discussed. It will examine the organization, objectives, and methodologies of key terrorist groups operating in the 21st century, particularly those showing ideological hardening, religious revivalism, and ethnic militancy.

Prerequisites: SS 110 and SS 235.

#### SIS 326

Personal Security and Defensive Skills (3,0) 3 Credits

Basic instruction in personal security through historical, technological, and practical education and training in the art and science of personal security awareness and defense for the professional. A comprehensive education on firearms history, laws, mechanics and ballistics, technology, current events, cultural philosophies and psychology, and very large emphasis on safety from varying perspectives. This is a two-phase course in which phase one is mandatory and phase two is an optional lab.

#### SIS 328

Intelligence Analysis, Writing, and Briefing (3,0) 3 Credits

This course is designed to strengthen the student's analytical and communications skills, preparatory to

a career in intelligence and corporate security arenas. The course will enable the student to understand predictive analysis and modeling and will provide analytical tools with which to deal with changing events. Included among the latter are computerbased analytical programs currently used intensively in the intelligence community, as well as familiarity with intelligence and warning matrices and link analysis. The student also is trained to write intelligence briefs and required to practice this style and format under short deadlines. The student also will write a longer intelligence assessment and then brief that to the class.

#### SIS 400

International Security and Globalization (3,0) 3 Credits

An analysis of 21st-century international security issues related to scientific and technological change. Topics include the nature of security-economic, sociocultural, and military; political leadership/followership, decision making, and conflict resolution; political violence, especially terrorism and ethnic conflict; intelligence and counterintelligence analysis and operations; weapons proliferation; information warfare; the politics of international organized crime; bureaucratic evil; internal dislocation and immigration; and the politics of public health. A special focus throughout the course will be on the aviation and aerospace industries: policies and operations, safety, and security. This course will emphasize science, technology, and globalization as the environment in which concepts of international security evolve and as impacted by international security phenomena.

**Prerequisites:** College-level psychology and college-level history or permission of instructor.

#### SIS 405

Environment and Security (3,0) 3 Credits

Credits This cour

This course is designed to introduce students to the contingencies and conflicts posed by the intersection of security and environmental issues, including disputes over ground water rights, international rivers, scarce energy resources, manipulation of crop gene pools, genetically modified crops, global migration, international treaties and conventions on environmental issues, and global climate change. Students will be introduced to environmental issues that pose significant security risks to a nation, affect a nation's economic wellbeing and/or military preparedness, and pose challenges to those laws governing the protection of the natural environment. Ethical issues will also be addressed, particularly as these relate to

policy making on issues that span both environmental and security concerns.

Prerequisite: SIS 315 or permission of the instructor.

## SIS 410

Business Security and Competitive Intelligence (3,0) 3 Credits

This course will focus on the security requirements of corporations, in both the domestic and international arenas. Among the topics addressed are personnel security, due diligence in hiring, physical security and access controls, government classification systems and requirements, political and security risk analysis, and corporate crisis and emergency planning and management. Included in the international sphere will be stakeholder analysis; the implications of cultural factors, legal systems, and international criminal threats; emergency extraction methodologies and actors; and kidnap and rescue. In addition, the course will develop approaches to competitive intelligence. This is the use of methods in the legal domain and using open source information to seek out and analyze the strategic plans of one's competitors, of their intended actions and investments, methods of operation, and corporate financial position.

**Prerequisites:** SIS 312 and 315; or permission of the instructor.

## SIS 415

Studies in Global Intelligence II (3,0)

3 Credits

This course provides an intensive, semester-long simulation for teams of students assuming the roles of political, military, economic, or scientific and technological intelligence case officers. Through the semester-long immersion with an intelligence tasking, students will be expected to demonstrate sophistication with case officer-agent relationships; staffing and coordination involving the various combinations in one's intelligence station, among stations, and between one's station and regional and central headquarters; intelligence briefings, executive summaries, and estimates; credibility and risk analysis, both of sources and of recommendations concerning specific covert action, espionage, and counterintelligence operations; operations/physical/communications/ personnel securities; and the intelligence opportunities, limitations, and threats presented by today's era of globalization.

Prerequisite: SIS 315 or permission of the instructor.

## SIS 420

Aviation Security and Technology (3,0) 3 Credits

This course will concentrate on the disciplines of security and intelligence as applied to aviation. Students will learn to apply the four core security disciplines: communications security, operations security, physical security, and personnel security. Of prime concern in this course is airport/aviation readiness to prevent and respond to the following threats: hijackings, CBRN attacks, bombings, missiles, and shootings as perpetrated by terrorists and/or various nonpolitical hijackers. Other topics include airport familiarization and safety; post 9/11 responses by the public, industry, and government; airport hardening; security screening; first responder roles and needs; the off-airport interface and multimodal infrastructure; cargo and general aviation issues; international security; biometrics and other emerging technologies; and airline security issues.

**Prerequisites:** SIS 312 and SIS 315; or permission of the instructor.

## SIS 422

Homeland Security and Technology (3,0)

3 Credits

This course will examine the whole range of issues relevant to the defense and security of the U.S. homeland. These will include transportation security, immigration and border security, cargo security, the presence of radical elements in the United States, the statutory and regulatory structure, and the institutions and agencies responsible for homeland security at the federal, state, and local levels. Legal and ethical issues also will be examined, as these relate to national security and privacy.

Prerequisite: SIS 315 or permission of the instructor.

## SIS 425

Personnel Security (3,0)

3 Credits

This course will focus on how one to minimize violations of trust in the professional world. It does this through a detailed analysis of the selection, orientation, management, training, resignation, termination, and retirement of personnel in security, intelligence, business, and government organizations. The scope of this course embraces relevant material from the behavioral and social sciences, philosophy, history, computer science, engineering disciplines, and personnel security case histories. Of special relevance are the constructs of personality, morals and ethics, deception, genetic epistemology, corruption, coercion, profiling, and private and public self-consciousness. *Prerequisite: SIS 315 or permission of the instructor.* 

#### SIS 199, 299, 399, 499

Special Topics in Global Security and Intelligence Studies

1-3 Credits

Individual independent or directed studies of selected topics in Global Security and Intelligence Studies related topics.

**Prerequisites:** Consent of instructor and approval of department or program chair. May be repeated with a change of subject.

## Space Studies

## SP 110

Introduction to Space Flight (3,0)

3 Credits

A survey of the major aspects of space flight. Topics covered include the history of space flight, space shuttle operations, and present and future commercial, industrial, and military applications in space.

## SP 200

Planetary and Space Exploration (3,0)

3 Credits

This is a survey course of U.S. and international space programs. The student will be introduced to the Earth and its space environment, to methods of scientific exploration, and to spacecraft and payload criteria at the introductory physics level.

## SP 210

Space Transportation System (3,0)

3 Credits

A survey course of the space transportation system (STS) at the introductory physics level. Included are manned space flight operations, supporting systems, and the space shuttle mission, both present and future. A review of space shuttle flight profiles, guidance and navigation control, proximity operations and rendezvous, and a brief review of hypersonic orbiter aerodynamics are included. Also covered are future STS applications to space station logistical operations, commercial applications, and Department of Defense operations.

#### SP 215

Space Station Systems and Operations (3,0) 3 Credits

This course is designed to provide a brief study of the space station's flight operations, its supporting elements, and planned systems. The survey study will include commercial applications, logistical support, and maintenance and servicing design concepts at the introductory level.

#### SP 220

Life Support Systems (3,0)

3 Credits

This course is a survey at the elementary physics level of the requirements and design considerations for life support systems in space and on other planets. Included are an introduction to basic human physiology, a description of the space environment and a survey of historical life support systems, and a presentation of spacecraft limitations and requirements.

Prerequisite: PS 102 or PS 103.

#### SP 300

Satellite and Spacecraft Systems (3,0)

3 Credits

Orbital satellites and spacecraft are discussed according to their application, design, and environment. The power system, shielding, and communication systems are reviewed along with their missions, space environment, and limitations.

Prerequisite: MA 112 or equivalent.

#### SP 400

Introduction to Space Navigation (3,0)

3 Credits

This course will introduce the student to basic elements of space navigation at the introductory physics level. The consequences of Newton's law of gravitation and central force motion, including Kepler's three laws of planetary motion, are explained. The physical characteristics of the solar system and the Earth/Moon system are reviewed. The basic methods and techniques of navigating in near-Earth orbit and the Moon and planets are described.

Prerequisites: MA 112 and PS 103 or equivalent.

## SP 425

Selected Topics in Space and Aerospace (3,0) 3 Credits

This course introduces students to problems in space operations, space flight, or other space-related topics that can be critically addressed from a knowledge base of elementary calculus, elementary physics, and the subject matter of any two space studies courses. The specific topics will be selected by the course monitor and instructor and published in the Schedule of Courses in the preceding semester. This is a required course for the Space Studies minor.

*Prerequisites:* PS 104 and any two SP courses or equivalent.

#### SP 299, 399, 499

Special Topics in Space Studies 1-3 Credits

Individual independent or directed studies of selected topics in space studies related topics. *Prerequisites:* Consent of instructor and approval of department or program chair. May be repeated with a change of subject.

## Social Sciences

#### SS 110

World History (3,0)

3 Credits

Designed primarily as a survey of the development and evolution of Western civilization from 1500 to the present. Emphasis is placed on the effect of Western influence on the world.

#### SS 120

American History (3,0)

3 Credits

From 1865 to the present. Reconstruction, the age of big business, the United States as a world power. World War I, World War II, the Great Depression and its aftermath.

## SS 130

History of Aviation in America (3,0) 3 Credits

A survey of the history of America in the 20th century, emphasizing the explosive growth of aviation as a major influence on the economic, military, and societal development of the United States.

#### SS 204

Introduction to Geography (3,0)

3 Credits

A survey course designed to acquaint the student with types of maps, map reading and use, as well as to show relationships between geography and economics, culture, and geopolitics. Humans and their use of their environment are stressed, along with the usual emphasis on places, names, and locations. Ancillary topics will include climate, demography, and transportation.

#### SS 210

Introduction to Sociology (3,0)

3 Credits

Integrated survey of the fundamental concepts of culture, forms of collective behavior, community and social organization, social interaction, and social change. The social effects of aviation and the impact of science on the social order living in an air age will also be investigated.

#### SS 302

Evolution of Scientific Thought (3,0)

3 Credits

Traces the development of science from the earliest times through the modern period, with particular emphasis given to our changing concepts of nature and of science itself. (Also offered as PS 302. Students receive either Social Sciences elective credit or Physical Sciences elective credit, but not both.)

**Prerequisites:** Any course from the HU 140 series and either PS 101 or PS 102 or PS 103 or PS 150 and PS 215.

#### SS 307

Global Policy Studies (3,0)

3 Credits

A crossnational survey and analysis of the processes of policy making for science and technology, environment, and security. Emphasis on how local, national, international, and global policy making are related in these three areas of global change.

**Prerequisites:** Two Social Sciences courses and one History course or permission of instructor.

#### SS 310

Personality Development (3,0)

3 Credits

A survey of selected theories of human nature and functioning from the beginnings of modern psychology to present developments, including psychodynamic, cognitive, behavioral, biological, humanistic, and other types. Various concepts of personality and the associated methodologies for gathering and validating knowledge are explored. Theories are applied to normal issues in personal, professional, and relational life, and theory-related skills are taught for self-awareness, problem-solving, habit change, and emotional and interpersonal competence.

## SS 311

#### U.S. Military History 1775-1900 (3,0)

3 Credits

Military history with emphasis on military policy, organization, and technology as they relate to U.S. political, social, and economic developments from 1775 to 1900.

#### SS 320

American National Government (3,0)

3 Credits

Basic issues of American democracy, constitutional principles, and the executive, legislative, and judicial branches of government.

**Prerequisite:** College-level history or permission from the instructor.

#### SS 321

U.S. Military History 1900-Present (3,0)

3 Credits

Military history with emphasis on military policy, organization, and technology as they relate to U.S. political, social, and economic developments from 1900 to the present.

#### SS 325

International Studies (3,0)

3 Credits

An overview of the land, the people, the culture, and the history of one region of the world, with emphasis on current events and policies on the world scene. Specific content varies from year to year.

**Prerequisite:** College-level history or permission from the instructor.

#### SS 326

Russian-American Relations (3,0)

3 Credits

This course explores the development of Russian-American economic and political relations, emphasizing the era of the 20th century.

**Prerequisite:** College-level history or permission from the instructor.

#### SS 331

Current Issues in America (3,0)

3 Credits

A course in selected political-economic issues of national and international importance. Extensive use of journals, magazines, and newspapers to supplement lectures and discussions.

**Prerequisite:** College-level history or permission from the instructor.

#### SS 332

Gender, Ethnicity, and Class in 19th and 20th Century Global History (3,0)

3 Credits

The social and cultural conceptualization of gender, ethnicity, and class, and their significance and role in global history during the 19th and 20th centuries.

#### SS 333

U.S.-Asian Relations (3,0)

3 Credits

This course explores the development of U.S.-Asian political, cultural, and economic relations, from their beginnings in the 19th century to the present. The course will examine America's domestic motivations for expanding into the Pacific, the various impacts that the United States has had on Asian nations, and Asia's collaboration with and resistance to the American presence.

**Prerequisite:** Lower developmental history course or junior standing.

## SS 334

Contemporary Africa and the World (3,0)

3 Credits

A historical examination of Africa's land, societies, and cultures with a focus on the political and economic changes and challenges that have marked the continent's relations with major world powers during and after the Cold War.

**Prerequisite:** College-level history or permission from professor.

## SS 336

The Modern Middle East in World Affairs (3,0) 3 Credits

A historical examination of the land, societies, cultures, economics, and politics of the Middle East from World War I to the present in relation to recent and current world events and policies.

**Prerequisite:** College-level history or permission from professor.

## SS 340

American Foreign Policy (3,0)

3 Credits

A survey of the evolution of present American foreign policy, stressing the factors that affect and shape this policy. Attention is given to current governmental offices, agencies, and departments and the role each plays in policy formulation. Emphasis is on the period since World War II.

**Prerequisite:** College-level history or permission from the instructor.

## SS 350

Psychology of Relationships (3,0)

3 Credits

Empirical, theoretical, and practical knowledge of the components of intimate relationships, involving friendship, romance, marriage, divorce, and nontraditional relationships, and embedded in lifespan development. Disciplines include social, behavioral, clinical, family, and biological psychology, as well as sociology, anthropology, sociobiology and neuroscience. Consideration of how relationship knowledge is gathered and interpreted, along with the social and political consequences of such knowledge for relationship descriptions, prescriptions, and power. Development of self-awareness and interpersonal skills through writing, experiential exercised, improvisational drama and communication games.

#### SS 351

Relationship Skills Laboratory (0,3)

1 Credit

This laboratory provides small group practice of principles taught in SS 350, Psychology of Relationships. Methods of practice include individual mental, emotional, and imaginal awareness techniques, pair-interactional exercises interspersed with individual writing and reflection, role playing, and group discussion.

*Colprerequisite:* Open to students who are taking or have completed SS 350.

## SS 360

Environmental Law (3,0)

3 Credits

Provides a general introduction to the field of planning, and examines the procedural approaches shared by practitioners working in all areas of contemporary planning. Introduces legal concepts and doctrines relevant to pollution control, assessment of environmental impacts, and land use.

Prerequisite: PS 142 or permission of instructor.

## SS 361

Labor and Technology (3,0)

3 Credits

This course examines the relationship between labor and technology from historical and cultural perspectives. This examination ranges from the industrial revolutions of the 18th and 19th centuries to the present with extrapolations into the future of industry, labor, and society. Particular emphasis will be placed on analyzing the change from mass production (Fordism) to flexible production (post Fordism), and the relationship between the mobility of labor and capital with the globalization of technology. This course will look at case studies from aviation/aerospace telecommunication, and automobile industries in the United States, Pacific Rim, European Community, and Latin America.

**Prerequisite:** College-level history or permission from the instructor.

## SS 363

Inter-American Relations (3,0)

3 Credits

This course explores the development of U.S. political and economic relations with Latin America from their beginnings in the 19th century to the present. *Prerequisite:* SS 110 or SS 120 or SS 130 or junior standing.

## SS 299, 399, 499

Special Topics in the Social Sciences

1-6 Credits

Individual independent or directed study of selected topics in the areas of history, sociology, psychology, and human culture in general.

**Prerequisites:** Consent of instructor and approval of the department chair.

# Systems Engineering

## SYS 301

Introduction to Systems Engineering (3,0)

3 Credits Provides an

Provides an overview of systems engineering in the development of large systems, including genesis and need, characteristics of systems and system engineers, the system life cycle (from birth to death), design for operational feasibility, project management, structure, and system control, statistical/probabilistic models in dealing with risk inherent in large, complex systems. Emphasis on the importance of system requirements regarding total system performance, interfaces, cost, schedule, optimization, and trades.

Prerequisite MA 243.

#### SYS 302

System Engineering Design Considerations (3,0) 3 Credits

This course examines the considerations in developing systems that meet specified system performance requirements while also achieving necessary levels of reliability, maintainability, and supportability consistent with the operational requirements. In addition, consideration is given to issues associated with producibility and disposability. Mathematical methods associated with reliability, maintainability, and supportability are discussed and applied. Liberal use of examples is incorporated to illustrate the interactions and relationships of these metrics, and how they are used to measure and trade off among these elements. The intent is to sensitize the systems engineer to the need for technical, schedule, and cost trade-offs to achieve desired yet safe and affordable system performance.

Prerequisite: SYS 301.

#### SYS 303

Optimization in Systems Engineering (3,0) 3 Credits

This course emphasizes that the optimization of some subsystems may be detrimental to others and hence to overall system performance or cost. Topics include traditional optimization methods, such as classical parameter optimization linear programming, dynamic programming, numerical methods (for example, perturbation and gradient techniques), and genetic algorithms. In addition, techniques such as Pareto or multi-objective optimization are examined with the aim of achieving a sufficient balance among subsystem performance and cost, ultimately to obtain an overall optimal system.

Prerequisite: SYS 301.

#### SYS 304

Systems Engineering in Management, Risk, and Decision Making (3,0)

3 Credits

An understanding of the decision-making process usually requires simplification of the complexity facing the systems engineer and associated decision-making. This course examines methods such as modeling and simulation (M&S) for identifying/ generating alternatives, evaluating their outcomes in terms of risk and benefit, and ultimately providing management authority with options and recommendations on such alternatives to support effective decision-making. Topics include both technical and economic evaluation models and methods. The course also emphasizes the importance of program controls (for example, PERT) and system configuration control.

Prerequisites: SYS 301, EC 225.

#### SYS 403

Systems Engineering Life Cycle Costing (3,0) 3 Credits

Current trends in system development indicate that, in general, complexity is increasing, and many systems in use today are not meeting the needs of customers. These trends, combined with past practices, have tended to create an imbalance between cost and effectiveness. This course addresses this important aspect of systems engineering by examining cost and economic factors under the general theme of design for affordability. An introduction to life-cycle costing is followed by a focus on costs as they occur throughout the system life cycle. Types of contracts (for example, fixed price, cost-plus) are studied. The steps in the life-cycle cost analysis process are examined through the use of examples, and the applications and benefits of life-cycle costing are summarized. Prerequisite: SYS 304.

#### SYS 405

Aerospace Systems Guidance and Control (3,0) 3 Credits

Provides a second, advanced course in control systems, with emphasis on the multidimensional state-space approach. Application of digital control systems in aerospace instrumentation, sensors, guidance, and navigation. Addresses optimal control systems, including multi-objective control, and introduction to advanced methods such as fuzzy systems control, neural networks, and genetic algorithms. *Prerequisite: EE 401 or equivalent control systems course.* 

SYS 410

Space Systems and Mission Analysis (3,0)

3 Credits

This course provides an arena for applying many of the important techniques in systems engineering through the development of a deep space exploration mission, from mission definition through system concept and design. Considerations will be given to all aspects of mission development and operations including spacecraft design, communications, navigation, payload data handling, personnel, and cost. Students will be assigned to discipline teams, working together in a systems engineering context to produce project documents (concept of operations, project plans, schedules, budgets, mission operations plans, and system design documents).

Prerequisite: SYS 403 or permission of the instructor.

## SYS 417

Senior Systems Engineering Project (3,0) 3 Credits

This is the capstone course for the systems engineering track. The project will involve setting system characteristics, specifications, interfaces, and so on, and planning and scheduling the design process. Complete analysis is required from performance, costs, and reliability. Although an electrical component is dominant, other disciplines such as software, mechanical, and fluid will be involved. The course requires the completion of a detailed project document package.

Prerequisite: SYS 403 or permission of the instructor.

# College Success

## **UNIV 101**

College Success (2,0) 1 Credit

A course in which students assess and develop the personal, interpersonal, intellectual, and social skills necessary to succeed in college. Time management, study skills, goal clarification, career information, and college resources are included. This course is available to freshmen only.

## **UNIV 102**

Self-Assessment and Portfolio Preparation (2,0) 1 Credit

This course is required of all adult undergraduate students seeking an assessment of their prior experiential learning by portfolio. Students will assess their prior learning experiences in light of career and educational goals. The online learning course is designed to assist students in life and career planning, goal clarification, career concerns, portfolio preparation, and the development of college success skills. The focus is on methods of self-assessment of prior learning work/education/training experiences and procedures for assembling a portfolio to document learning experiences. This course is graded Satisfactory/Unsatisfactory and is required for students who seek prior learning portfolio evaluation. Students must register for UNIV 102 within six months of course registration.

## **UNIV 400**

Career Development (1,0)

1 Credit

Introduces students to various elements involved in obtaining a position in their chosen fields. Topics include self-assessment, research and selection of a career path, sources of jobs, job-search techniques, resumes and letters of application, references, interviewing skills, business etiquette, and professional image. Each student will develop a career portfolio including personal and professional information related to career goals.

## Applied Meteorology

## WX 201

Survey of Meteorology (3,0)

3 Credits

This survey course in atmospheric science includes applications to flight. Included is a systematic development of the following: thermal patterns, atmospheric moisture, horizontal and vertical pressure patterns, clouds, atmospheric circulation, local winds, stability, air masses, fronts, fog, icing, thunderstorms, jet streams, and turbulence. Students will study and make use of surface weather observations, surface maps, and constant pressure maps.

Prerequisite: MA 006 or equivalent.

#### WX 202

Current Weather Discussion (1,0)

1 Credit

This course takes advantage of real-time weather data to introduce, review, and apply various topics that are developed in other courses in our program. Two, three, and four-dimensional analysis techniques are used to examine the evolution of previous, current, and forecast weather conditions. Subject matter will vary from semester to semester. The course is repeatable for a total of three credits.

Prerequisite: WX 201 or WX 252.

#### WX 205

Reading the Clouds (1,0)

1 Credit

This course focuses on visually identifying clouds and cloud formations to interpret their underlying meteorological meaning. Formations associated with wind shear, turbulence, stable and unstable atmospheres, and severe weather will be discussed. *Prerequisite:* WX 201 or WX 252.

#### WX 210

Introduction to Geographic Information Systems (3,0)

3 Credits

Geographic Information Systems (GIS) encompass all aspects of spatial data analysis from data acquisition and manipulation through problem solving to the graphic presentation of results. This course surveys GIS theory and applications as students learn to store, retrieve, manipulate, analyze, and display spatial data according to a variety of user-defined specifications. Lectures will emphasize fundamental principles of GIS while computer-based exercises will emphasize training.

#### WX 211

Introduction to Weather Observations (1,0) 1 Credit

This course provides an in-depth examination of the currently used aviation routine weather report (METAR). Various methodologies of modern measurement techniques, including the use of remote sensing, are examined in detail. The impacts of converting from a human-based observation system to an automated, machine-based system are presented and discussed. In-situ measurements will be taken and field measurement sites that provide observational support to the aviation/aerospace industry will be visited.

Prerequisite: WX 201 or WX 252.

## WX 215

Weathering and Landforms (3,0)

3 Credits

Students will acquire a thorough comprehension of various physical and chemical forces that sculpt the landscape. From alluvial fans and distinct dune formations of the arid and semi-arid West to the karst terrain of the humid East, these features reveal a rich history of climatological conditions. A greater understanding of weathering processes and the resultant landforms should lead to a heightened appreciation of geophysical properties and products.

#### WX 220

Data Analysis and Visualization (3,0) 3 Credits

This course builds on CS 125 to include fundamentals of programming in IDL (Interactive Data Language), addressing a wide range of meteorological problem-solving, data analysis, and visualization techniques. Students will use a problem-solving approach for understanding IDL structures, procedures, and functions, with emphasis on scientific techniques and applications. The students will also receive a brief introduction to Fortran and C++.

Prerequisite: CS 125.

#### WX 252

Introduction to Meteorology (3,0)

3 Credits

A survey course in meteorology for meteorology majors, covering the following topics: atmospheric composition and structure, energy exchange, thermal patterns, atmospheric moisture, clouds, stability, precipitation processes, wind and pressure, global circulation, upper-level winds and jet streams, local winds, air masses, fronts, mid-latitude cyclones, weather forecasting, thunderstorms, and tropical meteorology. Student will also be introduced to weather observations, surface and upper-air maps, the Skew-T log-P chart and satellite and radar imagery.

## WX 261

Applied Climatology (3,0)

3 Credits

An in-depth survey of the varied climates of the world, the weather systems that contribute in the aggregate to those climates, and their cumulative influence on aircraft system performance and the National Air Space over very small to global space and time scales. Included is a historical perspective on how our climate is changing and the atmospheric processes involved in the global change process. Emphasis is placed on developing a broad-based working knowledge of the impacts of present-day climate and its variability on aviation-related practices, procedures, and operations.

Prerequisite: WX 201 or WX 252.

## WX 270

Weather Information Systems (3,0)

3 Credits

An introduction to the various states of weather-sensing equipment modernization and the systems that deliver weather information to various users. The development of various sensing devices are explored and the current technology explained. *Prerequisite:* WX 201 or WX 252.

#### WX 280

Introduction to TV Weathercasting (3,0) 3 Credits

This course introduces the student to the world of broadcast meteorology. Using the most modern of facilities in our state-of-the-art building, students will learn to prepare and present TV presentations. A local on-camera meteorologist will help instruct, critique, and assist other faculty in making weather come alive on the University's local cable network. *Prerequisite:* WX 201.

#### WX 301

Aviation Weather (3,0) 3 Credits

An expansion of WX 201, including the following theoretical concepts: hydrostatic instability, baroclinic instability, thermal wind, and kinematic fields. These will be integrated into real-time weather analysis of synoptic patterns involving mid-latitude cyclones, advection, frontal systems, and jet streams. Practical application will be achieved through presentation of current and historical weather data emphasizing common hazards to aviation such as thunderstorms, strong winds, fog, icing, and turbulence. An introduction to weather forecasting concepts will be presented.

Prerequisite: WX 201 or WX 252.

#### WX 310

Advanced Geographic Information Systems 3 Credits

Advanced GIS is designed to further develop the concepts and principles learned in WX 210, Introduction to GIS. Lectures will focus on current theories and technology trends in geographic information sciences integrating theoretical knowledge with hands-on technical training in the computer classroom. Weekly discussion of the latest developments in GIS will reinforce these experiences while fostering an appreciation of GIS as an effective analytical tool for understanding complex processes. The course culminates in a class project involving scholarly research by teams of students based on GIS applications.

Prerequisite: WX 210.

#### WX 353

Thermodynamics of the Atmosphere (3,0) 3 Credits

A course for those requiring an in-depth understanding of the physical processes governing the atmosphere. Includes discussion and quantitative treatment of meteorological conventions, atmospheric state and structure, radiation, heat/energy transfer, boundary layer structure and fluxes, moisture, stability, cloud formation, and precipitation.

*Prerequisites: PS* 104 (or *PS* 160 or *PS* 208), WX 201 or WX 252.

#### WX 354

Dynamics of the Atmosphere (3,0)

3 Credits

A course for those requiring an in-depth understanding of the dynamic processes governing the atmosphere. Includes discussion and quantitative treatment of atmospheric forces, the equations of motion, local and global winds, air masses and fronts, middle latitude cyclones, quasi-geostrophic theory, thunderstorms, and hurricanes.

Prerequisites: PS 104 (or PS 160 or PS 208), WX 353.

#### WX 355

Weather Analysis (5,0)

5 Credits

This course presents conceptual models of synoptic weather features and applies them to analysis of meteorological data fields. Meteorological codes for surface and upper air data are surveyed and the basic conventions of surface and upper air charts are introduced. Labs cover the standard tools of weather analysis and give students practice constructing and using isopleths of pressure, temperature, dew point, and geopotential height. The horizontal and vertical structure of fronts is examined through pattern recognition of standard meteorological variables, atmospheric thickness, and cross-section analyses. Methods for analyzing wind fields, such as streamlines, air parcel trajectories, and jet stream identification, are presented. Students practice conceptually integrating satellite and radar data to verify and refine their analyses in accordance with dynamical principles. This course covers both manual (handdrawn) weather map techniques and computer meteorological analysis software packages.

Prerequisite: WX 353. Corequisite: WX 354.

#### WX 363

Thunderstorms (3,0)

3 Credits

This course provides tools for analyzing and forecasting thunderstorms and their associated hazards. Key characteristics of the thunderstorm and its environment are explored using both case studies and realtime weather data. Students examine atmospheric soundings to determine the likelihood of storm development and the amount of energy available for thunderstorms. Vertical wind shear is analyzed for clues about storm organization and severity. Other information, such as weather charts, computer models, satellite imagery, and Doppler radar imagery, is used to observe the characteristics of thunderstorms and the weather patterns that favor them. Students gain a basic scientific understanding of thunderstorm behavior as well as practical experience observing and predicting them.

Prerequisite: WX 252 or WX 301 or WX 353.

#### WX 364

Weather for Aircrews (3,0)

3 Credits

Making use of the Weather Center and the Internet, students collect and study weather data from around the world. Emphasis is placed on decoding information contained in the remarks section of weather observations and on the differences between North American weather charts and those produced in other parts of the world. Students investigate the flying conditions and aviation environment over the seven continents. The proper operation of airborne weather radar is studied. Students identify weather hazards by using ground-based weather radar and satellite imagery. At the Daytona Beach campus, this is the capstone course for the Aviation Weather Minor.

Prerequisite: WX 252 or WX 301.

## WX 365

Satellite and Radar Weather Interpretation (3,0) 3 Credits

A practical introduction to meteorological interpretation of satellite and weather radar imagery. This course surveys the basic physics of electromagnetic (EM) radiation and shows how characteristics of the EM spectrum are exploited in passive (satellite) and active (radar) remote sensing to create digital images of geophysical information. The theory of radar signal propagation and precipitation estimation is applied to the meteorological interpretation of radar imagery and supplemented with practical analysis of various radar product types. Weather satellite image types, including visible, conventional infrared, and water vapor channels and their meteorological applications, are examined. Real-time satellite identification of meteorological phenomena will be emphasized, including mountain waves, midlatitude cyclones, fronts, jet streams, troughs, ridges, vorticity, cloud types, fog, precipitation, ordinary and severe thunderstorms, tropical waves, and hurricanes. Surface and upper-air weather maps will be used to enhance the students' understanding of satellite image signatures.

Prerequisite: WX 252 or WX 301 or WX 353.

#### WX 370

Planetary Atmospheres (3,0)

3 Credits

The knowledge of mechanisms and forces that cause the Earth's atmosphere to move will be applied to the other planets. Solar effects on space travel will be studied. Emphasis will be placed on the weather of the planets that will most likely be visited in the early 21st century. Students will present a project that examines the solar and atmospheric effects of travel to their favorite planet. This course can be used to satisfy a requirement in the Space Studies Minor. *Prerequisite:* WX 252 or WX 301 or WX 353.

#### WX 390

Atmospheric Physics (3,0)

3 Credits

Topics covered include elements of Earth-Sun geometry, radiative transfer, photochemistry, and remote sensing of the atmosphere. Additionally, properties of aerosols and clouds, cloud nucleation, precipitation processes, and atmospheric electricity will be discussed.

Prerequisites: MA 112 or MA 242, WX 353.

#### WX 420

Advanced Atmospheric Thermodynamics (3,0) 3 Credits

This course provides an application of physics and calculus to the study of atmospheric thermodynamics. The course covers such topics as hydrostatics, conservation of energy, the Ideal Gas Law, temperature relationship to kinetic energy, specific heats, enthalpy, and entropy. Additionally, water and its transformations, the thermodynamics of dry, moist, and saturated air, and thermodynamic diagrams are covered.

Prerequisites: PS 160 or PS 208, WX 353, MA 242.

## WX 422

Statistical Applications for Meteorological Data Analysis (3,0)

3 Credits

This course illustrates the applications of a broad range of statistical applications to meteorology, as well as more general data analysis techniques. The course will include the following topics: basic statistical properties for various types of spatial and temporal data collections, including the standard statistical measures of mean, median, mode, standard deviation, and variance. Additional application topics will include correlations, confidence tests, probability distributions, time-series sampling theory, as well as data processing practices including regression analysis, Fourier analysis, and Eigen-vector analysis. The meteorological-specific applications would include data assimilation error covariance functions, Model Output Statistics (MOS), Perfect Prog forecasts, statistical forecast models, and Ensemble forecasts of model uncertainties as well as a number of forecast verification metrics including such quantities as Probability of Detection, False Alarm Rate, and Critical Success Scores. The course will include a number of laboratory exercises using various computer software resources ranging from spreadsheet calculations through higher-level programming methods.

**Prerequisite:** Any course in computer programming (EGR 115, or CS 118, or CS 223, etc.) or permission of the instructor.

## WX 427

Forecasting Techniques (3,0)

3 Credits

This course provides an introduction to the world of weather prognostication. Topics include the traditional forecast methods based on weather analysis techniques, up through the latest computer-generated weather prediction models. The student is exposed to techniques for forecasting tomorrow's weather as well as seasonal weather trends.

*Prerequisites:* WX 353, WX 354, WX 355, WX 363, and WX 365.

## WX 429

Severe Weather Seminar (2,0)

2 Credits

Investigations into recent severe weather outbreaks. Students will collect and analyze data using the latest techniques to document and explain large-scale convective systems. Radar and satellite data are assessed and case studies are published. *Prerequisite:* WX 363.

## WX 457

Weather Operations Seminar (3,0)

#### 3 Credits

This course simulates a number of industry/agency operational weather environments. The student will acquire and evaluate the significance that weather impact variables have on all phases of the operational environment. Real-time as well as preprogrammed scenarios are used to provide the student the opportunity to become knowledgeable in the methodologies employed by decision-makers in flight and marine planning/operations, multimedia productions, and agribusiness operations.

Prerequisite: WX 355.

#### WX 490

Advanced Dynamic Meteorology I (3,0)

3 Credits

This first course in atmospheric dynamics uses physics and calculus. The instruction includes such topics as equation of motion on a rotating Earth, balanced flow, kinematics, circulation theorem, conservation of absolute angular momentum, mass continuity, vorticity equation, and wind-pressure imbalance.

Prerequisites: MA 243, WX 354, and WX 420.

## WX 491

Advanced Dynamic Meteorology II (3,0)

3 Credits

This is the second course in atmospheric dynamics, which uses vectors. It includes such topics as Rossby waves, quasi-geostrophic theory, and synoptic-scale instability theory.

Prerequisite: WX 490.

#### WX 299, 399, 499

Special Topics in Meteorology

1-6 Credits

Individual independent or directed studies of selected topics in applied meteorology.

**Prerequisites:** Consent of the instructor and approval of the program coordinator.

## **Contact/Information Sources**

Worldwide students should contact their campus or Advising Enrollment and Recruitment Office (AERO), or any of the offices listed below for more information and guidance:

#### **General Information:**

Telephone: (386) 226-6910 -OR-(800) 522-6787 Email:ecinfo@erau.edu

## STUDENT SERVICES

## ENROLLMENT MANAGEMENT OFFICE

Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900

## Admissions:

(866) 509-0743 Email: ecssc@erau.edu

Financial Aid:

(386) 226-6300 -OR- (800) 943-6279

Registrar: (866) 393-9046 Email: ecregist@erau.edu

## **Portfolio Assessment:**

(877) 362-7970 Fax: (386) 226-6984

## STUDENT AFFAIRS DEPARTMENT

Disability Support Services: Student Affairs/Student and Technology Services Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900 Telephone: (386) 226-6944

#### **Student Financial Services:**

Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900

#### **Career Services:**

Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900 Telephone: (386) 226-6054 Email: eccareer@erau.edu

## Veterans Affairs:

Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900 Telephone: (386) 226-6350

#### CENTER FOR PROFESSIONAL EDUCATION

## Worldwide:

Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900 Telephone: (386) 323-8669 Fax: (386) 323-8692 Toll Free: 1-866-574-9125

## WORLDWIDE ONLINE ADVISING ENROLLMENT

AND RECRUITMENT OFFICE (AERO) Embry-Riddle Aeronautical University 600 S. Clyde Morris Blvd. Daytona Beach, FL 32114-3900 Telephone: (800) 359-3728 Worldwide: (386) 226-6397 Fax: (386) 226-7627

## **Embry-Riddle Aeronautical University** Worldwide Campus Listing by State / Country

ALABAMA		
FORT RUCKER	Enterprise	(334) 598-6232
<i>Teaching Sites:</i> Mobile, AL (out of Keesler, MS) <b>HUNTSVILLE</b>	Huntsville	(251) 441-6737 (256) 876-9763
ALASKA		
ANCHORAGE FAIRBANKS Teaching Site:	Anchorage Fairbanks	(907) 753-9367 (907) 356-7773
Eielson AFB		(907) 377-2977
ARIZONA		
LUKE Classroom Locations: Glendale Municipal Airport Lockheed-Martin Goodyear (MSTM ONLY)	Glendale	(623) 935-4000
SKY HARBOR	Phoenix	(602) 275-5533
TUCSON WILLIAMS GATEWAY	Tucson Mesa	(520) 747-5540 (480) 279-1150
ARKANSAS		
ARKA	ANSAS	
ARKA LITTLE ROCK	ANSAS Little Rock AFB	(501) 983-9300
LITTLE ROCK		(501) 983-9300
LITTLE ROCK	Little Rock AFB	(501) 983-9300 (530) 788-0900
LITTLE ROCK CALIF BEALE Classroom Location: McClellan AFB CAMP PENDLETON	Little Rock AFB <b>ORNIA</b> Marysville Oceanside	(530) 788-0900 (760) 385-4423
LITTLE ROCK CALIF BEALE Classroom Location: McClellan AFB CAMP PENDLETON CHINA LAKE	Little Rock AFB <b>ORNIA</b> Marysville Oceanside Ridgecrest	(530) 788-0900 (760) 385-4423 (760) 939-4557
LITTLE ROCK CALIF BEALE Classroom Location: McClellan AFB CAMP PENDLETON CHINA LAKE EDWARDS FORT IRWIN Classroom Location :	Little Rock AFB <b>ORNIA</b> Marysville Oceanside	(530) 788-0900 (760) 385-4423
LITTLE ROCK CALIF BEALE Classroom Location: McClellan AFB CAMP PENDLETON CHINA LAKE EDWARDS FORT IRWIN	Little Rock AFB ORNIA Marysville Oceanside Ridgecrest Edwards	(530) 788-0900 (760) 385-4423 (760) 939-4557 (661) 258-1264

## Worldwide

OAKLAND Classroom Locations:	Oakland	(510) 636-2424	
Hayward, Livermore, Oakland, and San Ca PALMDALE SAN DIEGO TRAVIS VANDENBERG <i>Classroom Location:</i> Lompoc	rlos Airports Palmdale San Diego Fairfield Lompoc	(661) 947-4025 (858) 576-4375 (707) 437-5464 (805) 734-4076	
VENTURA	NAS Point Mugu	(805) 271-9691	
COLO	DRADO		
COLORADO SPRINGS	Ft. Carson	(719) 576-6858	
FLO	RIDA		
FT. LAUDERDALE Classroom Locations:	Pompano Beach	(954) 497-3774	
Palm Beach Lakes H.S. Signature Flight Support, FLL/HWY International Airport U.S. Coast Guard Air Station, Opa Locka Pratt & Whitney, West Palm Beach			
FORT WALTON BEACH HURLBURT FIELD	Fort Walton Beach	(850) 678-3137 (850) 581-2106	
JACKSONVILLE	Jacksonville	(904) 645-0333	
<i>Teaching Site:</i> Mayport		(904) 249-6700	
Classroom Locations:		· · ·	
Craig Airfield	Jacksonville		
Northrop Grumman Jacksonville Int'l Airport	St. Augustine NAS Jacksonville	(904) 779-0246	
MIAMI	Miami	(305) 871-3855	
Teaching Site:		. ,	
Key West		(305) 871-3855	
ORLANDO Metro PENSACOLA	Orlando Pensacola	(407) 352-7575 (850) 458-1098	
Teaching Sites:	1 chisacola	(000) 400 1070	
NAS Whiting Field	Milton	(850) 623-7787	
U.S. Coast Guard ATC			
Mobile (see Alabama)	ALABAMA	(201) 702 5020	
SPACE COAST MSTM Teaching	Cocoa	(321) 783-5020	
Site: Barry University	Merrit Island MSTM ONLY		
Classroom Locations:			
Vero Beach			
Sarno			

United Space Alliance Brevard County Adult Ed. Center <b>TAMPA</b> <i>Teaching Site:</i> St. Petersburg College <i>Classroom Location:</i> Tampa Coast Guard Air Station <b>TYNDALL</b> <i>Teaching Site:</i> Tallahassee	Kennedy Space Center Titusville Tampa Panama City	(813) 828-3772 (727) 394-6218 (850) 283-4557
GE	ORGIA	
ATLANTA METRO Teaching Sites: Delta Airlines NAS Atlanta Classroom Location: Virginia Crossings	Atlanta	(770) 671-9888 (404) 714-3248 (770) 426-9990
MOODÝ ROBINS	Moody AFB Warner Robins	(229) 244-9400 (478) 926-1727
Teaching Site: Columbus, Georgia SAVANNAH Classroom Location: Fort Stewart	Fort Benning Savannah	(706) 685-0105 (912) 355-0644
HA	WAII	
HONOLULU Classroom Location: Honolulu Airport Training Center KANCOHE SCHOFIELD BARRACKS Classroom Location: Coast Guard Air Station	Honolulu, Oahu Island (808) 838-1435 MCB Hawaii Schofield Barracks Barbers Point	(808) 422-0835 (808) 254-2106 (808) 624-2334
	AHO	
MOUNTAIN HOME	Mountain Home	(208) 832-2222
INDIANAPOLIS		(317) 487-6281
	Indianapolis	(317) 407-0201
	NSAS	
MCCONNELL	Wichita	(316) 687-3006

KENTUCKY		
FORT CAMPBELL LOUISVILLE	Clarksville Louisville	(270) 798-2775 (502) 964-9204
L	OUISIANA	
BARKSDALE NEW ORLEANS	Shreveport	(318) 747-4508 (504) 361-0335
	MAINE	
BRUNSWICK	Brunswick	(207) 721-0664
Ν	IARYLAND	
ANDREWS PATUXENT RIVER	Andrews Lexington Park	(301) 735-6340 (301) 863-8776
MINNESOTA		
MINNEAPOLIS	Eagan	(651) 905-9595
Ν	<b>IISSISSIPPI</b>	
KEESLER MOBILE, AL (out of Keesler, MS)	Biloxi	(228) 432-5312 (251) 441-6737
Ν	MONTANA	
<b>GREAT FALLS</b> Classroom Location:	Great Falls	(406) 727-9901
Helena		(406) 439-9060
Ν	VEBRASKA	
OFFUTT	Omaha	(402) 292-6655
NEVADA		
FALLON LAS VEGAS	Fallon Las Vegas	(775) 423-4018 (702) 643-0762
NEW JERSEY		
MCGUIRE	Trenton	(609) 723-1337
NEW MEXICO		
ALBUQUERQUE Cannon Holloman	Albuquerque Clovis Alamagordo	(505) 846-8946 (505) 784-8763 (505) 479-6892

NORTH C	CAROLINA	
ELIZABETH CITY FAYETTEVILLE GREENSBORO POPE AFB SEYMOUR JOHNSON	Elizabeth City Fayetteville Goldsboro	(252) 331-2225 (910) 436-5005 (336) 605-3030 (910) 436-3188 (919) 734-9211
NORTH	DAKOTA	
GRAND FORKS MINOT	Grand Forks Minot	(701) 594-5324 (701) 727-9007
OI	HIO	
<b>CINCINNATI</b> <i>Teaching Site:</i> Cincinnati-Kentucky Airport	Cincinnati	(513) 733-3728
DAYTON AREA Teaching Site:	Fairborn	(937) 878-3728
Wright-Patterson		(937) 254-3728
OKLA	HOMA	
ALTUS OKLAHOMA CITY VANCE	Altus Oklahoma City Enid	(580) 481-5991 (405) 739-0397 (580) 213-7320
ORE	GON	
PORTLAND		(503) 288-8690
SOUTH C	CAROLINA	
CHARLESTON GREENVILLE MCAS BEAUFORT MCENTIRE ANGB SHAW	Charleston Greenville MCAS Beaufort Sumter	(843) 767-8912 (864) 233-5288 (843) 228-7585 (803) 783-5025 (803) 666-7401
TENNESSEE		
MEMPHIS	Memphis Airport	(901) 507-9969
TEXAS		
CORPUS CHRISTI DYESS FORT WORTH MSTM Teaching Site: Lockheed-Martin	Corpus Christi Abilene Dallas/Fort Worth	(361) 937-4951 (325) 692-2007 (817) 737-8180

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HOUSTON SAN ANTONIO Sheppard	Houston San Antonio	(281) 244-9456 (210) 659-0801 (940) 851-6458
UT	AH	
NORTHERN UTAH Classroom Locations: Ogden Airport	Ogden (AMT ONLY)	(801) 777-0952
Clearfield Town Square		
VIRC	GINIA	
FORT EUSTIS LANGLEY NORFOLK <i>Teaching Site:</i> Oceana	Newport News Hampton Norfolk	(757) 887-0980 (757) 764-2662 (757) 440-5078 (757) 437-8061
WASHI	NGTON	
EVERETT SEATTLE SPOKANE TACOMA WHIDBEY ISLAND	Everett Seattle Spokane Tacoma Oak Harbor	(425) 514-0220 (426) 226-2484 (509) 244-3832 (253) 589-1728 (360) 279-0959
WYO	MING	
CHEYENNE Classroom Location: Aims Community College	Cheyenne Greeley, CO	(307) 634-9693
INTERNATIONAL		
Embry-Riddle Aeronautical University International Regional Office CMR 429Embry-Riddle Aeronautical University International Regional Office Europaallee 6APO AE 09054-0429 DSN: 483-7811 Civilian: 011-49-631-303-27811 Fax: 011-49-631-303-27810 Email: europe.rdo@erau.edu Website: www.erau.edu/eu/Embry-Riddle Aeronautical University International Regional Office Europaallee 6 D-67657 Kaiserslautern Germany Civilian: 011-49-631-303-27811		

## Worldwide Locations (International-Civilian)

LUXEMBOURG

Luxemborug City

011-49-631-303-27811

## Worldwide Locations (International - U.S. Military)

ENC	GLAND	
LAKENHEATH/MILDENHALL	Lakenheath	011-44-1638-522464
GER	MANY	
BAMBERG KATTERBACH RAMSTEIN AB SPANGDAHLEM AB GEILENKIRCHEN WIESBADEN	Bamberg Katterbach Ramstein Spangdahlem Wiesbaden	$\begin{array}{c} 011-49-951-3009279\\ 011-49-9802-832379\\ 011-49-6371-44204\\ 011-49-6565-7297\\ 011-49-2451-63-2246\\ 011-49-611-411-8032 \end{array}$
I	TALY	
AVIANO VINCENZA SIGONELLA NAPLES	Aviano	011-39-0434-66-0631 011-39-0444-717570 011-39-095-56-4550 011-39-081-568-4364
SI	PAIN	
ROTA LAJES FIELD	Rota Portugal	011-34-956-822984 011-351-295-57-3375
TU	RKEY	
INCIRLIK		011-90-322-316-1098
LUXEN	ABOURG	
LUXEMBOURG	Luxembourg	011-352-42-59-91314
Deployed Classroom Locations		
KUWAIT		
BAMBERG INCIRLIK	Camp Arifjan Camp Buehring Bagram Airfield Salerno	011-49-631-303-27816 011-49-631-303-27816 011-49-631-303-27816 011-49-631-303-27816

# FACULTY AND ADMINISTRATION

The administration and faculty of Embry-Riddle are listed below. Where applicable, the numeral one (1) denotes the Daytona Beach Campus; the numeral two (2) denotes the Prescott Campus; the numeral (3) denotes the Worldwide Campuses. All others are assigned to the University administration.

# Legend

Letter designations for aviation qualifications are as follows:

- A Airplane
- C Commercial Pilot
- G Glider
- H Helicopter
- I Instrument
- L Land
- P Private Pilot
- S Seaplane
- AD Aircraft Dispatcher
- IA Inspection Authorization

- ME Multi-Engine
- SE Single-Engine
- A&P Airframe and Powerplant Maintenance Technician
- AGI Advanced Ground Instructor
- ATP Airline Transport Pilot
- BGI Basic Ground Instructor
- CFI Certified Flight Instructor
- CTO Control Tower Operations
- DME Designated Mechanic Examiner

- DWE Designated Written Examiner
- HTA Heavier Than Air
- IGI Instrument Ground Instructor
- LTA Lighter Than Air
- SME Single- and Multi-Engine
- FCC Federal Communication
  - Commission
- FE Flight Engineer
- AC Advanced Graduate Credit

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