



**EMBRY-RIDDLE**  
AERONAUTICAL UNIVERSITY



2009-2010  
**Undergraduate/Graduate Catalog**  
Prescott, AZ  
[www.embryriddle.edu/pr](http://www.embryriddle.edu/pr)



*Leading the World in Aviation and Aerospace Education*

## **PRESCOTT, ARIZONA, CAMPUS**

Embry-Riddle Aeronautical University

3700 Willow Creek Road

Prescott, AZ 86301-3720

(928) 777-3728

Admissions: (928) 777-6600 or (800) 888-3728

Financial Aid: (928) 777-3765

E-mail (Admissions): [pradmit@erau.edu](mailto:pradmit@erau.edu)

## **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](mailto:dbadmit@erau.edu)

## **WORLDWIDE CAMPUSES AND ONLINE**

Embry-Riddle Aeronautical University

600 S. Clyde Morris Blvd.

Daytona Beach, FL 32114-3900

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Admissions: (866) 509-0743 or (800) 522-6787

Financial Aid: (866) 567-7202

E-mail (Admissions): [wwem@erau.edu](mailto:wwem@erau.edu)

[www.embryriddle.edu/worldwide](http://www.embryriddle.edu/worldwide)

**<http://www.erau.edu>**



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# 2009 - 2011 ACADEMIC CALENDAR

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## Fall Semester 2009

*(August 24 – December 12)*

August 20-23	Orientation and Registration
August 24	Classes begin
September 7	HOLIDAY - Labor Day
October 9	Fall Break
November 11	HOLIDAY - Veterans Day
November 25-27	HOLIDAY - Thanksgiving
December 3	Last Day of Classes
December 4	Study Day
December 5, 7-10	Final Examinations
December 12	Commencement

## Fall Semester 2010

*(August 30 – December 18)*

August 26-29	Orientation and Registration
August 30	Classes Begin
September 6	HOLIDAY – Labor Day
October 15	Fall Break
November 11	HOLIDAY - Veterans Day
November 24 – 26	HOLIDAY - Thanksgiving
December 9	Last Day of Classes
December 10	Study Day
December 11, 13-16	Final Examinations
December 18	Commencement

## Spring Semester 2010

*(January 13 – May 8)*

January 12	Orientation and Registration
January 13	Classes Begin
January 18	HOLIDAY - Martin Luther King Jr. Day
February 15	HOLIDAY - Presidents Day
March 15-19	Spring Break
April 29	Last Day of Classes
April 30	Study Day
May 1, 3-6	Final Examinations
May 8	Commencement

## Spring Semester 2011

*(January 12 – May 7)*

January 11	Orientation and Registration
January 12	Classes Begin
January 17	HOLIDAY - Martin Luther King Jr. Day
February 21	HOLIDAY - Presidents Day
March 21-25	Spring Break
April 28	Last Day of Classes
April 29	Study Day
April 30, May 2-5	Final Examinations
May 7	Commencement

## Summer Semester (Term A) 2010

*(May 13 – June 28)*

May 12	Orientation and Registration
May 13	Classes Begin
May 31	HOLIDAY - Memorial Day
June 24	Last Day of Classes
June 25	Study Day
June 26, 28	Final Examinations

## Summer Semester (Term A) 2011

*(May 12 – June 27)*

May 11	Orientation and Registration
May 12	Classes Begin
May 30	HOLIDAY - Memorial Day
June 23	Last Day of Classes
June 24	Study Day
June 25, 27	Final Examinations

## Summer Semester (Term B) 2010

*(July 1 – August 16)*

June 30	Orientation and Registration
July 1	Classes Begin
July 5	HOLIDAY - Independence Day
August 12	Last Day of Classes
August 13	Study Day
August 14, 16	Final Examinations

## Summer Semester (Term B) 2011

*(June 30 – August 15)*

June 29	Orientation and Registration
June 30	Classes Begin
July 4	HOLIDAY – Independence Day
August 11	Last Day of Classes
August 12	Study Day
August 13, 15	Final Examinations

### **This catalog becomes effective July 1, 2009.**

The 2009-2011 academic calendar applies to the Prescott Campus. This calendar is subject to change.

Orientation programs for all new 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 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 online edition of this catalog will be considered to be the official version, reflecting addendum or corrections to the publication. 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 to be photographed or published.

# 2009-2011 GRADUATE PROGRAM CALENDAR

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## Deadlines for Prescott Campus

Admission	Fall 2009	Spring 2010	Summer 2010	Fall 2010	Spring 2011
For U.S. Students	07/01/09	11/01/09	03/01/10	07/01/10	11/01/10
International Students	07/01/09	11/01/09	03/01/10	07/01/10	11/01/10
Graduation Application	10/27/09	03/11/10	07/01/10	10/27/10	03/11/10



# MESSAGE FROM THE PRESIDENT

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## 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 90,000 alumni, you are now a member of a worldwide family of leaders in the aviation and aerospace 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 dynamic 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 83 years we have grown from the world's finest aviation institute to an internationally respected comprehensive university, committed to teaching, research, and professional service to the aviation and space community. With 130 campuses and centers all over the world, we can truly say that the sun never sets on Embry-Riddle.

I welcome you to an exciting and global University, and to the Embry-Riddle experience.



John P. Johnson, Ph.D.  
President





# MISSION OF THE UNIVERSITY

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Embry-Riddle Aeronautical University is an independent, nonsectarian, non-profit, 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 Beach, Florida, and Prescott, Arizona, provide education in a traditional setting, while an extensive network of learning centers throughout the United States and abroad serves civilian and military working adults through Embry-Riddle Worldwide.

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, aerospace, and related disciplines.

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

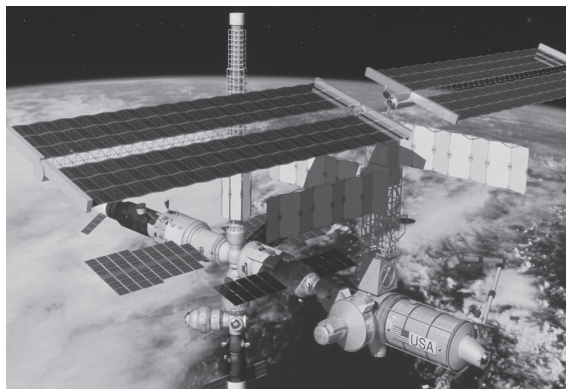
To promote ethical and responsible behavior among its students and graduates in the local, national, and

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, non-credit 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 well-rounded individual prepared for personal and professional success.

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



# EMBRY-RIDDLE AT A GLANCE

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## 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.



*T. Higbee Embry*

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 developments at the end 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



*John Paul Riddle*

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 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.

In 1965, with Jack R. Hunt as president,

## Embry-Riddle at a Glance

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*Jack R. Hunt*

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 510-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. 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



*Lt. Gen. Kenneth L. Tallman*

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 strategic partnerships with industry. These partnerships included a joint venture with Flight Safety International; a partnership with Cessna



*Steven M. Sliwa*

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, and continues to rank, Embry-Riddle's aerospace engineering program No. 1 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



*Dr. George H. Ebbs*

as new undergraduate degree programs in computer science, global security and intelligence studies, mechanical engineering, software engineering, and space physics. In addition, major construction was also initiated at both residential campuses.

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, Air National Guard, and international flight safety officers at Kirtland Air Force Base in Albuquerque, N.M., and trained Air Force pilots at the U.S. Air Force Academy in Colorado Springs, Colo.

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.



*Dr. John P. Johnson*

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, 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 97 nations. The University offers more than 30 degree programs at the bachelor and master level. Doctoral programs in aviation and in engineering physics are pending approval by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS) for the University to offer programs at the doctoral level. Embry-Riddle provides flexible educational services to thousands of working adults through its Worldwide Campus, which has more than 130 campus centers in the United States, Europe, Canada, and the Middle East, and also offers online learning.

# ACCREDITATIONS AND AFFILIATIONS

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## Regional Accreditation

Embry-Riddle Aeronautical University, including the Daytona Beach Campus, the Prescott Campus, and the Worldwide Campus, 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.

## Program Accreditations

**At the Daytona Beach Campus:** The bachelor degree programs in Aerospace Engineering, Civil Engineering, Computer Engineering, Engineering Physics, Mechanical Engineering, and Software Engineering 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). The bachelor degree programs in Aeronautical Science, Aerospace Electronics, Air Traffic Management, Applied Meteorology, and Safety Science are accredited by the Aviation Accreditation Board,

International (AABI). The bachelor degree programs in Business Administration and the Master of Business Administration program are accredited by the Association of Collegiate Business Schools and Programs (ACBSP). The Aviation Maintenance Science degree is accredited by AABI for two Areas of Concentration: Aerospace Electronics and Maintenance Management. The certificate programs in Maintenance Technology (airframe and power plant) are approved by the Federal Aviation Administration (FAA).

**At the Prescott Campus:** The bachelor degree programs in Aerospace Engineering, Computer Engineering, and Electrical Engineering are accredited by ABET. The bachelor degree programs in Aeronautical Science, Applied Meteorology, and Aviation Business Administration are accredited by AABI.

**At Both Residential Campuses:** Certificate programs in Flight (private, commercial, instrument, multi-engine, flight instructor, and instrument flight instructor ratings) and Flight Dispatch are approved by the FAA.

# STATEMENT OF VALUES

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## **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.

## Embry-Riddle Statement of Values

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### **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

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



# UNIVERSITY INFORMATION

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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 34,000 students annually at its residential campuses in Prescott, Arizona, and Daytona Beach, Florida, and through its Worldwide Campus.

There are approximately 1,700 undergraduate and graduate students at the Prescott Campus, 5,000 at the Daytona Beach Campus, and 27,200 at the Worldwide Campus.

Our students hail from all 50 states and 97 nations. At the Prescott Campus, the top five states of origin in descending order are California, Arizona, Texas, Colorado, and Washington. At the Daytona Beach campus, the top five states of origin are Florida, New York, Pennsylvania, New Jersey, and Texas.

International students make up 4 percent of the student body at Prescott and 11 percent at Daytona Beach, with India at the top, followed by Korea and Nigeria. At the residential campuses, females constitute 18 percent of the student population.

The University's 539-acre western campus in Prescott is located 100 miles north of Phoenix. New buildings include the Udvar-Hazy Library and Learning Center, the Aerospace Experimental and Fabrication Building, and the Academic Complex. 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. Students gain experience in various campus laboratories and have access to a supersonic wind tunnel and shock tube.

The University's 185-acre eastern campus in Daytona Beach offers state-of-the-art facilities, including a new academic hall for the College of Business that contains high-tech classrooms. The College of Aviation building has air traffic control simulation and research labs and a weather center, while the Lehman Engineering and Technology Center houses the technology for online learning, videoconferencing, decision support systems, and three-dimensional modeling. The Advanced Flight Simulation Center contains an FAA-certified Level-6 CRJ200 simulator and Level-6 Frasca FTDs that provide a level of on-campus training unique to higher education.

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 campus centers in the United States, Europe, Canada, 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 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 95 instructional aircraft and 36 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 349 students were awarded co-op or intern positions during the 2007-2008 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 2008, some 161 faculty members were involved in research and other activities with 166 sponsored projects. The total value of all active awards was more than \$9 million.

For the Class of 2005, 95 percent of Embry-Riddle graduates overall are either employed or have continued their education within one year of graduation. The major airlines hire more alumni from Embry-Riddle than from any other collegiate aviation program, and Embry-Riddle

## University Information

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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 contract with the U.S. Department of Defense that maintains the University's long-time status as the sole provider of aviation-related degree pro-

grams to the U.S. military in Europe. Under another contract, Embry-Riddle 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.

# ADMISSIONS

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## 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	January 15	Rolling	May 1
Spring	November 1	Rolling	November 1
Summer Term A	April 1	Rolling	As requested
Summer Term B	April 1	Rolling	As requested

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

Embry-Riddle Aeronautical University  
Director of Admissions  
3700 Willow Creek Road  
Prescott, AZ 86301-3720  
(928) 777-6600 or  
(800) 888-3728  
Fax (866) 532-5894  
email address: [pradmit@erau.edu](mailto:pradmit@erau.edu)  
<http://www.erau.edu>  
(you may also apply online)

## First Year Applicants

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.

Entrance requirements to the University include 4 years of English; 3 years minimum, 4 years preferred college preparatory mathematics; 2 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 required for admission for U.S. citizens and permanent residents. International students: 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 acceptance to your degree program.

# Admissions

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## English Language Proficiency

The Office of Admissions strongly recommends that all of our applicants for whom English is not the primary language spoken at home 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:

### 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 concerning English language proficiency, contact the Director of International Recruitment, Office of Admissions, at (928) 777-6600.

## 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 fewer than 30 college-level credit hours may 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

Transfer credit may be granted under the following conditions:

1. Appropriate coursework completed at another accredited institution with a grade of A, B, C, P, or equivalent will be accepted. Grades are not transferable.
2. Previous flight experience may be accepted in accordance with the Embry-

Riddle policy as stated in the Advanced Standing section of this chapter.

3. 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.
4. Embry-Riddle evaluates previous academic credit on a course-by-course basis. 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.
5. 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.
6. 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 first-year 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:

7. Completed application form and \$50 application fee (nonrefundable).
8. Official copy of high school transcript or completion of the General Education Development Test (GED scores must be sent directly by the testing agency).
9. 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.

## Admissions

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### 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 non-degree 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 a non-degree seeking student can get more information from the Director of Admissions.

### International Applicants

Refers to nonresident, nonimmigrant students planning to study in the U.S. (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 213 (computer based), 79 (Internet based), or 550 (paper based). Students scoring below the preferred score, but who meet all other admission requirements, may be granted conditional admission; upon completion of adequate English language preparation, regular admission will be offered. Embry-Riddle in Prescott is a designated cooperating university with ELS Language Centers; for more information, please see the section on English as a Second Language below. 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>

For more information concerning TOEFL or the Embry-Riddle Language Institute, contact the Director of International Recruitment, Office of Admissions, at (928) 777-6600.

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 course-by-course evaluation directly to Embry-Riddle. Following is a list of international translation and evaluation providers:

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

Educational Credential Evaluators Inc.

P.O. Box 92970

Milwaukee, WI 53202-0970

(414) 289-3400

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

Josef Silny & Associates

P.O. Box 248233

Coral Gables, FL 33124

(305) 666-4133

email: [info@jsilny.com](mailto:info@jsilny.com)

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](mailto:info@wes.org)

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



## Admissions

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- 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.
- 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 enrolled, 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 U.S.
  - 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 U.S.
- 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 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)**

In order to help students fulfill the English proficiency requirement, Embry-Riddle in Prescott works as a cooperating school with ELS Language Centers, one of the premier providers of English language learning in the United States. If you meet all other admission criteria beside the TOEFL requirement, ERAU-Prescott can conditionally admit you while you study English with ELS Language Centers. Upon completion of Level 112 with ELS Language Centers, you can be fully admitted to begin your studies at ERAU – Prescott.

Please visit the ELS Language Centers website at <http://www.els.edu> for more information.

For direct information about ERAU – Prescott’s cooperating University arrangement with ELS Language Centers, and for a listing of the ELS Language Centers location nearest to our campus, please visit the following link: <http://www.collegedirectory.els.edu/scr/SchoolInfo.asp?sid=1158&mjrgrp=-&majors=->

### **Admitted Student Information**

All students accepted for admission must submit a non-refundable \$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 November 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. If the student does not enroll 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 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.

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 and maintained by the Records Office. Documentation that may be sub-

## Admissions

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mitted for consideration toward advanced standing includes military training, FAA certificates, official examination scores, and professional experience. Credit may be awarded as follows:

1. The University offers advanced standing 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.
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. A determination of the exact amount of credit to be awarded will be made by the Records Office and the Flight Department. 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.
6. 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. 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.

7. The degree program for which holders of the FAA Airframe and Powerplant Certificate may receive advanced standing is Aeronautics.
8. 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.
9. 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**

All 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**

All flight students are required to possess an FAA Class I or Class II Medical Certificate and provide proof of citizenship before beginning flight training.

# GRADUATE ADMISSIONS

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Embry-Riddle seeks graduate students of good character who have demonstrated scholastic achievement and capacity for future growth. Our admission process is aimed at identifying the best students who show the potential to succeed in our graduate program. We use the guidelines in the next section to determine which applicants are to be granted full admission to the Master of Science in Safety Science graduate program. Students who fail to meet these guidelines but who are judged to have potential for success in the graduate program may be granted conditional admission (subject, of course, to openings in the graduate program). Students admitted under conditional status will have to prove their ability to pursue a graduate program by meeting specific performance criteria after matriculation at the University.

Admission actions are often taken in the anticipation of the applicant successfully completing the baccalaureate or some other admission requirement. Admission granted by such actions is provisional and is automatically rescinded if the applicant fails to meet the requirement before the specified date for the start of graduate study.

The Master of Science in Safety Science may require that potential degree candidates display a mastery of a number of topical areas critical to the initiation of graduate-level study in this field. Candidates are informed of these requirements along with their notification of acceptance.

Any questions relating to the criteria or any other aspect of the admissions process should be addressed to the Graduate Admissions Office on the Prescott Campus.

## General Criteria

Applicants must possess an earned baccalaureate degree or equivalent.

If earned in the U.S., this degree must be from an appropriately accredited college, university, or program.

If earned outside the U.S., the degree must be from an institution that offers a degree program that is equivalent to one in an appropriately accredited college, university, or program in the U.S. Applicants educated at foreign schools may be required to submit an evaluation by submitting official certified documentation of their educational achievements to an international education evaluation organization specified by Embry-Riddle.

A well-defined process will be used to determine whether a student is fully qualified for admission to a specific graduate program. Criteria for making this judgment will include academic record, work experience, professional activities, publications, recommendations, written statements, and interviews, as appropriate.

Articulation of applicable courses to meet program requirements or course prerequisites may be required as a condition of admission.

In most cases, students required to complete undergraduate prerequisites as conditions of their admission will receive conditional status admission. Upon successful completion of the appropriate undergraduate prerequisite courses, these students will transition to full graduate student status. While in conditional status, these students are not eligible for assistantship opportunities.

### Program-Specific Criteria

In addition to the general criteria for admission, some of our graduate programs have additional program-specific admission criteria.

#### Master of Science in Safety Science (MSSS)

Applicants for admission to the MSSS program must have prerequisite knowledge in the areas of:

- Mathematics
- Chemistry
- Physics

If they do not possess such knowledge, they may be required to register for undergraduate prerequisite courses in these areas. The student should possess a strong academic record, generally evidenced by a CGPA of 2.75 or higher.

#### Conditional Admission

- Students who fail to satisfy the guidelines for full admission but are judged to have potential for success in the graduate program may be granted conditional admission.
- Students admitted under conditional status must prove their ability to pursue a graduate program by meeting specific performance criteria after matriculation at the University. Students admitted on conditional status will be monitored closely as to scholarly performance. Students who are admitted conditionally will be on conditional status until they have completed nine hours of graduate work. During this period, students may receive no grade lower than a B. Students will not be permitted to repeat courses during this period.

- The conditions of admission will be communicated to applicants in the letter of admission. Students are fully admitted to the program when the conditions have been properly satisfied.

### Procedures for Admission

Applications will not be processed until all required documents are received.

Applications received after the submission deadlines stated in the following sections will be processed as quickly as possible, but acceptance for admission may not be early enough for the applicant to begin the program as soon as desired. From the day of the receipt of all application documentation, admission notifications are usually sent within three weeks.

Prescott applicants should submit their application to:

Embry-Riddle Aeronautical University  
Graduate Admissions Office

3700 Willow Creek Road

Prescott, AZ 86301-3720

(800) 888-3728 -or- (928) 777-6993

fax: (928) 777-6958

email: [prmsss@erau.edu](mailto:prmsss@erau.edu)

<http://www.erau.edu/pr/degrees/>

### U.S. Citizens and Permanent Residents of the U.S.

All applicants must submit the following items to the Graduate Admissions Office prior to the application deadline:

1. **Completed application form** and the \$50 application fee. Please note: Permanent residents must provide a photocopy of their ARC (Alien Registration Card).
2. **Transcripts.** Official sealed transcripts for all college coursework earned (both graduate and undergraduate). Transcripts

## Graduate Admissions

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must be sent directly from the institutions attended to Embry-Riddle Graduate Admissions. A minimum of a bachelor degree is required.

3. **Course descriptions** for all graduate coursework to be considered for transfer.
4. **Statement of objectives.** The statement of objectives is an important part of your application. You should give your reasons for wishing to do graduate work in the field you have chosen, incorporating your interests and your background as well as your long-term professional goals, defining how Embry-Riddle's Master of Science in Safety Science program can support those interests and goals. This should be at least three or four paragraphs.
5. **Three graduate applicant reference forms**, two academic and one professional.
6. **Resume.** A current resume outlining your education, work experience, special activities, and awards.
7. **Assistantships.** If interested in assistantship opportunities, submit an assistantship application declaring your interest in research, teaching, or administrative fields. Indicate any special skills that you feel may qualify you for an assistantship. To be eligible for an assistantship, a student must have a minimum 3.00 GPA in their undergraduate degree and have full graduate status (conditional admission eliminates a student from eligibility until all conditions are removed).

### Special Requirements for International Applicants

Embry-Riddle is authorized under federal

laws to enroll nonimmigrant alien students. An international applicant is defined as a nonresident, nonimmigrant applicant entering the U.S. on a nontourist visa.

In addition to the above required documents, **international applicants must also submit the following:**

1. All applicants whose native language is not English, or who were educated at schools where English was not the language of instruction in all disciplines, must submit their official TOEFL scores sent directly from the testing authority. The minimum acceptable score is 550 written/213 computer-based/79 iTOEFL.
2. In addition to official sealed transcripts, for any transcript not in English, a notarized English translation must also be submitted.

### I-20 Requirements for International Students

Upon application, international students who require an initial or renewed student visa must submit the following:

1. Affidavit of Financial Support.
2. Supporting bank letter verifying appropriate funds on deposit. Please refer to the student's acceptance packet for the specific dollar amount requirement. 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.

3. The I-20 Form must be in the student's possession before departure and be presented to the nearest U.S. embassy or consulate to obtain the necessary entry visa before departure to the U.S.

The I-20 will be issued to the student upon admission to the University if all required documentation has been received.

These rules and procedures apply equally to international students already studying in the U.S. who wish to pursue graduate study at Embry-Riddle. The only exception is that they must follow the procedures required by the U.S. Bureau of Immigration and Customs Enforcement to obtain approval for the transfer. Students should seek the assistance of the international student advisor at their current university to assist them with the transfer procedures. Transfer students should contact their current school's International Student Service Office and request that their SEVIS record be released to Embry-Riddle at the end of their last semester at their current school. This will allow our admissions office to issue a new I-20.

### **Admission Time Limit**

Applicants who have been accepted for admission into Embry-Riddle graduate programs must enroll in Embry-Riddle graduate courses in one year from the date of the semester for which they were accepted. Those who do not enroll in the specified time period must reapply for admission according to the regulations and procedures in effect at

the time of reapplication.

A student who cancels the application at any point in the application process may reactivate the application at any time up to one year from the date of application. After one year, a new application, fee, and supporting documents must be submitted.

### **Admission Deposit**

At least 30 calendar days prior to matriculation, admitted students must submit a \$200 tuition deposit.

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 a student has not matriculated, the deposit is forfeited.

### **Credit for Prior Academic Work and for Courses Taken at Other Institutions**

Students applying prior academic work toward their Embry-Riddle graduate program requirements must submit appropriate documentation for such credit as part of the admission process. The request must be in writing and be accompanied by official transcripts or equivalent evidence of such work. Requests must be approved by the academic department chair or their designee.

Prior academic work and courses taken at other institutions by veteran students and/or other eligible students receiving Veterans Education Benefits will be evaluated and credit granted as appropriate and will be reported to the DVA as required by law.

Credit (called transfer credit) may be received for graduate work done at another appropriately accredited college or university.

Credit (called escrow credit) may be



## Graduate Admissions

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received for certain graduate courses taken by Embry-Riddle undergraduates.

Credit may be received for certain graduate courses taken as non-degree graduate work or as part of another (completed or non-completed) Embry-Riddle graduate degree program. When transferring from one Embry-Riddle graduate program to another this credit may include prior work on a GRP or thesis.

The combined total credit applied to an Embry-Riddle graduate degree may not exceed 12 credit hours.

In order to satisfy a graduate degree program requirement, the academic work for which such credit is sought must be determined to be specifically relevant to the applicant's graduate degree program at Embry-Riddle. The content of the applicable course or other program should be used to determine the nature of the credit to be applied to the student's degree requirement. The appropriate Prescott academic department chair or designee shall make these determinations.

Credit will be granted only if the student demonstrated performance expected of a graduate student at Embry-Riddle; (in the case of graduate courses, this normally means that the course was completed with a B or better (3.00 on a 4.00 system).

Credit for academic work used to satisfy the requirements of an undergraduate degree will not be accepted toward the requirements for a graduate degree.

Credit will generally be accepted only for courses that were completed in the seven-year period immediately preceding the date that the student begins classes.

Permission to obtain graduate credit for courses to be taken outside the University after matriculation must be granted by the academic department chair or designee.

The last nine hours of graduate credit on a degree program must be earned at Embry-Riddle.

A student may not be enrolled in more than one graduate degree program. Upon completion of a Embry-Riddle graduate degree program, a student may elect to apply to another graduate degree program at this university. After meeting admissions requirements and receiving notification of acceptance, a student may request that up to 12 hours of credit be transferred to the new degree program if the hours are applicable to the newly elected degree program. The transfer of these hours is at the discretion of the appropriate college dean or their designee.

### Intra-University Transfer

Graduate students who have matriculated on either the Daytona Beach, Prescott, or Worldwide Campuses who are continuously enrolled students, and who have met their financial obligations on the campus where they matriculated, may transfer from one campus to the other. Transfers are not automatic and certain conditions must be met. Additionally, a vacancy must exist in the program to which the student wishes to transfer, either permanently or as a visiting student.

Students are urged to begin this process at least 45 days before the first day of classes in order to avoid any interruption in the progress toward their degree.

# UNDERGRADUATE ACADEMIC REGULATIONS AND PROCEDURES

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## Undergraduate 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 their academic advisor, program/department chair, or the Records Office. 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 updated to the official electronic catalog and published in the next print catalog.

Students should consult the graduate section of this catalog for academic policies and regulations regarding graduate programs.

## Academic Advising

All new students are assigned an academic advisor. Academic advisors help students choose and schedule courses to 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 semester of enrollment and are encouraged to do so via Web registration. First-year students must first see their advisor. Registration must be completed and payment of all tuition deposits and fees must be made according to instructions published by the 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 class days of the semester if 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 semester.

A schedule of classes is prepared for each semester. 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

# Undergraduate Academic Regulations and Procedures

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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 semester. 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.
3. 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

# Undergraduate Academic Regulations and Procedures

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will be converted to semester credit hours on the following basis: A quarter hour equals two-thirds of a semester hour.

## Course Load Status

Enrollment in 12 credit hours constitutes the minimum load for full-time student status during the fall and spring semesters. The minimum load for full-time student status during each summer term is six 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 semester.

The maximum credit hour load is 16 credit hours for spring or fall semester or nine credit hours for summer term. Students may register for an overload of hours with advisor approval. A student with more than 27 completed credit hours and an Embry-Riddle cumulative GPA of 3.00 or higher may enroll for up to 18 credit hours, in a fall or spring semester with no increase in tuition for hours over the block. Completed credit hours and an Embry-Riddle cumulative GPA at the end of the spring semester will be used for fall semester eligibility. Completed credit hours and an Embry-Riddle cumulative GPA at the end of the summer semester will be used for spring semester eligibility.

## Classification of Students

Students are classified at the end of each semester 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
A	Superior	4
B	Above average	3
C	Average	2
D	Below average	1
F	Failure	0
AU	Audit	0
I	Passing but incomplete	0
IP	In progress	0
P	Passing grade (credit)	0
S	Satisfactory (noncredit)	0
X	Advanced standing credit granted for experience outside the University	0
T	Transfer credit	0
N	No grade submitted by instructor	0
W	Withdrawal from a course	0
WF	Withdrawal from the University - Failing	0
XP	Course Equivalency Examination passed & advanced standing granted	0

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## Grade Reports

Final grades are issued at the end of each semester. Students can access their grades immediately after they are posted, via Student Online Services. Students who have specifically requested a hard-copy grade report and supplied an address to the Records Office will be mailed an unofficial copy of their transcript.

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

## Grade Point Averages: GPA, CGPA

A semester grade point average (GPA) and cumulative grade point average (CGPA) are computed for each student after every semester. The GPA is calculated by dividing the number of grade points earned during the semester 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 semesters and the second week of summer terms.

## 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, through the first five class days of the semester or the first three days for summer terms. They may change from credit to audit until the last day of the withdrawal period, through the tenth week of the semester or the fourth week of the summer term. 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)

Students receive the grade W if they withdraw from a course by the end of the tenth week of spring and fall semesters and the fourth 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

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, the end of the tenth week of the semester, or the end of the fourth week of summer terms, 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 by the end of the fourth week of the subsequent semester, the incomplete (I) automatically converts to an F.

## 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 semester, the temporary grade IP is assigned for flight courses in which students are still active. If the course is not subsequently completed the following semester 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. Only the last grade counts toward course completion.

## 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. 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. 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 semester receive a letter and certificate with a notation placed on their academic transcript by the Records Office. To be eligible for semester honors, students must be enrolled full-time, have completed all coursework for the semester, maintained at least a 2.00 CGPA, and must not have received a D or F during the semes-

## Undergraduate Academic Regulations and Procedures

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ter. In addition, students must have achieved a semester GPA of 3.50-4.00 for inclusion on the Dean's List or 3.20-3.49 for inclusion on the Honor Roll.

### Academic Warning, Probation, Suspension, and Dismissal

#### Warning

A student whose cumulative grade point average (CGPA) is less than 2.00 for one semester will be placed on academic warning. The academic program of a student on warning may be restricted by the College dean or designee.

#### Probation

A student whose CGPA is less than 2.00 for two consecutive semesters will be 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 may lose eligibility for financial aid programs. The academic programs of students on warning or probation may be restricted. A student who has a semester GPA of less than 1.00 may be placed on academic probation.

#### Suspension

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

#### Dismissal

A student who has been suspended for academic reasons and is subsequently readmitted will be on probationary status until the CGPA has been raised to 2.00. If the semester GPA falls below 2.00 during the probationary period, the student will be dismissed. Any previously suspended and readmitted student who has been restored to good standing whose academic performance subsequently deteriorates to a level that would qualify for initial suspension will be dismissed.

Students may appeal an academic dismissal within 30 calendar days of notification, with documentation to their College Dean. If the student is allowed to return, the dismissal statement will be removed from the student's transcript.

The Dean is the final authority in the dismissal process. Once confirmed, the Academic dismissal is final and the student will not be readmitted to the University.

Note: When a change of grade or the conversion of an incomplete grade 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,

# Undergraduate Academic Regulations and Procedures

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- 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 to the campus and college from which they were suspended.

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 advisor 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 the Records Office. 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. (See minor section of this catalog).

The student becomes subject to the requirements of the minor as stated in the catalog in effect at the time the minor is declared. The department 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 department chair to initiate the application.

When a student elects to change degree programs, or minors within a degree program, the requirements of the catalog in effect at the time the request was approved apply. 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.



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## 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.

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.

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. Approval for flight instruction taken away from Embry-Riddle must be obtained, in writing, from the Flight Department.

To initiate this procedure, students must process a Petition to Take Courses at Another Institution. Students must provide adequate evidence that the petitioned courses are equivalent to Embry-Riddle courses or are acceptable as elective credit in their degree program. The Records Office evaluators will determine if the requested courses are equivalent and notify the student by returning the approved petition. After the courses are deemed equivalent, the petition is evaluated considering such factors as the reasons for petitioning and the availability of the courses in the University curriculum prior to approval. A course taken at another institution will not replace the grade of a previously completed Embry-Riddle course.

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. 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 circum-

## Undergraduate Academic Regulations and Procedures

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stances, students may be allowed an exception to take courses at a local institution. If a student is nearing graduation and if schedule conflicts and/or course availability would unduly delay completion of degree requirements, the student may petition for a waiver from their College Dean or designee.

After initial matriculation, students may not earn more than a total of 18 semester hours or that equivalent at another institution and their last 30 hours toward a bachelor's degree must be completed in residence at Embry-Riddle.

### 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.
4. Students pursuing a baccalaureate 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 Computer Engineering, B.S. in Electrical Engineering, and the B.S. in Mechanical Engineering 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.
9. Students will not be issued a diploma while on probation for conduct or academics.
10. Students will not be permitted to participate in the formal graduation ceremony until all the degree requirements listed above have been satisfied or a waiver has been approved by the student's College Dean. Students anticipating

# Undergraduate Academic Regulations and Procedures

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a summer degree completion may participate in the spring ceremony if they meet established guidelines.

11. Under no circumstances will an official diploma be awarded, or the student's transcript annotated as complete, until all of the degree requirements indicated above have been satisfied and grades for all enrolled courses prior to degree completion have been posted to their transcript. Students enrolled in courses whose term ends after the graduation date (or beyond the incomplete period) will degree complete with the next scheduled graduation date.
12. Diplomas are 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:

<b>Honors Level</b>	<b>CGPA</b>
Summa Cum Laude	At least 3.90
Magna Cum Laude	At least 3.70 and less than 3.90
Cum Laude	At least 3.50 and less than 3.70

## Transcript Requests

A signed request for an academic transcript, accompanied by a fee, may be submitted by the student to the Records 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 non-disclosure 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 the following:

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. The request 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 Records Office. The Records 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 Office.

### Flight Course Related Information

All flight training at Embry-Riddle is done in late-model, fully equipped aircraft. In addition, procedures trainers and flight-training devices give the student a safe, flexible, and cost-effective training environment. 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 space-available 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 Embry-Riddle Flight Operations Manual for additional information on flight line policies and procedures.

### Credit for Flight Training at Other Institutions

All students desiring to complete off-campus

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flight training for credit after matriculation must be approved in writing in advance by the Flight Department. The credit will be awarded as advanced 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.

### **B.S. 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 AABI flight education accredited college or university. In all cases, students must satisfactorily complete at least one flight course on campus after advanced standing is awarded or AABI 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 advanced standing.

### **Awarding Advanced 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 complete

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background check requirements.

Students enrolled in an FA course must present ONE of the following to the 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 U.S. 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 International Students Office or the Flight Department 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 phenylcyclidine (PCP) as follows:

1. Random testing of students engaged in flight training.
2. Required post-accident 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

## Undergraduate Academic Regulations and Procedures

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suffering death or serious injury, or where the aircraft receives substantial damage as determined 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:

- a. 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.
- b. 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.
- c. 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 possible 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 Grievance Procedure

It is the policy of Embry-Riddle to administer its educational programs in a fair, equitable, academically sound manner and in accordance with the appropriate regulations and criteria of its governing board, accrediting associations, and federal and state laws and regulations. To this end, students are provided an opportunity to express any complaint, grievance, or dispute that upon investigation may be redressed.

### Informal Process

Most grievances are handled informally between the individuals involved. Every effort must be made to resolve an issue directly with the faculty member or University administrator who made the decision. If resolution cannot be made at that level, the student should contact the department chair (for faculty-related issues), or the administrator's direct supervisor

## Undergraduate Academic Regulations and Procedures

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and request his/her assistance. If these efforts fail to resolve the matter, contact the Associate Dean of Academic Support.

### **Formal Process**

University committees/boards, which include student members, are available to process formal appeals when the informal mechanisms have been exhausted.

### **Academic Issues / Student Status**

The Academic and Admissions Standards Committee is an appeal board designated to resolve any conflict with Academic Procedures or Policies. This committee makes recommendations to the Academic Deans. Additional information regarding the Academic and Admission Standards Committee, including how to initiate the process, may be obtained at the Associate Dean of Academic Support Office.

### **Student Rights/Disciplinary Appeals**

The Student Affairs Student Conduct Board may be convened to consider cases of alleged misconduct in which a student appeals the charges of misconduct brought against him/her. These are cases in which a student wants to request a review of Sanction Levels IV - VII imposed by a department or University personnel, or cases

in which a student feels persons or agencies at the University have violated his/her rights. The Student Affairs Student Conduct Board is composed of a student chief justice, two student justices, and two staff/faculty justices. Students may elect to adjudicate an appeal through a University Administrator rather than the Student Affairs Student Conduct Board. The supervisor of the University Student Conduct officer that made the original decision may serve as the appeal administrator. Applications for hearing or appeal are available through the Dean of Students Office.

If the student complaint cannot be resolved after exhausting the institution's grievance procedure, the student may file a complaint with the Arizona State Board for Private Postsecondary Education.

The student must contact the State Board for further details.

Arizona State Board for Private  
Postsecondary Education  
1400 W. Washington, Room 260  
Phoenix, AZ 85007  
Phone: (602) 542-5709  
Website: <http://azppse.state.az.us>



# GRADUATE ACADEMIC REGULATIONS AND PROCEDURES

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## Graduate Regulations and Procedures

All University graduate academic and non-academic procedures and regulations are subject to change. Therefore, all procedures and regulations in effect at a given time may not be reflected in the current catalog. When such changes do occur, notice of the change will be incorporated into the next catalog. Catalogs are effective on the date published unless otherwise stated.

## Student Responsibilities

Students are responsible for being fully informed about all procedures and regulations governing their participation in Embry-Riddle's graduate programs. The necessary information may be found in the graduate section of this catalog, Student Handbook, orientation and information packets published and distributed by the campus, and periodic announcements published by the University. A student who requires clarification of any policy or regulation should seek help from his/her academic advisor or the Records Office. University regulations will not be waived because a student is unaware of established standards and procedures.

## Academic Advising

Academic advisors help students choose and schedule courses that meet their educational goals.

Academic advisors post a schedule of office hours, and students should feel free to call on their advisors when assistance or discussion is needed.

## Registration

Students are required to register for each semester and are encouraged to use web registration. Tuition deposits, registration, and fee payments must be completed according to instructions published by the Records Office. Students are not officially enrolled until they complete all phases of registration, including financial requirements.

Registration will be allowed through the first five class days for fall and spring and the first three class days of summer terms.

## Schedule of Classes

A schedule of classes is prepared for each semester. The University reserves the right to make necessary and appropriate adjustments to the published schedule to include cancellation or rescheduling of any class.

## Academic Integrity

Embry-Riddle is committed to maintaining and upholding intellectual integrity. The faculty, colleges, divisions, or campuses of the University may impose sanctions on students who commit the following academic integrity violations.

1. Cheating: The use of inappropriate sources of information on a test or being a party to obtaining or possessing an examination before the time the examination is scheduled.
2. Plagiarism: Presenting as one's own the ideas, words, or products of another.
3. Forgery and unauthorized alteration or misuse of one's own or another's academic records or transcripts.

# Graduate Academic Regulations and Procedures

4. Knowingly furnishing fake or misleading information to the University when seeking admission to the University or campus.
5. 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.
6. Misuse of computing facilities and/or security violations, including attempted violations of computing facilities.
7. Conduct that disrupts the educational process of the University.

Sanctions may include a failing grade on the assignment, a failing grade for the course, or dismissal from the University.

## Exclusion from Courses

A student making no real progress in a course or whose behavior is detracting from the course may be excluded from the course by the appropriate dean or designee with a grade of W or WF. Students have five calendar days following written notification of this exclusion in which to appeal. Until the final disposition of the appeal, the student is considered enrolled in the course.

## Course Loads

Full-time graduate students normally take six semester credit hours. Additional courses above nine credit hours require permission from the appropriate department chair. If a student demonstrates exceptional academic performance, the department chair or designee may approve a maximum one-course

overload. A student's enrollment may be restricted when deemed in the best interest of the student.

## The 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
A	Excellent	4
B	Satisfactory	3
C	Passing	2
F	Failure	0
WF	Withdrawal from the University-Failing	0
W	Withdrawal from a course	0
AU	Audit	0
I	Passing but incomplete	0
IP	Thesis or Research Project in progress	0
N	No grade submitted by instructor	0
P	Passing grade (credit)	0
S	Satisfactory (noncredit)	0
T	Transfer credit	0

## Grade Reports

Final grades are issued at the end of each semester. Students can access their grades immediately after they are posted through Student On-Line Services. Students who have specifically requested a hard copy grade report and supplied an address to the Records Office will be mailed an unofficial copy of their transcript.

## Graduate Academic Regulations and Procedures

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

### 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.

### Grade Point Averages: GPA, CGPA

A semester grade point average (GPA) and cumulative grade point average (CGPA) are computed for each student after every semester. The GPA is calculated by dividing the number of grade points earned during the semester 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, F, and WF only.

### Thesis Grading

A final grade of P or F is awarded upon completion of the thesis. If the student is making progress, a grade of IP is awarded at the end of each semester. The P grade will replace the IP grade for all semesters. If the student has not made progress, a grade of F will be issued and will result in a change from IP to F for all thesis credits. A student enrolled for a thesis will receive a grade each semester, as determined by the student's

thesis committee. Students must continually register for one credit hour of thesis until complete.

### Graduate Research Project Grading

A final grade of P or F is awarded upon completion of the graduate research project. If the student is making progress, a grade IP is awarded at the end of each semester. Upon the successful completion of the graduate research project a grade of P is awarded to all attempts. If the student has not made progress, a grade of F will be issued and will result in a change from IP to F for the original three hours, and from IP to N for all remaining credits. Students who do not complete their graduate research project in the number of credit hours required by their degree program are required to register for one credit hour for every subsequent semester, until completion.

### Internship Grading

A final grade of P or F is awarded upon completion of a graduate internship.

### 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 semesters and the second week of summer terms.

### Auditing a Course (AU)

Because students audit a course solely to enhance their knowledge, academic credit is not granted toward degree requirements

# Graduate Academic Regulations and Procedures

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for audited courses. Students may change their registration from audit to credit during the add period only, the first five class days of spring or fall semester and the first three class days of summer term. They may change from credit to audit until the last day of the withdrawal period, the end of the tenth week for fall and spring and the end of the fourth week of summer terms. 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)

Students receive a grade of W if they withdraw from a course before the end of the tenth week of spring and fall semesters and the end of the fourth week of summer terms. If they withdraw from a course after this period, they receive a grade of F. If students stop attending their classes and fail to withdraw from the University, a grade of F is assigned for each course in which they were enrolled.

Students are not permitted to drop or withdraw from a course while a charge of academic dishonesty is pending.

## Incomplete Grade (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 in the specified period, the grade of I automatically converts to an F.

The period to convert an I in a graduate course extends through a time period determined by the instructor, but no later than three calendar months following the

end of the semester in which the I grade was assigned.

## Repeating a Course

Students may petition the graduate coordinator of their degree program to repeat one course in which less than a grade of B was earned for the purpose of improving their grade point average. Both grades earned appear on the transcript, but only the replacement grade is included in the calculation of the grade point average.

## Undergraduate Enrollment in Graduate Courses

During their senior year, Embry-Riddle undergraduate students may take selected Embry-Riddle graduate courses, normally 500-level, for credit toward their undergraduate or graduate degree. Students must be within 10 hours of completion of the undergraduate degree, have the approval of the program coordinator of the appropriate graduate program, and have at least a 2.50 CGPA to qualify for enrollment in graduate courses while an undergraduate.

## Academic Warning and Dismissal

### *Warning*

Students whose cumulative grade point average (CGPA) falls below 3.00 are placed on Academic Warning. Students on Academic Warning must raise their cumulative grade point average to 3.00 in the next 12 hours of graduate work.

### *Dismissal*

1. Students on conditional status who fail to satisfy the conditions of their admission;

## Graduate Academic Regulations and Procedures

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2. Earn less than a B in three graduate courses;
3. Earn an F in any two graduate courses;
4. Are on Academic Warning and fail to earn a 3.00 CGPA in the next 12 hours of graduate work;
5. Earn less than a 2.50 cumulative grade point average.

Students may appeal their first academic dismissal from the University by submitting a petition in writing detailing the existence of any exceptional mitigating circumstances to the appropriate administrator or designee in 30 days of the receipt of the dismissal notice. They will refer the petition to the appropriate appeals committee for recommendation. Upon recommendation of the appeals committee, the appropriate administrator or designee reviews the case and makes the final determination of the action to be taken. Such action will be taken in a timely manner not to exceed 30 days of the receipt of the petition. If confirmed, academic dismissal is final.

Students whose academic dismissal is final will not be readmitted to the University for two years. Unless readmitted to the University, such students will not be permitted to take any further graduate courses with the University. After this two-year period has lapsed, a student must reapply and meet all admission requirements in effect at the time of application to be eligible for reconsideration.

### Dismissal for Cause

The University reserves the right to 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 as determined by the University.

### Transfer Between Graduate Degree Programs

A graduate student who wishes to transfer from one program to another must prepare a written petition before the transfer will be considered. Requests for transfer of credits from Embry-Riddle or other institutions and/or advanced standing credits should be included in this petition.

The department responsible for the new program, however, has the prerogative to accept or reject the student's request and to determine the courses applicable to the new program. Students should contact the appropriate graduate program coordinator.

When a student elects to transfer from one degree program to another, the catalog in effect when the transfer is approved is applicable.

### Additional Graduate Degrees

A graduate student is allowed to apply up to 12 applicable credit hours from one graduate degree program to meet the requirements of another graduate degree program. In order to be awarded a second graduate degree, the student must satisfy all the requirements of the degree sought.

## Catalog Applicability

The catalog in effect at the time of the student's initial matriculation remains applicable as long as the student remains in the original degree program. 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.

Students who change from one graduate degree program to another come under the provisions of the catalog in effect on the date the change of program petition was approved.

Curricular requirements stated in the applicable catalog will not be affected by subsequently published addenda or by later catalogs unless the student elects to change catalogs with the approval of their department chair.

## Time Limitation for Degree Completion

The student has seven years from the date of admission to the master degree program to complete the degree. An Embry-Riddle course older than seven years at the time of graduation may not be used in the program of study for a master degree. (Prerequisite courses are exempt from this requirement.) Transfer courses older than seven years, earned at other universities, may be accepted at the discretion of the appropriate program chair. Students who do not maintain continuous enrollment (missing enrollment at the University for a period of two years) must file for readmission to the University, although seven years is measured from when the student was first admitted to the program.

## Loss of Graduate Status and Readmission

Under certain circumstances (other than graduation), a graduate student may lose graduate status and will no longer be considered a student at Embry-Riddle. This can occur when:

- A student voluntarily withdraws from the University.
- A student is dismissed from the University and the dismissal becomes final.
- A student fails to meet the requirement for continuous enrollment. This occurs when a student does not enroll in at least one semester in a two-year period.
- A student does not complete the degree requirements of a graduate program within seven years of starting the graduate program.

Students who fail to maintain continuous enrollment for any reason are required to apply for readmission under the catalog in effect at that time.

## Withdrawal from the University

Students who leave the University for any reason should conduct an exit interview with the Graduate Admissions Coordinator 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 by the college dean or designee for medical reasons or other extenuating circumstances.

# Graduate Academic Regulations and Procedures

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## Graduation Requirements

The following summary of graduation requirements is provided, for all students. An Embry-Riddle master's degree will be conferred upon the successful completion of the general requirements of the University and the specific requirements of the degree sought.

1. All courses, theses, GRPs, and other academic requirements must be successfully completed as appropriate for the applicable catalog.
2. Students pursuing a master's degree must earn a minimum cumulative grade point average (CGPA) of 3.00 for all work completed at the University.
3. The student is not on Academic Warning.
4. All debts and obligations to the University are satisfied.
5. The student is not under University investigation for misconduct or other disciplinary matters.
6. A student must be enrolled in the semester in which he/she graduates.
7. An application for graduation must be initiated by the student and received in the time limit specified by the Records Office.
8. Participation in graduation exercises will not be permitted, a diploma will not be awarded, nor a transcript annotated as complete, until all of the degree requirements have been satisfied.

## Graduation Honors

Graduation honors recognize students who have completed a graduate degree program and who have excelled academically throughout their graduate careers. To be

eligible, graduate students must have completed their degree program with an Embry-Riddle cumulative grade point average of 4.00 based on grades received in all courses that apply to specific degree requirements. The student's diploma and transcript will be annotated WITH DISTINCTION.

## Transcript Requests

A signed request for an academic transcript, accompanied by a fee, must be submitted by the student to the Records 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 non-disclosure request. Students are required to file a request for nondisclosure on an annual basis. Directory information consists of student name, address, telephone number, photograph, email address, date and place of birth, major fields of study, dates of attendance, degrees and awards received, and the most recent educational institution attended by the student.

The University will obtain written consent from students before disclosing any personally identifiable information from their educational records with the exception of the directory information. The receipt of the written request to release an educational 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 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 may be mailed directly to the recipient.
5. The request 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 educational records. The student must submit a written request to the Records Office. The Records Office must make the records available for inspection and review within 45 days of the request.

FERPA allows disclosure of educational records or components thereof under certain conditions. Students desiring additional information regarding FERPA should contact the Records Office.

### **Student Grievance Procedure**

It is the policy of Embry-Riddle to administer its educational programs in a fair, equitable, academically sound manner and in accordance with the appropriate regulations and criteria of its governing board, accrediting associations, and federal and state laws and regulations. To this end, students are provided an opportunity to express any complaint, grievance, or dispute that upon investigation may be redressed.

#### **Informal Process**

Most grievances are handled informally between the individuals involved. Every effort must be made to resolve an issue directly with the faculty member or University administrator who made the decision. If resolution cannot be made at that level, you should contact the department chair (for faculty-related issues), or the administrator's direct supervisor and request his/her assistance. If these efforts fail to resolve the matter, contact the Associate Dean of Academic Support.

#### **Formal Process**

University committees/boards, which include student members, are available to process formal appeals when the informal mechanisms have been exhausted.

#### **Academic Issues / Student Status**

The Academic and Admissions Standards Committee is an appeal board designated to resolve any conflict with Academic Procedures or Policies. This committee makes recommendations to the Academic Deans. Additional information regarding the Academic and Admission Standards



## Graduate Academic Regulations and Procedures

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Committee, including how to initiate the process, may be obtained at the Associate Dean of Academic Support Office.

### **Student Rights/Disciplinary Appeals**

The Student Affairs Student Conduct Board may be convened to consider cases of alleged misconduct in which a student appeals the charges of misconduct brought against him/her. These are cases in which a student wants to request a review of Sanction Levels IV-VII imposed by a department or University personnel, or cases in which a student feels persons or agencies at the University have violated his/her rights. The Student Affairs Student Conduct Board is composed of a student chief justice, two student justices, and two staff/faculty justices. Students may elect to adjudicate an appeal through a University administrator rather than the Student Affairs Student Conduct Board. The supervisor of the University Student Conduct officer who made the original decision may serve as the appeal administrator. Applications for hearing or appeal are available through the Dean of Students Office.

If the student complaint cannot be resolved after exhausting the institution's grievance procedure, the student may file a complaint with the Arizona State Board for Private Postsecondary Education.

The student must contact the State Board for further details.

Arizona State Board for Private  
Postsecondary Education  
1400 W. Washington, Room 260,  
Phoenix, AZ 85007  
Phone: (602) 542-5709  
Website: <http://azppse.state.az.us>

### **Substance Abuse**

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 University Health Services and Counseling offices.

# FINANCIAL INFORMATION

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## 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 check or a transfer to an Eagle Card Account. A student may also complete an authorization and have these funds directly deposited to a checking account. Each student is encouraged to open and maintain an account at a local bank for personal matters.

## Billing Statements

Residential campus students are assigned an Embry-Riddle email address, which is their primary address for all University correspondence.

Students must sign up to receive Online Billing statements in order to view their charges and/or make payments. Monthly statements will be emailed if there is an outstanding balance. Statements can be emailed to up to three addresses by requesting PIN numbers for each recipient (parent, grandparent, etc.) Sign up for this service at: <https://bosebill.salliemae.com/netpay/templates/268/frameset268.html>.

## 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 the term. Charges incurred subsequent to registration are due 30 days from

the date of invoice or the last day of classes, whichever occurs first. All payments should include the student's name and identification number.

Payments can also be made at: <https://bosebill.salliemae.com/netpay/products/erau/applyyourself/tuitionandfees/370/gateway.aspx>.

An invoice for Tuition and Fees will be issued for all registered students approximately 30 days prior to the start of the term. This bill is due on the first day of the term. Fees will be incurred for deferring payment.

## Books and Supplies

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

## Delinquent Accounts

When a student's account is delinquent, registration for any subsequent term will be denied and will result in mandatory prepayment or proof of adequate financial aid before being allowed to register. A delinquent student account will result in suspension of all academic processing including information on class performance, course grades, and transcripts. Continued delinquency may result in administrative withdrawal from the University.

Administrative withdrawal will not relieve a student from the obligation to pay outstanding debts. Delinquent accounts will be charged interest at the maximum rate

## Financial Information

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allowed by law and may be reported to one or all three credit bureaus. The student is subject to the costs of collection, including reasonable attorney's fees for making such a collection.

### Residential Campus Tuition and Fees

#### Fall 2009 / Spring 2010 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 per-credit-hour charge for those credit hours over 16.

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 2009/2010 financial insert and 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 "Pay-As-You-Go" system for all flight instruction, and payment is expected at the completion of each training activity. Following each activity, the instructor and student validate the charges calculated by Embry-Riddle's Education & Training Administration (ETA) system by entering their PIN numbers (electronic sig-

nature) into the system. Students then pay for the activity online using one of a variety of methods including Credit/Debit Cards, Eagle Card Flight Account, Eagle Dollars, or their Student Account (requires a positive Student Account balance). Students may not check-in for any subsequent activities until outstanding balances are paid.

In order to ensure continuity of training, it is important to have adequate funds to start and complete each course. If finances become an issue during a course, students should contact their Flight Training Manager immediately.

#### Room and Board

Room and Board fees may be incurred each semester by students attending the Prescott Campus and should be used when estimating the cost of attendance. Freshman students will 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 current options, requirements, and costs.

#### Mandatory Fees

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

- Student Government Association fee
- Health service fee
- International student service fee
- Insurance
- Technology fee

### User Fees

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

A graduate internship fee based on the cost of one credit hour in a student's degree program is charged for the semester of internship.

### Refund Policy

During the fall and spring terms, only those students who officially withdraw from all classes through the Records Office are eligible for a percentage refund of the charges indicated below. The effective date of the withdrawal, as determined by the Records Office, governs the refund computations. There will be no tuition refund for reductions of hours after the last day of add/drop.

During summer terms, refunds are calculated on a per course basis and withdrawal from all classes is not necessary to obtain a refund. The effective date of withdrawal, as determined by the Records Office, governs the 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.

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

- Tuition
- Student Government Association fees
- Housing fees (minus cancellation fee)
- International student service fee
- Health service fee
- Technology fee
- Meal plans

### Cancellation and Refund Policy:

#### Three-Day Cancellation

An applicant who provides written notice of cancellation within three days (excluding Saturday, Sunday, and federal or state holidays) of signing an enrollment agreement is entitled to a refund of all monies paid. No later than 30 days of receiving the notice of cancellation, the University shall provide the 100% refund.

#### Other Cancellations

An applicant requesting cancellation more than three days after signing an enrollment agreement and making an initial payment, but prior to entering the University, is entitled to a refund of all monies paid.

### 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%

#### 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%

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

## Financial Information

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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 submitted.

### Department of Education Withdrawal/Refunds Policy

Students receiving federal 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.

### 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 is available online 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 federal loan or owe a repayment on a federal grant 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 will receive a federal PIN from the Department of Education to renew their aid application. All students are encouraged to complete the FAFSA by Embry-Riddle's priority deadline of March 1.

### Programs Available

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

#### Grants

##### *Federal (Undergraduate Only)*

- Federal Pell Grant
- Federal Supplemental Educational Opportunity Grant
- Federal Academic Competitive Grant (ACG)
- Federal Science and Mathematics Access to Retain Talent Grant (SMART)

##### *State (Undergraduate Only)*

- Students are encouraged to visit the Arizona Commission for Postsecondary Education website for current information on State Grants: [www.azhighered.gov](http://www.azhighered.gov)

#### Loans

##### *Federal*

- Federal Stafford Loan (Undergraduate and Graduate)
- Federal Parent Loan for Undergraduate Students
- Federal Perkins Loan (Undergraduate Only)
- Federal PLUS (Graduate only)

##### *Private*

- 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 campus Financial Aid Office.

## Financial Information

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### 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 financial assurances to new high school 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)
- U.S. Marine Corps Platoon Leaders Class Program

#### 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 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 require-

ments. Students may receive education benefits only for courses that are required for their designated degree program.

For further information concerning approved programs and the application process, eligible persons should contact the Veterans Certifying Official. Students can also visit the U.S. Department of Veterans Affairs website at [www.gibill.va.gov](http://www.gibill.va.gov) for more information.

#### 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.

#### 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.

### Athletic Grants

The University offers a limited number of Athletic Grants for qualified students. Awards are available for men's and women's soccer, wrestling, and women's volleyball. 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 campus 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 under-represented (certain ethnic minorities and women in certain fields of study) upper-division 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 informa-

tion, students should contact the McNair Scholars Program office on campus.

### Graduate Assistantships

Graduate assistantships are academic appointments that are normally reserved for qualified graduate students. A graduate teaching assistant helps in teaching undergraduate students in specified courses or laboratories under the general supervision of a faculty member. A graduate research assistant is involved in research activities under the direction of a faculty member or a research associate. A graduate administrative assistant assists departments or faculty with curriculum development, special projects, and other duties as assigned. To be eligible for a graduate assistantship, a student must have full graduate status in a degree program, must have maintained a CGPA of 3.00 out of a possible 4.00 or above through the end of the semester (graduate or undergraduate) preceding the appointment, and must demonstrate adequate communication and technical skills.

The graduate program department has the responsibility to post the availability of its graduate assistantships. Students interested in applying should submit a resume directly to the department. Incoming students should contact departments directly about the availability of assistantships.

Full graduate assistantships carry a stipend set by the University and a tuition waiver for up to nine graduate credits per semester. Graduate assistants with such appointments are expected to devote 20 hours each week to effectively carry out their assignments. Under some circumstances, partial assistantships providing either tuition or a stipend may be



## Financial Information

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granted. In such cases, expected time to be devoted is set by the assigning department. Graduate assistants are permitted to accept other University employment; however, University policies limit all students to a total of 25 hours of work per week, including the graduate assistantship. All graduate teaching, research, and administrative assistantships, both full and partial, require that the recipient be registered for at least three graduate credits at Embry-Riddle for any semester of their appointment. Summer registration is not required, but encouraged.

# STUDENT LIFE AND SERVICES

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## Student Activities

The mission of the Department of Student Activities 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.

The Prescott Campus offers sports clubs, special interest groups, Greek life (sororities and fraternities), honor societies, aviation clubs, military organizations, and religious clubs. The Office of Student Activities provides support for these organizations in addition to assisting students in starting new clubs/organizations. Involvement in any club or organization develops social responsibility, strong group dynamics, leadership, communication, management, budgeting, and decision-making skills. Students have the opportunity to learn about all of the organizations at the fall and spring Activity Fair.

The Department of Student Activities, located in the Student Union, is the point of contact for Student Activities, leadership development, student organizations and clubs, Greek Life, and the Student Union.

## Student Government Association (SGA)

Student Council is elected each year by the student body and is responsible for providing a communication 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; a directory; discount cards; lawyer service; lockers; banners; color printer; and free faxing. SGA members also participate on almost every committee on campus, and the president of the SGA is a student delegate of Embry-Riddle's Board of Trustees. For questions, comments, or concerns, contact [prsga@erau.edu](mailto:prsga@erau.edu) or call (928) 777-3784.

## Student Conduct

The Dean of Students Office offers a variety of services to assist students with problems such as personal and family emergencies. The department oversees all non-academic judicial issues and disciplinary records. The Dean of Students Office is located in building 18A.

## Intramural and Recreational Sports

Intramural and Recreational Sports 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. Students are encouraged to use all on-campus sports-related facilities (outdoor swimming pool, tennis and basket-

## Student Life and Services

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ball courts, playing fields, indoor racquetball, gymnasium, and fitness center). Hours vary for each facility and are posted.

In addition to on-campus recreational activities, the Prescott 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 less competitive venue 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 Prescott Campus. 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. Our wrestling team has finished in the top 10 programs in the nation for over 10 years, including a second-place finish in 2007. In 2006, the Eagles were recognized with the prestigious National Champion of Character Sportsmanship Award at the national tournament.



The University sponsors four intercollegiate sport programs at the Prescott Campus: men's wrestling, women's and men's soccer, and women's volleyball. Any student who meets both University and NAIA eligibility requirements is able to compete for a position on a varsity team. Athletic grants-in-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, log on to <http://www.embryriddleports.com>.

For tryout information, contact the Intercollegiate Athletics Department, located in building 81, adjacent to the Eagle Gym.

### 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.

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 stu-

dents 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 students in order to promote 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 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.

### **Chris and Steven F. Udvar-Hazy Library and Learning Center**

The mission of the Hazy Library and Learning Center is to provide access to and delivery of information resources and multimedia technologies to students, faculty, and staff that strengthen the University's commitment to academic excellence in teaching, learning, and research.

The Library and Learning Center opened as a campus landmark building in spring 2008. This strikingly designed, 21st century facility of 35,700 square feet incorporates emerging technologies and expanded knowledge access throughout the building for both individual use and collaborative student projects. Students use a variety of research and study accommodations including the presentation room and collaboration rooms, which are equipped with

multimedia presentation equipment, group study rooms, the research instruction room, and the Worthington reading room. The Information Computer Commons provides 40 computer work stations with clusters providing specialized engineering design and math software programs. Wireless connectivity is available throughout the building. Soft seating and open tables with mountain vistas create comfortable environments in which to study. The Multimedia Technology Center provides digital imaging and presentation development software and high-end computers for student projects and assignments requiring audio and video content. Laptop computers are available at the Media Technology Center for students to checkout for use in the library.

The library's Web site ([www.library.pr.erau.edu](http://www.library.pr.erau.edu)) serves as a gateway to the library catalog, scholarly databases, and thousands of electronic journals and books. The print collection contains over 40,000 books, DVDs, technical reports, and 650 current periodical subscriptions and newspapers. The Library also participates in local, state, and national network consortia that allow students access to unlimited information through reciprocal borrowing agreements. Professional librarians and expert staff promote academic success by assisting students in locating and evaluating a wide range of information resources available in the library and via the Internet. The library research instruction program provides an introduction to research methodologies and to the resources available in an academic discipline, including specialized subject databases.

The Aviation Safety and Security Archives, located in RASC2, is a repository

## Student Life and Services

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for a lifetime of research materials donated by leaders in the aviation safety industry, including unique or rare, primary materials and manuscripts. ASASA's Digital Library website, <http://prcarc1.erau.edu/index.html>, contains thousands of photographs, letters, aircraft accident reports, and other documents, most of which offer full text, key word searching.

The Hazy Library and Learning Center, Building 43, is open seven days a week, for a total of 107 hours throughout the academic semesters, with extended hours during final examinations. For more information, visit [www.library.pr.erau.edu](http://www.library.pr.erau.edu). You may also phone 928-777-3811 for library hours, or 928-777-3761 for research assistance.

### 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 one-stop-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. 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 on-campus housing
- Telecommunications support (including voicemail) for University Housing
- Wireless Internet access in many buildings and Residence Halls

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 on-campus employment and guidance to finding part-time or full-time off-campus employment in the Prescott and Quad-city areas. On-campus employment is available to all students regardless of financial need. Working on or off campus gives students an income, self-confidence, valuable employment and credit references, and a sense of accomplishment. They acquire useful skills in time management, financial planning, and professional decorum.

Students are the life blood of Embry-Riddle and student workers are a vital part of the day-to-day operations of the campus. Student workers interact closely with other students, faculty, and staff. Because students work and serve each other at Embry-Riddle, a sense of community is created. Whether

undergraduate or graduate students, the campus and community is fortunate to have dedicated Embry-Riddle students as part of their work force, and Embry-Riddle students benefit greatly from being a valued part of the work force.

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 Safety and Security Department. This unit consists of full-time officers and part-time employees. The Safety Office provides patrol and escort services, parking and traffic services, life-saving systems, event management, crime prevention, communications/dispatch services, and locksmith services. The Safety Department also provides 24-hour service to the University's flight line. 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 may feel 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.

The Fred and Fay Haas Memorial

Interfaith Chapel was opened in Fall 2008, and has become the center of the campus ministry program.

### Disability Support Services

The University is committed to ensuring access and providing reasonable accommodation for qualified students with documented disabilities. The Director of Student Activities is the designated contact to handle Disability Support Services (DSS) inquiries and coordinates DSS and accommodations for students on 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 may include 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 with a documented disability who are considering a program of study are encouraged to contact the Director of Disability Support Services at least six weeks prior to arriving on campus for information on eligibility requirements and DSS services.

## Student Life and Services

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Contact (928) 777-3700 for DSS inquiries and information.

### 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 physician/nurse assessment, prescriptive care, chiropractor, podiatrist, massage therapy, 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. 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.

International students should contact the Center for International Programs and Services about their specific insurance requirements.

### *Health Insurance Requirement for Students*

All students must have health insurance and provide proof of coverage on an annual basis; insurance coverage must be continuous throughout enrollment at Embry-Riddle. The university recommends that students and/or their parents who are currently insured contact their plan administrator to ascertain benefits and limitations while enrolled. Some plans cover only emergency room care or require extended waits to become established with a local provider; many plans reimburse services received out-of-network at a lower rate or not at all.

All students will be automatically enrolled in the university's student health insurance plan with the premium assessed to their student account. Students with comparable private insurance may waive out of this plan and have the charge removed from their account. Prior to completing the waiver request, we encourage students and/or their parents to review the university's basic student plan and major medical options at [www.uhcsr.com](http://www.uhcsr.com). The waiver request must be received and approved by the first day of classes. Failure to waive the insurance by the semester deadline will result in the non-refundable insurance fee remaining on your student account. Embry-Riddle is not responsible for insurance waivers that are submitted after the deadlines. The waiver can be completed by logging on to [www.SRStudentcenter.com](http://www.SRStudentcenter.com).

International students with an F1 or J1 visa must demonstrate proof of coverage that meets the State Department's requirements for international students. International Students: Please contact the Center for International Programs and Services for assistance.

### 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. 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 system offers 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 Prescott Campus are furnished and air-conditioned. Housing fees include all utilities, Internet (plug-in and wireless), local phone service with voice mail, and cable TV access. Although computer labs are conveniently located in academic buildings, first-year 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. First-year students are assigned to buildings that are specially designated for new students.

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

### Housing Policies and Application Policy

Housing brochures and contracts are sent to students who have been accepted to the University. Completed contracts must be returned to the Housing Office with a \$250 deposit no later than June 15 (December 15 for spring semester) for a guaranteed space in Embry-Riddle-managed housing, not necessarily a specific location or room type. Embry-Riddle guarantees all students who are required to live on campus a space. Students who are not required to reside on campus will be housed on a first come, first serve basis, space permitting. Temporary assignments may be created in order to fulfill the request for housing.



## Student Life and Services

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### Housing Options

#### First-Year Freshman Housing

All first-year students under the age of 21 without permanent residency in Yavapai County, and with less than 28 earned credit hours, are required to live in University-managed housing for their first full academic year to include fall and spring. Any student required to reside in University-managed housing is required to have a meal plan.

#### *Mingus Mountain Complex:*

- 3-bedroom suite with a kitchenette shared by 6 people

#### Upper class and non-traditional aged Housing

#### *Village Complex:*

- 2-bedroom suite shared by 4 people
- 2-bedroom apartment shared by 4 people

#### *Mingus Mountain Complex:*

- 3-bedroom suite without a kitchenette shared by 6 people

### Meal Plans

Meal plan costs are listed on the Housing Contract and may be obtained by calling the Housing Office at (928) 777-3744.

All first-year students who are required to live on campus must purchase the seven-day all-access or five-day Soaring Eagle all-access meal plan for each of their consecutive fall and spring semesters. The seven-day plan includes \$100 in Dining Dollars, while the Soaring Eagle plan includes \$200. Dining Dollars can be used to purchase individual items to go at any campus dining location.

Other plan options are available for students not required to live in University-managed housing, with information available from the Housing Office.

#### *Meal Plan Options for non-required students*

- All You Can Eat (during the hours of cafeteria operation)
- 7-day All Access with \$100 in Dining Dollars
- 5-day Soaring Eagle All Access with \$200 in Dining Dollars
- 5-day All Access with \$50 in Dining Dollars

#### *Block Plans (number of meals for the semester)*

- 175 Block Plan
- 125 Block Plan
- 75 Block Plan
- 50 Block Plan

### New Students

Students released from their housing contract on or after the first day of classes will be charged an \$800 administrative fee. Please refer to the housing contract for terms and conditions.

### Current Students

Current students released from their housing contract after April 30 will be charged an \$800 administrative fee.

### Dining Services

A variety of nutritious and satisfying dining services and meal plan options are offered. 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 cook-outs, 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.

### 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 on 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 <https://erau.blackboard.com>. 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 <https://erau.blackboard.com>.

### Statements

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

### Account Closing and Refund

Your funds in an Eagle Card account are not transferable and there are no cash with-

## Student Life and Services

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drawals 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 Cashier's Office.

### 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 <https://erau.blackboard.com>, 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 Office.

### 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 trans-

action 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.

### Mail

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

#### *If box number is known:*

Student Name  
Embry-Riddle Box # \_\_\_\_\_  
3700 Willow Creek Road  
Prescott, AZ 86301-3720

#### *If box number is unknown:*

Student Name  
Embry-Riddle New Student  
3700 Willow Creek Road  
Prescott, AZ 86301-3720

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

### **Center for International Programs and Services (CIPS)**

The Center for International Programs and Services at Prescott serves 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 and immigration policies and procedures as well as the American education system in general. The office provides services that include advising students on immigration regulations as well as 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 community of Prescott. Some of these activities include International Educational Week, 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.

To learn more about CIPS, contact us at (800) 888-6600 or (928) 777-3774.

### **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. Over 100 companies visit the Prescott and Daytona Beach 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

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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 80 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 the Prescott Campus.

## College of Arts and Sciences

B.S. in Aviation Business Administration  
B.S. in Aviation Environmental Science  
B.S. in Global Security and Intelligence Studies  
B.S. in Interdisciplinary 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  
M.S. in Safety Science  
Still Exploring

## College of Engineering

B.S. in Aerospace Engineering  
B.S. in Computer Engineering  
B.S. in Electrical Engineering  
B.S. in Mechanical Engineering  
Still Exploring

## 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.

## 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 abil-

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.

ity, 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, 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.

### 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.

### 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.

### Physical and Life Sciences

6 hours

In order to appreciate current understanding 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.

## Academic Programs

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### 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 study may include cultural, aesthetic, philosophical, and spiritual dimensions of the human condition.

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

### 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.

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# GRADUATE ACADEMIC PROGRAM

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## Introduction

The Master of Science in Safety Science (MSSS) degree program is designed to provide students with a practical course of study in occupational health and safety. The degree will produce safety professionals who are skilled in providing safety management expertise in a variety of industries. Graduates will be able to provide leadership and guidance in compliance issues involving EPA, OSHA, DOD, FAA, DOE, NTSB and state

health, hygiene, and workplace standards, and will be prepared for service in numerous industries, including but not limited to the aviation/aerospace industry and the military.

For detailed information about the Master of Science in Safety Science degree program, including Graduate Assistantships, Graduate Internships, and Guidelines for Graduate Research Projects and Thesis, see the complete program listing in the College of Aviation section of this catalog.



## Academic Programs at the Prescott Campus

### *College of Arts and Sciences*

*Dr. Richard Bloom, Dean*

Welcome. Our programs and curricula encompass the humanities, communication, strategic languages, 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 academics we offer mental, physical, and spiritual enrichment so that our students can succeed in all areas of life from the professional to the personal. We are totally committed to human development for commonwealth and commonweal.

Cherished pursuits of the College are developing leaders; inculcating moral and ethical integrity; helping to resolve local, regional, national, international, and global issues; and maintaining the unquenchable human soul through the Apollonian and the Dionysian.

General Education. The College offers courses in mathematics, the physical and life sciences, the social and psychological sciences, information technology, 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 and emotional grounding necessary for 21st century success on the student's terms. Finally, they shape the priceless competencies of speech, writing, close reading, quantitative analysis, qualitative analysis, aesthetic apperception, critical thinking, moral

and ethical judgment and behavior, street smarts, and leadership. General education is founded on wisdom accumulated from the beginnings of intellectual history and emotional experience 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 Business Administration; Aviation Environmental Science; Global Security and Intelligence Studies; Interdisciplinary Studies; and Space Physics.

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 Upward Bound program provides educational 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

## Academic Programs at the Prescott Campus

from Embry-Riddle. Please refer to the Financial Assistance section of the catalog for more information.

National Aeronautics and Space Administration (NASA) Education 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 innovative outcome assessment techniques founding program quality.

Foreign Language Institute. The Institute provides intensive education and training in Arabic and Chinese languages and cultures during the summer months for high school and undergraduate students. This opportunity is being broadened to include personnel in business, education, and law enforcement communities. It also is setting standards on strategic language pedagogical excellence, especially in Arabic and Mandarin Chinese.

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 and venues.

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 with its faculty-student intelligence product, The Eagle Eye. As well, the Aviation Business Administration (ABA) program is renowned for its faculty-led student teams providing ad hoc consulting for airports and other transportation sites and for its consulting with the Transportation Research Board and the Arizona Aerospace and Defense Commission.

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. Of special note are our Space Physics faculty and students who epitomize learning through scholarship and research. For example, one area of specialization involving the laser interferometer gravitational wave observatory. Another font of excellence comprises FAA-sponsored research on elements of aviation-related environmental and ecological issues, while ABA faculty have literally "written the book" on airport management and aviation labor relations. Yet another growing area of excellence is in the empirical validation of novel service learning activities.

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.

## Academic Programs at the Prescott Campus

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### *Aviation Business and Management Program*

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#### 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 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 Industry 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**

The Bachelor of Science degree in Aviation Business Administration (ABA) 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-Fixed Wing, Flight Operations-Helicopter, and 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 cross-utilize 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.

Select Aviation Business Administration program offerings at the Prescott Campus are accredited by the Aviation Accreditation Board International (AABI). The Embry-Riddle Aeronautical University – Prescott Bachelor of Science degree program in Aviation Business Administration is a member of the Association of Collegiate Business Schools and Programs (ACBSP) and has applied for candidacy for accreditation. In order to be awarded an ABA degree, a student is required to complete a minimum of 80% of the business core and area of concen-

tration in residence or transfer those credits from institutions approved by the Department Chair.

	<b>Credits</b>
General Education .....	39
Business Core.....	48
Area of Concentration .....	15/16
Open Electives.....	18/17
<b>TOTAL DEGREE CREDITS</b>	<b>120</b>

**General Education**

Communication Theory and Skills*.....	9
Mathematics*.....	9
Computer Science*.....	3
Physical and Life Sciences* (One course must include a laboratory.).....	6
Humanities Lower-Level course*.....	3
Social Sciences Lower-Level course*.....	6
Humanities/Social Sciences Upper-Level course .....	3
<b>Total Credits</b>	<b>39</b>

**Business Core**

<b>Course</b>	<b>Title</b>	<b>Credits</b>
BA 102	Introduction to Aviation Business and Industry -OR-	
AS 120	Principles of Aeronautical Science.....	3
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 319	Managerial and 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 211	Macroeconomics.....	3
EC 315	Managerial Economics.....	3
<b>Total Credits</b>		<b>48</b>

# Academic Programs at the Prescott Campus

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## Areas of Concentration

### Airport Management

Course Title	Credits
BA 408 Airport Management . . . . .	3
BA 308 Public Administration -OR-	
BA 412 Airport Planning and Design Standards. . . . .	3
BA 418 Airport Administration and Finance** . . . . .	3
BA/EC Business Electives (300-400 level). . . . .	6
<b>Total Credits</b>	<b>15</b>

### Finance

Course Title	Credits
BA 334 Investment Analysis -OR-	
BA 342 International Finance . . . . .	3
BA 434 Corporate Finance II** . . . . .	3
EC 312 Money and Banking . . . . .	3
BA/EC Business Electives (300-400 Level)* . . . . .	6
<b>Total Credits</b>	<b>15</b>

\*Of which one course must be aviation focused.

### Flight Operations - Fixed Wing

Course Title	Credits
AS 121 Private Pilot Operations. . . . .	4
AS 221 Instrument Pilot Operations . . . . .	3
AS 321 Commercial Pilot Operations** . . . . .	3
FA 121 Private Single Flight . . . . .	1
FA 221 Instrument Single Flight . . . . .	1
FA 321 Commercial Single Flight . . . . .	1
*300/400 Level AS, BA, EC, SF, or WX . . . . .	3
<b>Total Credits</b>	<b>16</b>

\*Must be approved by the Department Chair.

Note: Students selecting this option need to begin the coursework as soon as possible. Please see the Advanced 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.

### Flight Operations - Helicopter

Course Title	Credits
AS 142 Private Helicopter Operations . . . . .	3
AS 252 Instrument Helicopter Operations. . . . .	3
AS 372 Commercial Helicopter Operations** . . . . .	3
300-400 Level AS, BA, EC, SF, or WX* . . . . .	3
Advanced Standing for:	
Helicopter Private Pilot Certificate . . . . .	1
Helicopter Commercial Pilot Certificate. . . . .	1
Helicopter Instrument Rating. . . . .	1
<b>Total Credits</b>	<b>15</b>

\*Must be approved by the Department Chair.

### Management

The focus is to produce an aviation management generalist. The culminating focus course is BA 436.\*\*  
Select any five designated electives of which a minimum of two must be aviation focused . . . . . 15

### Courses Available as Designated Electives

Course Title	Credits
BA 308 Public Administration . . . . .	3
BA 324 Aviation Labor Relations. . . . .	3
BA 333 Personal Financial Planning . . . . .	3
BA 334 Investment Analysis. . . . .	3
BA 342 International Finance . . . . .	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
BA 418 Airport Administration and Finance. . . . .	3
BA 421 Small Business Management . . . . .	3
BA 425 Trends and Current Problems in Air Transportation. . . . .	3
BA 427 Management of the Multicultural Workforce . . . . .	3
BA 434 Corporate Finance II. . . . .	3
BA 399, 499 Special Topics in Business . . . . .	3
EC 312 Money and Banking. . . . .	3
EC 420 Economics of Air Transportation . . . . .	3
EC 399, 499 Special Topics in Economics . . . . .	3
AES 403 Wildlife and Airports . . . . .	3
AES 406 Environmental Management . . . . .	3
AS 402 Airline Operations . . . . .	3
SIS 420 Aviation Security and Technology. . . . .	3

Open Electives. . . . . 17/18

**TOTAL DEGREE REQUIREMENTS** **120**

\*\*These classes are considered the capstone class for the area of concentration.

# Academic Programs at the Prescott Campus

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## 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 Department of Business Chair.

**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, MA 222 and MA 320

**Physical and Life Sciences**  
Any AES or PS course, or WX 201, of which one course must include a laboratory.

**Social Sciences**  
*LOWER-LEVEL:*  
EC 210 -AND- one of the following: PSY 101, SS 110-130, 204, 210  
*UPPER-LEVEL:*  
300-400 level EC, PSY, or SS

## Suggested Program of Study

### FRESHMAN YEAR

Course	Title	Credits
	Communication Theory and Skills . . . . .	3
	Lower-Level Humanities . . . . .	3
	Lower-Level Social Sciences . . . . .	3
	Computer Science . . . . .	3
	Mathematics . . . . .	3
	Physical and Life Sciences . . . . .	3
BA	102 Introduction to Aviation Business and Industry . . . . .	3
BA	201 Principles of Management . . . . .	3
EC	210 Microeconomics . . . . .	3
	Open Elective . . . . .	3
<b>Total Credits</b>		<b>30</b>

### SOPHOMORE YEAR

Course	Title	Credits
	Communication Theory and Skills . . . . .	6
	Physical and Life Sciences . . . . .	3
BA	210 Financial Accounting . . . . .	3
BA	221 Advanced Computer Based Systems . . . . .	3
BA	311 Marketing . . . . .	3
EC	211 Macroeconomics . . . . .	3
MA	222 Business Statistics . . . . .	3
MA	320 Decision Mathematics . . . . .	3
	Open Elective . . . . .	3
<b>Total Credits</b>		<b>30</b>

### JUNIOR YEAR

Course	Title	Credits
	Upper-Level Humanities -OR- Social Sciences . . . . .	3
BA	312 Managerial Accounting . . . . .	3
BA	319 Managerial and Organizational Behavior . . . . .	3
BA	320 Business Information Systems . . . . .	3
BA	332 Corporate Finance I . . . . .	3
BA	335 International Business . . . . .	3
EC	315 Managerial Economics . . . . .	3
	Concentration Courses . . . . .	3
	Open Elective . . . . .	6
<b>Total Credits</b>		<b>30</b>

### SENIOR YEAR

Course	Title	Credits
BA	325 Social Responsibility and Ethics in Management . . . . .	3
BA	390 Business Law . . . . .	3
BA	420 Management of Production and Operations . . . . .	3
BA	436 Strategic Management . . . . .	3
	Concentration Courses . . . . .	12
	Open Electives . . . . .	6
<b>Total Credits</b>		<b>30</b>
<b>TOTAL DEGREE CREDITS</b>		<b>120</b>

This suggested sequencing is appropriate for most ABA students. However, those seeking a Flight Operations concentration should consult their advisor as their particular (flight-oriented) concentration courses should be scheduled much earlier in the sequence.

## Academic Programs at the Prescott Campus

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### *Aviation Environmental Science*

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#### 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, and 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 demon-

strate 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 in Aviation Environmental Science (AES) requires successful completion of a minimum of 120 credit hours.

#### Aviation Environmental Science Core Courses

Course	Title	Credits
AES 111	Plant Biology . . . . .	4
AES 112	Animal Biology . . . . .	4
AES 142	Introduction to Environmental Sciences . . .	3
AES 309	Principles of Ecology . . . . .	3
AES 330	Environmental Consulting . . . . .	3
AES 403	Wildlife and Airports . . . . .	3
BA 201	Principles of Management . . . . .	3
EC 210	Microeconomics	
	-OR-	
EC 211	Macroeconomics . . . . .	3
PS 105	Chemistry I . . . . .	4
SS 204	Introduction to Geography . . . . .	3
SS 302	Evolution of Scientific Thought . . . . .	3
SS 305	Global Policy Studies . . . . .	3
SS 360	Environmental Law . . . . .	3
WX 210	Introduction to Geographic Information Systems . . . . .	3
<b>Total Credits</b>		<b>45</b>

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

## Academic Programs at the Prescott Campus

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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
AES 310	Air Quality and Sound Pollution . . . . .	3
PS 106	General Chemistry II . . . . .	4
PS 314	Environmental Chemistry . . . . .	4
SF 315	Environmental Compliance and Safety. . . . .	3
	Designated Electives . . . . .	13
<b>Total Credits</b>		<b>27</b>

### Possible Designated Electives (choose 4)

Course	Title	Credits
AES 240	Natural History of the Region . . . . .	4
AES 306	Consumer and Hazardous Waste. . . . .	3
AES 308	Atmospheric Environmental Studies. . . . .	3
AES 311	Water Quality . . . . .	3
AES 312	Plant Identification . . . . .	3
AES 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 ever-evolving 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 Safety. . . . .	3
	Designated Electives . . . . .	12
<b>Total Credits</b>		<b>24</b>



# Academic Programs at the Prescott Campus

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## Possible Designated Electives (choose 4)

Course	Title	Credits
AES 306	Consumer and Hazardous Waste.....	3
AES 310	Air Quality and Sound Pollution.....	3
BA 311	Marketing.....	3
BA 314	Human Resource Management.....	3
BA 335	International Business.....	3
BA 421	Small Business Management.....	3
SS 360	Environmental Law.....	3

## Suggested Program of Study

### FRESHMAN YEAR

Course	Title	Credits
AES 111	Plant Biology.....	4
AES 112	Animal Biology.....	4
AES 142	Introduction to Environmental Science...3	3
COM122	English Composition and Literature.....	3
COM219	Speech.....	3
HU 14X	Humanities.....	3
IT 109	Introduction to Computers and Applications.....	3
MA 120	Quantitative Methods I.....	3
MA 222	Business Statistics.....	3
<b>Total Credits</b>		<b>29</b>

### SOPHOMORE YEAR

Course	Title	Credits
AES 309	Principles of Ecology.....	3
BA 201	Principles of Management.....	3
COM221	Technical Report Writing -OR-	3
COM222	Business Communication.....	3
PS 105	General Chemistry I.....	4
SS 204	Introduction to Geography.....	3
SS 302	Evolution of Scientific Thought.....	3
WX 210	Introduction to Geographic Information Systems.....	3
	Lower-Level Humanities.....	3
	Upper-Level Humanities.....	3
	Area of Concentration.....	3-4
<b>Total Credits</b>		<b>31-32</b>

### JUNIOR YEAR

Course	Title	Credits
EC 210	Microeconomics -OR-	3
EC 211	Macroeconomics.....	3
SS 360	Environmental Law.....	3
AES 330	Environmental Consulting.....	3
	Upper-Level Humanities.....	3
	Designated Electives.....	9
	Area of Concentration.....	3
	Open Electives.....	6
<b>Total Credits</b>		<b>30</b>

### SENIOR YEAR

Course	Title	Credits
SS 305	Global Policy Studies.....	3
AES 403	Wildlife and Airports.....	3
	Area of Concentration.....	6
	Designated Electives.....	3-4
	Open Electives.....	10-12

### SUMMER

Course	Title	Credits
CEAES 396	.....	3
<b>Total Credits</b>		<b>28-31</b>

### 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: SS

### Computer Science (3 credits)

IT 109

### Mathematics (6 credits)

MA 120, 222

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### *Global Security and Intelligence Studies*

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#### 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, law, government, 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 mili-

tary 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 project, 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.

## Academic Programs at the Prescott Campus

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In the senior year, the GSIS major will select one of three areas of concentration: Pre-Law and Government, Intelligence, or Criminal Justice and Security. Each area of concentration contains at least 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 choose 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 are required to complete a senior project prior to graduation. The options include a senior thesis, an expanded co-op, or a semester-long war or simulation game. The expanded co-op requires a major paper and could be a stepping stone to a permanent job. The war or simulation game will enable the student to bring all he or she has learned in the program to dealing with a crisis situation. 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 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

	Credits
General Education .....	39
GSIS Core .....	33
Area of Concentration .....	15
Foreign Language .....	12
GSIS Designated Electives.....	9
Open Electives.....	9
Senior Project.....	3
<b>TOTAL DEGREE CREDITS</b>	<b>120</b>

### Global Studies Core Courses

Course	Title	Credits
BA 201	Principles of Management.....	3
EC 210	Microeconomics .....	3
SIS 100	Introduction to Global Security and Intelligence Studies.....	3
SIS 200	Introduction to the U.S. Legal System	
	-OR-	
SS 290	History of Modern Europe .....	3
SIS 315	Studies in Global Intelligence I.....	3
SIS 325	History of Terrorism.....	3
SS 204	Introduction to Geography .....	3
SS 312	Personality and Profiling.....	3
SS 320	Government of the U.S.....	3
SS 327	International Relations.....	3
SS 340	U.S. Foreign Policy .....	3
<b>Total Credits</b>		<b>33</b>

### Foreign Language Requirement

Twelve credits of foreign language are required for degree completion. All courses must be in the same language.

## Academic Programs at the Prescott Campus

### GSIS Areas of Concentration

Choose one of these Areas of Concentration or select two courses from one and three courses from the other for a joint AOC in Security and Intelligence.

#### PRE-LAW AND GOVERNMENT

Course	Title	Credits
BA 390	Business Law	3
SS 410	International Human Rights	3
SIS 312	Global Crime and International Justice Systems	3
SIS 416	Introduction to Middle Eastern Comparative Law	3
SIS 421	History and Philosophy of Law/Jurisprudence	3

**Total Credits** 15

#### INTELLIGENCE (CHOOSE FIVE)

Course	Title	Credits
SIS 317	Political Change, Revolution, and War	3
SIS 323	Intelligence and Technology	3
SIS 328	Intelligence Analysis, Writing, and Briefing	3
SIS 335	Counter-Intelligence	3
SIS 400	International Security and Globalization	3
SIS 405	Environment and Security	3
SIS 418	Islam: Origins, History, and Role in the Modern World	3

**Total Credits** 15

#### CRIMINAL JUSTICE AND SECURITY (CHOOSE FIVE)

Course	Title	Credits
SIS 312	Global Crime and Criminal Justice Systems	3
SIS 410	Corporate Security Management and Operations	3
SIS 420	Aviation Security and Technology	3
SIS 422	Homeland Security and Technology	3
SIS 425	Information Protection and Computer Security	3
SIS 430	Emergency Management and Contingency Planning	3

**Total Credits** 15

#### GSIS DESIGNATED ELECTIVES (CHOOSE 3)

Course	Title	Credits
BA 335	International Business	3
EC 211	Macroeconomics	3

HU 341	World Philosophy	3
HU 345	Comparative Religions	3
HU 420	Applied Cross-Cultural Communication	3
PSY 350	Social Psychology	3
RS 305	Asian Literature	3
SIS 320	Topics in Global History: Politics and Culture	3
SS 260	Cultural Anthropology	3
SS 410	International Human Rights	3
SS 333	U.S.-Asian Relations	3
SS 336	The Modern Middle East in World Affairs	3

**Total Credits** 9

#### OPEN ELECTIVES

The student will choose nine credits of open electives.

### Suggested Program of Study

#### FRESHMAN YEAR

Course	Title	Credits
COM122	English Composition and Literature	3
IT	Information Technology	3
HU	Lower-Level Humanities (140 series)	3
MA	Lower-Level Mathematics	3
PS 111	Plant Biology	4
PSY 101	Introduction to Psychology	3
SIS 100	Introduction to Global Security and Intelligence Studies	3
SIS 200	Introduction to the U.S. Legal System	3
-OR-		
SS 290	History of Modern Europe	3
SS 110	World History	3
SS 204	Introduction to Geography	3

**Total Credits** 31

#### SOPHOMORE YEAR

Course	Title	Credits
BA 201	Principles of Management	3
COM219	Speech	3
COM223	Intelligence Writing	3
EC 210	Microeconomics	3
L	Foreign Language I	3
L	Foreign Language II	3
MA	Mathematics	3
PS	Physical Science	3
SIS 260	Forensic Science Applications in Security and Intelligence	4
SS 327	International Relations	3

**Total Credits** 31

# Academic Programs at the Prescott Campus

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## JUNIOR YEAR

Course	Title	Credits
L	Foreign Language III .....	3
L	Foreign Language IV .....	3
SIS 315	Studies in Global Intelligence I. ....	3
SIS 325	History of Terrorism .....	3
SS 320	Government of the U.S. ....	3
SS 312	Personality and Profiling. ....	3
SS 340	U.S. Foreign Policy .....	3
	Designated Electives .....	9
<b>Total Credits</b>		<b>30</b>

## SENIOR YEAR

Course	Title	Credits
	Area of Concentration .....	15
	Upper-Level HU/SS/RS Elective. ....	3
	Senior Course** .....	3
	Open Electives. ....	9
<b>Total Credits</b>		<b>30</b>
<b>TOTAL DEGREE CREDITS</b>		<b>122</b>

\*Other PS courses may be acceptable with approval from the Department Chair.

\*\* One of the three options below are acceptable to fulfill the Senior Project requirement.

1. SIS 415, Studies in Intelligence II. A capstone course that consists of a semester-long simulation or war game, allowing students to bring to bear all aspects of their education.
2. SIS 475, Senior Thesis Limited to seniors with a GPA of at least 3.4 who plan to attend graduate or law school. Admittance is by application.
3. SIS 499, Senior Co-op or Internship. A co-op or internship that requires a major paper.

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## *Interdisciplinary Studies*

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Bachelor of Science

### **Program Plan of Study and Requirements**

The Interdisciplinary Studies program consists of core requirements and three minors. The core requirements in this program help our students to become 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, foreign languages, and psychology. The core prepares students to connect their three minor fields of study meaningfully and usefully. The student chooses a senior capstone experience which most often is the election of a co-op experience.

By combining three minors, students design their own degree programs. Such combinations as security, psychology, safety or space studies, computer science, or psychology offer combinations of fields that the aerospace industry will find valuable. A minor in Asian Studies, coupled with the enhanced general education options, provide an international focus to the degree. Minors in the business areas gives students practical knowledge that combine 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, aerospace, and related industries.

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 appropriate sequencing.

### **Degree Requirements**

The Bachelor of Science degree in Interdisciplinary 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**

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

\* 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.

# Academic Programs at the Prescott Campus

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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 100-200 level (EC 200 may not be taken in con-  
 junction with EC 210 or EC 211)  
 SS/PSY 100-200 level  
*UPPER-LEVEL:*  
 SS/PSY 300-400 level

## Core Requirements

### Cross Discipline Core

Course	Title	Credits
AS 120	Principles of Aeronautical Science -OR-	
SP 110	Introduction to Space Flight -OR-	
SS 130	History of Aviation in America - OR-	
IS 100	Interdisciplinary Studies: Issues in Facing the Future -OR-	
FAA	Private Pilot Certificate	3
BA 201	Principles of Management	3
PSY 101	Introduction to Psychology**	3
MA 222	Business Statistics**	3
<b>Total Credits</b>		<b>21-33</b>

\*\* If not taken for general education credit.

### Enhanced General Education

Choose two of the following:

Course	Title	Credits
HU 140-146	Series	3
SS 204	Introduction to Geography	3
SS 210	Introduction to Sociology	3
SIS 100	Introduction to Global Security and Intelligence Studies	3
LAR 101	Arabic I	3
LAR 102	Arabic II	3
LCH 101	Chinese I	3
LCH 102	Chinese II	3
LFR 101	French I	3
LFR 102	French II	3

LGE	German I	3
LGE	German II	3
LSP	Spanish I	3
LSP 102	Spanish II	3
	-OR-	
	Summer Study Abroad	6

Choose one of the following:

HU 330	Values and Ethics	3
HU 341	World Philosophy**	3
HU 345	Comparative Religions**	3

\*\*If not taken for general education credit.

### International Focus

Choose two of the following:

Course	Title	Credits
BA 335	International Business	3
HU 335	Technology and Modern Civilization	3
SIS 312	Global Crime and International Justice Systems	3
SIS 315	Studies in Global Intelligence I	3
SIS 317	Political Change, Revolution, and War	3
SIS 320	Topics in Global History, Politics, and Culture	3
SIS 400	International Security and Globalization	3
SIS 415	Studies in Global Intelligence II	3
SS 327	International Relations	3
SS 333	U.S.-Asian Relations	3
SS 340	U.S. Foreign Policy	3

### Capstone Experience

IS 399	Cooperative Education - OR - Special Topics in Interdisciplinary Studies	3-6
<b>Total Credits</b>		<b>30-33</b>

### Minors and Open Electives

Students must select three minor fields of study. See the minor course of study section of this catalog on pages 133-140.

Open Electives will complete any remaining credits after the selection of minors.

<b>TOTAL DEGREE CREDITS</b>	<b>120</b>
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## *Space Physics*

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### Bachelor of Science in Space Physics

The Bachelor of Science in Space Physics is an applied physics program designed to prepare students for graduate studies in physics and astrophysics, as well as for work in space, and aerospace-related industries. Physics is the study of the forces of nature, space and time at the most fundamental level, and provides the foundation on which all physical sciences rest. Students will study the structure of the universe on all scales from the smallest (elementary particles) to the largest (cosmology) and will gain hands-on experience with research-quality equipment and modern sensing techniques.

In their senior year, students will pursue an area of concentration (AOC) in which to specialize. The areas of concentration are Astrophysics, Particle Physics & Cosmology, Remote Sensing, and Exotic Propulsion. Students are required to complete a senior thesis on a research topic in their area of concentration and are encouraged to engage in directed research with faculty members throughout the duration of the program.

### 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, Physics I, and General Chemistry and must have a good command of written English.

### Degree Requirements

The Bachelor of Science in Space Physics is a 120 credit hour program that can be completed in eight semesters. The list of courses below comprises the complete requirements for the degree of Bachelor of Science in Space Physics. The list is organized as a “vertical outline” according to the year in which the courses would normally be taken. While it is not a requirement that the courses be taken during the year shown, students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Therefore, it is recommended that students keep their schedule as close as possible to the one shown below. Before registering for a course, check the course descriptions at the back of this catalog to ensure that all prerequisites and/or corequisites are met. Note that prerequisites for a course are only considered met if the student obtained a grade of “C” or better in the prerequisite courses.

#### FRESHMAN YEAR

Course	Title	Credits
COM	Elective* . . . . .	3
MA 241	Calculus and Analytic Geometry I . . . . .	4
MA 242	Calculus and Analytic Geometry II . . . . .	4
PS 105	General Chemistry . . . . .	4
PS 204	Astronomy . . . . .	3
PS 208	Physics II . . . . .	3
PS 215	Physics I . . . . .	3
PS 216	Physics I Laboratory . . . . .	1
PS 221	Intermediate Physics Laboratory . . . . .	2
SS	Lower-Level Elective* . . . . .	3
UNIV 101	College Success* . . . . .	1
<b>Total Credits</b>		<b>31</b>

\*Open elective or in excess of degree requirement.



# Academic Programs at the Prescott Campus

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## SOPHOMORE YEAR

Course	Title	Credits
COM	Elective*	3
HU	Lower-Level Elective*	3
MA 243	Calculus and Analytic Geometry III	4
MA 341	Introduction to Mathematical Analysis	3
MA 345	Differential Equations and Matrix Methods	4
MA 432	Linear Algebra	3
PS 232	Computational Methods in Physical Sciences	3
PS 219	Physics III	3
PS 303	Modern Physics	3
PS 315	Modern Physics Laboratory	2
<b>Total Credits</b>		<b>31</b>

## JUNIOR YEAR

Course	Title	Credits
COM	Elective*	3
MA 441	Mathematical Methods for Engineering and Physics I	3
MA 442	Mathematical Methods for Engineering and Physics II	3
PS 321	Classical Mechanics I	3
PS 330	Electricity and Magnetism I	3
PS 340	Astrophysics I	3
PS 350	Quantum Mechanics I	3
PS 380	Optics Laboratory	3
	Open Electives	3
	Technical Elective	3
<b>Total Credits</b>		<b>30</b>

## SENIOR YEAR

Course	Title	Credits
PS 405	Atomic and Nuclear Physics	3
PS 430	Thermodynamics and Statistical Mechanics	3
PS 490	A.O.C. Research Thesis, Part I**	3
PS 491	A.O.C. Research Thesis, Part II**	3
	Technical Electives	6
HU	Upper-Level Elective	3
SS	Upper-Level Elective	3
	Open Electives	4
<b>Total Credits</b>		<b>28</b>
<b>TOTAL DEGREE CREDITS</b>		<b>120</b>

\* Embry-Riddle courses in the general education categories of Communication, Humanities, and Social Sciences may be chosen from those listed below, assuming prerequisites are met. Courses from other institutions are acceptable if they fall into these broad categories and are at the appropriate level.

\*\* Students will choose a thesis topic in their declared Area of Concentration (AOC). They will be assigned a faculty advisor and corresponding section of PS 490/PS 491. Thesis topics must be approved by the faculty advisor assigned.

## Communications Electives

COM 122, COM 219, COM 221, COM 222, COM 225, or any COM 3XX or COM 4XX course.

## Lower-Level Social Sciences Electives

EC 200, EC 210, EC 211  
Any Lower-Level SS, RS, or SIS course.

## Lower-Level Humanities Electives

Any HU 140 series.

## Upper-Level Humanities Electives

Any Upper-Level HU course.

## Upper-Level Social Sciences Electives

Any Upper-Level SS course.

## Technical Electives

PS 322 Classical Mechanics II  
 PS 331 Electricity and Magnetism II  
 PS 375 Planetary Science  
 PS 408 Astrophysics II  
 PS 412 Particle Physics and Cosmology I  
 PS 413 Particle Physics and Cosmology II  
 PS 420 Remote Sensing  
 PS 422 Space Propulsion  
 PS 451 Quantum Mechanics II  
 PS 299/399/499 Special Topics in Physics  
 MA 412 Probability and Statistics  
 MA 443 Complex Variables  
 MA 299/399/499 Special Topics in Mathematics

Any other upper-division technical course with approval of the Physics Department Chair.

### *College of Aviation*

*Dr. Jackie Luedtke, Dean*

The College of Aviation is composed of the departments of Aeronautical Science, Meteorology, Safety Science, and the Flight Department, which serves as 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. 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 commercial 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 prepares students for careers in weather forecasting, research, the military, and aviation, including dispatching. The program is housed in a well-equipped, modern facility. 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 department offers state-of-the-art rooftop weather-observing equipment and a computer-equipped Weather Center.

The Prescott Campus also offers a B.S. in Aeronautics, in which the curriculum is designed to build on the aviation knowledge and skills students bring with them to campus.

For the graduate student, the Master of Science in Safety Science is offered. This degree program provides the graduate with experiences to enhance the practice of safety in the aviation and general industrial environments. The 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 600 students and a fleet of 28 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 A320 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.

## Academic Programs at the Prescott Campus

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### *Aeronautical Science (Professional Pilot)*

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#### Bachelor of Science

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 profes-

sional 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 four specializations after matriculation. Students entering under this catalog may select from the Airline Pilot, Commercial Pilot, Helicopter 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**

	<b>Credits</b>
General Education .....	39
Aeronautical Science Core - Fixed Wing.....	52
-OR-	
Aeronautical Science Core - Helicopter.....	51
Flight Core Courses .....	4
Fixed Wing Specialty Courses.....	25
-OR-	
Helicopter Specialty Courses .....	26
<b>Total Degree Credits</b>	<b>120</b>

# Academic Programs at the Prescott Campus

## University General Education

Course	Title	Credits
	Communication Theory and Skills* . . . . .	9
	Lower-Level Humanities* . . . . .	3
	Lower-Level Social Sciences* . . . . .	6
	Upper-Level Humanities or Social Sciences* . . . . .	3
	Computer Science Elective* . . . . .	3
BA 201	Principles of Management . . . . .	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
<b>Total Credits</b>		<b>39</b>

## Aeronautical Science Core Courses - Fixed Wing

Course	Title	Credits
AS 119	Private Pilot Operations . . . . .	4
AS 122	Introduction to Careers in Aviation . . . . .	3
AS 221	Instrument Pilot Operations . . . . .	3
AS 246	Basic Air Navigation . . . . .	3
AS 309	Aerodynamics . . . . .	3
AS 310	Aircraft Performance . . . . .	3
AS 311	Aircraft Engines-Turbine . . . . .	3
AS 321	Commercial Pilot Operations . . . . .	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
<b>Total Credits</b>		<b>52</b>

## Aeronautical Science Core Courses - Helicopter

Course	Title	Credits
AS 122	Introduction to Careers in Aviation . . . . .	3
AS 142	Private Helicopter Operations . . . . .	3
AS 252	Instrument Helicopter Operations . . . . .	3
AS 246	Basic Air Navigation . . . . .	3
AS 309	Aerodynamics . . . . .	3
AS 310	Aircraft Performance . . . . .	3
AS 311	Aircraft Engines-Turbine . . . . .	3
AS 372	Commercial Helicopter Operations . . . . .	3
AS 356	Systems and Components . . . . .	3
AS 357	Flight Physiology . . . . .	3
AS 358	Advanced Avionics . . . . .	3

AS 387	Crew Resource Management . . . . .	3
AS 388	Helicopter Flight Planning . . . . .	3
AS 408	Flight Safety . . . . .	3
AS 438	Advanced Helicopter Operations . . . . .	3
AS 442	Flight Instructor Helicopter Operations . . . . .	3
WX 201	Survey of Meteorology . . . . .	3
WX 301	Aviation Weather . . . . .	3
<b>Total Credits</b>		<b>54</b>

## Flight Core Courses

### FIXED WING PROFESSIONAL PILOT TRACK I

Course	Title	Credits
FA 119	Private Single Flight . . . . .	1
FA 221	Instrument Single Flight . . . . .	1
FA 321	Commercial Single Flight . . . . .	1
FA 323	Commercial Multi-Add On . . . . .	1
<b>Total Credits</b>		<b>4</b>

### FIXED WING PROFESSIONAL PILOT TRACK II (MULTI-ENGINE INTENSIVE)

Course	Title	Credits
FA 119	Private Single Flight . . . . .	1
FA 122	Private Multi Flight with Laboratory . . . . .	1
FA 222	Instrument Multi Flight . . . . .	1
FA 322	Commercial Multi Flight . . . . .	1
<b>Total Credits</b>		<b>4</b>

### HELICOPTER PILOT TRACK

Course	Title	Credits
FA 142	Helicopter Pilot Flight Private . . . . .	1
FA 252	Helicopter Pilot Flight Instrument . . . . .	1
FA 372	Helicopter Pilot Flight Commercial . . . . .	1
FA 442	Helicopter Pilot Flight Instructor . . . . .	1
<b>Total Credits</b>		<b>4</b>

## Airline Pilot Specialty

Course	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 -OR-	
AS 410	Airline Dispatch Operations . . . . .	3
AS 411	Jet Transport Systems . . . . .	3
AS 435	Electronic Flight Management Systems . . . . .	3
FA 422	Airline Flight Crew Techniques and Procedures . . . . .	1
	Electives . . . . .	11
<b>Total Credits</b>		<b>25</b>

# Academic Programs at the Prescott Campus

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## Commercial Pilot Specialty

Course	Title	Credits
AS 254	Aviation Legislation -OR-	
AS 405	Aviation Law	3
AS 380	Pilot Career Planning and Interviewing Techniques	1
BA/SIS	300/400 level Minor	3 9-18
	Electives	0-9
<b>Total Credits</b>		<b>25</b>

## Military Pilot Specialty

Course	Title	Credits
AS 435	Electronic Flight Management Systems ROTC	3 16
	Electives	6
<b>Total Credits</b>		<b>25</b>

## Helicopter Pilot Specialty

Course	Title	Credits
AS 254	Aviation Legislation -OR-	
AS 405	Aviation Law	3
AS 378	Environmental Helicopter Operations	3
AS 380	Pilot Career Planning and Interviewing Techniques	1
AS 412	Corporate and Business Aviation	3
AS 428	FMS/Autopilots for Helicopters	3
BA/SF/WX	300-400 Level Electives	6
	Electives	4
<b>Total Credits</b>		<b>26</b>
<b>TOTAL DEGREE CREDITS</b>		<b>120</b>

## 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
	Computer Science Elective*	3
AS 119	Private Pilot Operations	4
AS 122	Introduction to Careers in Aviation	3
AS 246	Basic Air Navigation	3
AS 254	Aviation Legislation -OR-	
AS 405	Aviation Law	3
FA 119	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
<b>Total Credits</b>		<b>29</b>

## SOPHOMORE YEAR

Course	Title	Credits
	Communication Theory and Skills*	3
	Lower-Level Humanities	3
AS 221	Instrument Pilot Operations	3
AS 309	Aerodynamics	3
AS 311	Aircraft Engines-Turbine	3
AS 357	Flight Physiology	3
FA 221	Instrument Single Flight -OR-	1
FA 122	Private Multi Flight with Laboratory -AND-	1
FA 222	Instrument Multi Flight	1
PS 104	Technical Physics II with Laboratory	3
WX 201	Survey of Meteorology	3
WX 301	Aviation Weather	3
<b>Total Credits</b>		<b>28/29</b>

## JUNIOR YEAR

Course	Title	Credits
	Communication Theory and Skills*	3
	Lower-Level Social Sciences*	6
AS 310	Aircraft Performance	3
AS 321	Commercial Pilot Operations	3
AS 350	Domestic and International Navigation	3
AS 356	Aircraft Systems and Components	3
AS 358	Advanced Avionics	3
BA 201	Principles of Management	3
FA 321	Commercial Single Flight -AND-	1
FA 323	Commercial Multi Add On -OR-	1
FA 322	Commercial Multi Flight Electives	1 3
<b>Total Credits</b>		<b>31/32</b>

# Academic Programs at the Prescott Campus

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## SENIOR YEAR

Course	Title	Credits
	Upper-Level HU/SS Elective* . . . . .	3
AS 380	Pilot Career Planning and Interviewing Techniques . . . . .	1
AS 387	Crew Resource Management . . . . .	3
AS 402	Airline Operations -OR-	
AS 410	Airline Dispatch Operations . . . . .	3
AS 408	Flight Safety . . . . .	3
AS 411	Jet Transport Systems . . . . .	3
AS 420	Flight Technique Analysis . . . . .	3
AS 435	Electronic Flight Management Systems . . .	3
FA 422	Airline Flight Crew Techniques and Procedures . . . . .	1
	Electives . . . . .	8
<b>Total Credits</b>		<b>31</b>
<b>TOTAL DEGREE CREDITS</b>		<b>120</b>

## 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 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* . . . . .	3
AS 119	Private Pilot Operations . . . . .	4
AS 122	Introduction to Careers in Aviation . . . . .	3
AS 246	Basic Air Navigation . . . . .	3
AS 254	Aviation Legislation -OR-	
AS 405	Aviation Law . . . . .	3
FA 119	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
<b>Total Credits</b>		<b>29</b>

## SOPHOMORE YEAR

Course	Title	Credits
	Communication Theory and Skills* . . . . .	3
	Lower-Level Humanities* . . . . .	3
AS 221	Instrument Pilot Operations . . . . .	3
AS 309	Aerodynamics . . . . .	3
AS 311	Aircraft Engines-Turbine . . . . .	3
AS 357	Flight Physiology . . . . .	3
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 201	Survey of Meteorology . . . . .	3
WX 301	Aviation Weather . . . . .	3
<b>Total Credits</b>		<b>28/29</b>

## JUNIOR YEAR

Course	Title	Credits
	Communication, Theory, and Skills* . . . . .	3
	Lower-Level Social Sciences* . . . . .	6
AS 321	Commercial Pilot Operations . . . . .	3
AS 310	Aircraft Performance . . . . .	3
AS 350	Domestic and International Navigation . . .	3
AS 356	Aircraft Systems and Components . . . . .	3
AS 358	Advanced Avionics . . . . .	3
BA 201	Principles of Management . . . . .	3
FA 321	Commercial Single Flight . . . . .	1
	-AND-	
FA 323	Commercial Multi Add On . . . . .	1
	-OR-	
FA 322	Commercial Multi Flight . . . . .	1
	Minor . . . . .	3
<b>Total Credits</b>		<b>31/32</b>

## SENIOR YEAR

Course	Title	Credits
	Upper-Level HU/SS Elective* . . . . .	3
AS 380	Pilot Career Planning and Interviewing Techniques . . . . .	1
AS 387	Crew Resource Management . . . . .	3
AS 408	Flight Safety . . . . .	3
AS 420	Flight Technique Analysis . . . . .	3
SIS	300/400 Level . . . . .	3
	Minor . . . . .	6-15
	Electives . . . . .	0-9
<b>Total Credits</b>		<b>31</b>
<b>TOTAL DEGREE CREDITS</b>		<b>120</b>

# Academic Programs at the Prescott Campus

## 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* . . . . .	3
AS 119	Private Pilot Operations . . . . .	4
AS 122	Introduction to Careers in Aviation . . . . .	3
AS 246	Basic Air Navigation . . . . .	3
FA 119	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
WX 201	Survey of Meteorology . . . . .	3
	ROTC . . . . .	2
<b>Total Credits</b>		<b>31</b>

### SOPHOMORE YEAR

Course	Title	Credits
	Communication Theory and Skills* . . . . .	3
	Lower-Level Humanities* . . . . .	3
AS 221	Instrument Pilot Operations . . . . .	3
AS 309	Aerodynamics . . . . .	3
AS 311	Aircraft Engines-Turbine . . . . .	3
AS 357	Flight Physiology . . . . .	3
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
<b>Total Credits</b>		<b>27/28</b>

### JUNIOR YEAR

Course	Title	Credits
	Communication Theory and Skills* . . . . .	3
	Lower-Level Social Sciences . . . . .	3
AS 310	Aircraft Performance . . . . .	3
AS 321	Commercial Pilot Operations . . . . .	3
AS 350	Domestic and International Navigation . . . . .	3

AS 356	Aircraft Systems and Components . . . . .	3
AS 358	Advanced Avionics . . . . .	3
BA 201	Principles of Management . . . . .	3
FA 321	Commercial Single Flight . . . . .	1
	-AND-	
FA 323	Commercial Multi Add On . . . . .	1
	-OR-	
FA 322	Commercial Multi Flight . . . . .	1
	ROTC . . . . .	6
<b>Total Credits</b>		<b>31/32</b>

### SENIOR YEAR

Course	Title	Credits
	Lower-Level Humanities* . . . . .	3
	Upper-Level HU/SS Elective* . . . . .	3
AS 387	Crew Resource Management . . . . .	3
AS 408	Flight Safety . . . . .	3
AS 420	Flight Technique Analysis . . . . .	3
AS 435	Electronic Flight Management Systems . . . . .	3
	Elective . . . . .	6
	ROTC . . . . .	6
<b>Total Credits</b>		<b>30</b>
<b>TOTAL DEGREE CREDITS</b>		<b>120</b>

## Helicopter Pilot Specialty

The Helicopter Pilot Specialty program has been developed to provide the aeronautical knowledge necessary for a student to acquire the necessary skills needed to operate in the field of helicopter aviation. The initial academic and flight courses are designed to provide the basic foundation in aerodynamics, regulations, weather, and flight planning. The upper-level Aeronautical Science courses offer managerial and critical thinking techniques needed for advanced helicopter operations.

### FRESHMAN YEAR

Course	Title	Credits
	Communication Theory and Skills* . . . . .	3
	Computer Science Elective* . . . . .	3
AS 142	Private Helicopter Operations . . . . .	3
AS 122	Introduction to Careers in Aviation** . . . . .	3
AS 246	Basic Air Navigation . . . . .	3
AS 254	Aviation Legislation . . . . .	3
	-OR-	
AS 405	Aviation Law . . . . .	3
FA 142	Helicopter Pilot Flight Private . . . . .	1
MA 111	College Mathematics for Aviation I . . . . .	3
MA 112	College Mathematics for Aviation II . . . . .	3

# Academic Programs at the Prescott Campus

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PS	103	Technical Physics I with Laboratory . . . . .	3
<b>Total Credits</b>			<b>28</b>

\*\* Meets open elective or credit in excess of degree requirements.

## SOPHOMORE YEAR

Course	Title		Credits
		Communication Theory and Skills* . . . . .	3
		Lower-Level Humanities* . . . . .	3
AS	252	Instrument Helicopter Operations . . . . .	3
AS	309	Aerodynamics . . . . .	3
AS	311	Aircraft Turbine Engines . . . . .	3
AS	357	Flight Physiology . . . . .	3
FA	252	Helicopter Pilot Flight Instrument . . . . .	1
PS	104	Technical Physics II with Laboratory . . . . .	3
WX	201	Survey of Meteorology . . . . .	3
WX	301	Aviation Weather . . . . .	3
		Open Elective . . . . .	3
<b>Total Credits</b>			<b>31</b>

## JUNIOR YEAR

Course	Title		Credits
		Communication Theory and Skills* . . . . .	3
		Lower-Level Social Sciences* . . . . .	6
BA	201	Principles of Management . . . . .	3
AS	310	Aircraft Performance . . . . .	3
AS	356	Aircraft Systems and Components . . . . .	3
AS	358	Advanced Avionics . . . . .	3
AS	372	Commercial Helicopter Operations . . . . .	3
AS	378	Environmental Helicopter Operations . . . . .	3
AS	388	Helicopter Flight Planning . . . . .	3
FA	372	Helicopter Pilot Flight Commercial . . . . .	1
<b>Total Credits</b>			<b>31</b>

## SENIOR YEAR

Course	Title		Credits
		Upper-Level HU/SS Elective* . . . . .	3
		Upper-Level BA/SF/WX Elective . . . . .	6
AS	380	Pilot Career Planning and Interviewing Techniques . . . . .	1
AS	387	Crew Resource Management . . . . .	3
AS	408	Flight Safety . . . . .	3
AS	412	Corporate and Business Aviation . . . . .	3
AS	428	FMS/Autopilots for Helicopters . . . . .	3
AS	438	Advanced Helicopter Operations . . . . .	3
AS	442	Flight Instructor Helicopter Operations . . . . .	3
FA	442	Helicopter Pilot Flight Instructor . . . . .	1
		Elective . . . . .	1
<b>Total Credits</b>			<b>30</b>

<b>TOTAL DEGREE CREDITS</b>	<b>120</b>
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## 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 or 222

**Computer Science**  
IT 109 or CS 117 or 118

**Humanities/Social Sciences**

**LOWER-LEVEL:**

HU 140, 141, 142, 143, 144, 145, 146  
PSY 101, EC 210 or EC 211, SS 110, 120, 130, 204, or 210  
(Military Pilot Specialty must take PSY 101 and SS 110, 120, or 130.)

**UPPER-LEVEL:**

HU/SS 300-400 level or PSY 350

\*\* 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



## Academic Programs at the Prescott Campus

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an FAA certificate course prior to enrolling at Embry-Riddle may obtain written permission to complete that 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 flight 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 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. 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 with instructor authorization.

Certificated aircraft dispatchers are employed by airlines to manage the ground-based tasks vital to successful airline operations. Dispatchers share responsibility with the captain for preflight planning and preparation of the dispatch release, monitoring the progress of the flight, issuing safety-of-flight information to the crew, and canceling or re-dispatching 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 exhibit strong aeronautical decision-making skills incorporating the priorities of safety, passenger comfort, and economic 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 221	Instrument Pilot Operations . . . . .	3
AS 310	Aircraft Performance . . . . .	3
AS 350	Domestic and International Navigation . . . . .	3
AS 410	Airline Dispatch Operations* . . . . .	3
AT 200	Air Traffic Management I . . . . .	3
WX 201	Survey of Meteorology . . . . .	3
WX 301	Aviation Weather . . . . .	3
<b>Total Credits</b>		<b>21</b>

Embry-Riddle occasionally changes a course number designator or nomenclature without materially affecting course content. In these cases, the program evaluator will substitute the equivalent course for those above.

For those students who possess a Private or Commercial Pilot Certificate with Instrument Rating, this training and experience may be used as equivalent for AS 221, AT

## Academic Programs at the Prescott Campus

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200, or both, and constitutes a minimum of 70 hours of experience.

\* 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.

## Academic Programs at the Prescott Campus

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### *Aeronautics*

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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 advanced 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 aviation-specific knowledge through aviation-related coursework. This combination of a student's aviation learning, aviation courses, courses in 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 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. Advanced 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 com-

# Academic Programs at the Prescott Campus

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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 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 on any AOC prior learning or transfer credits granted.

### Aviation Area of Concentration (36)

Advanced standing credit and/or nonduplicating credit from AEL/AMT/AS/AT/FA/SF/SP/WX courses.

COM	Communication Theory and Skills* . . . . .	9
HU/SS	Humanities/Social Sciences* . . . . .	12
HU	Lower-Level Humanities Elective . . . . .	3
SS	Lower-Level Social Sciences Elective . . . . .	6
	(PSY 101 and/or Lower-Level SS)	
HU/SS	Upper-Level HU or SS Elective . . . . .	3
CS	Computer Science Elective . . . . .	3
MA	Mathematics . . . . .	6
MA 140	College Algebra (or higher-level math) . . . . .	3
MA 112	College Mathematics for Aviation II	
	-OR-	
MA 222	Business Statistics	
	-OR-	
MA	Upper-Level Mathematics . . . . .	3

PS	Physical Sciences . . . . .	6
PS	Physical and Life Sciences Elective . . . . .	3
	(One course must include a laboratory)	

### Program Support (12)

AS	254 Aviation Legislation . . . . .	3
AS	405 Aviation Law . . . . .	3
BA	201 Principles of Management	
	-OR-	
BA	210 Financial Accounting . . . . .	3
EC	200 An Economic Survey	
	-OR-	
EC	210 Microeconomics	
	-OR-	
EC	211 Macroeconomics . . . . .	3

### Professional Development Electives (21)

Select from upper-division (300-400) courses in AEL/AMS/AS/AT/BA/CS/EC/IT/LET/SF/SIS/WX.  
Open Electives . . . . . 15

**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 or 222

#### Humanities

HU 140 to HU 146

#### Social Sciences

**LOWER-LEVEL:**

100-200 level

**UPPER-LEVEL:**

300-400 level, 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

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### *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 pre- or corequisites. 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 a 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 non-military 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

# Academic Programs at the Prescott Campus

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

Course Title	Credits
AS 120 Principles of Aeronautical Science . . . . .	3
COM122 English Composition and Literature . . . . .	3
HU 14X Lower-Level Humanities . . . . .	3
MA 222 Business Statistics . . . . .	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
<b>Total Credits</b>	<b>31</b>

\*Meets open elective or credit in excess of degree requirement

#### SOPHOMORE YEAR

Course Title	Credits
COM219 Speech . . . . .	3
CS 125 Computer Science I . . . . .	4
MA 243 Calculus and Analytical Geometry III . . . . .	4
PS 105 General Chemistry I . . . . .	4
PS 105L 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 and Radar Weather Interpretation . . . . .	3
<b>Total Credits</b>	<b>30</b>

\*Courses offered only in the Spring semester.

#### JUNIOR YEAR

Course Title	Credits
<b>FALL</b>	
MA 345 Differential Equations and Matrix Methods . . . . .	4

EC/SS 1XX/2XX Lower-Level Economics	
	-OR- Social Sciences . . . . . 3
WX 354 Dynamics of the Atmosphere . . . . .	3
WX 420 Advanced Atmospheric Thermodynamics . . . . .	3
	Open elective (if no Co-op) . . . . . (3)

#### SPRING

MA 441 Advanced Engineering Mathematics . . . . .	3
WX 355 Weather Analysis . . . . .	5
WX 390 Atmospheric Physics . . . . .	3
	Open elective (if no Co-op) . . . . . (3)

#### SUMMER

CE AAS Co-op/Internship	
	-OR- Fall/Spring Open Electives . . . . . 6

**Total Credits** **30**

#### SENIOR YEAR

Course Title	Credits
<b>FALL</b>	
COM 221 Technical Report Writing	
	-OR-
COM222 Business Communication . . . . .	3
EC/SS 1XX/2XX Lower-Level Economics	
	-OR- Social Sciences . . . . . 3
WX 270 Weather Information Systems . . . . .	3
WX 427 Forecasting Techniques . . . . .	3
WX 490 Advanced Dynamic Meteorology I . . . . .	3

#### SPRING

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 electives . . . . . 5

**Total Credits** **29**

**TOTAL DEGREE CREDITS** **120**

## Applied Meteorology With Flying AOC

#### FRESHMAN YEAR

Course Title	Credits
AS 119 Private Pilot Operations . . . . .	4
COM122 English Composition and Literature . . . . .	3
FA 119 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
UNIV 101 College Success Seminar . . . . .	1
WX 252 Introduction to Meteorology . . . . .	3
WX 261 Applied Climatology . . . . .	3
<b>Total Credits</b>	<b>27</b>

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## SOPHOMORE YEAR

Course	Title	Credits
AS 221	Instrument Pilot Operations . . . . .	3
CS 125	Introduction to Computing for Engineers	4
FA 221	Instrument Single Flight . . . . .	1
MA 243	Calculus and Analytical Geometry III. . . . .	4
PS 105	General Chemistry I. . . . .	4
PS 105L	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 Interpretation . . . . .	3
<b>Total Credits</b>		<b>31</b>

\*Courses offered only in the Spring semester.

## JUNIOR YEAR

Course	Title	Credits
<b>FALL</b>		
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. . . . .	4
WX 354	Dynamics of the Atmosphere. . . . .	3
WX 420	Advanced Atmospheric Thermodynamics . . . . .	3
<b>SPRING</b>		
COM219	Speech. . . . .	3
MA 222	Business Statistics . . . . .	3
WX 355	Weather Analysis . . . . .	5
WX 390	Atmospheric Physics . . . . .	3
<b>Total Credits</b>		<b>31</b>

## SENIOR YEAR

Course	Title	Credits
<b>FALL</b>		
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
<b>SPRING</b>		
COM 221	Technical Report Writing -OR- 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 . . . . .	4
<b>Total Credits</b>		<b>31</b>

**TOTAL DEGREE CREDITS** **120**

## 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
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
	ROTC . . . . .	2
<b>Total Credits</b>		<b>30</b>

\*Meets open elective or credit in excess of degree requirement

### SOPHOMORE YEAR

Course	Title	Credits
COM219	Speech. . . . .	3
CS 125	Computer Science I. . . . .	4
MA 243	Calculus and Analytical Geometry III. . . . .	4
PS 105	General Chemistry I. . . . .	4
PS 105L	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 and Radar Weather Interpretation. . . . .	3
	ROTC . . . . .	2
<b>Total Credits</b>		<b>32</b>

\*Courses offered only in the Spring semester

### JUNIOR YEAR

Course	Title	Credits
<b>FALL</b>		
MA 345	Differential Equations and Matrix Methods. . . . .	4
EC/SS 1XX/2XX	Lower-Level Economics -OR- Social Sciences . . . . .	3
WX 420	Advanced Atmospheric Thermodynamics . . . . .	3
WX 354	Dynamics of the Atmosphere. . . . .	3
	ROTC . . . . .	3
<b>SPRING</b>		
MA 222	Business Statistics . . . . .	3
WX 355	Weather Analysis . . . . .	5
WX 390	Atmospheric Physics . . . . .	3
	ROTC . . . . .	3
<b>Total Credits</b>		<b>30</b>

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### SENIOR YEAR

Course	Title	Credits
<b>FALL</b>		
EC/SS 1XX/2XX	Lower-Level Economics -OR- Social Sciences	3
WX 270	Weather Information Systems	3
WX 427	Forecasting Techniques	3
WX 490	Advanced Dynamic Meteorology I	3
	ROTC	3
<b>SPRING</b>		
COM 221	Technical Report Writing -OR-	
COM 222	Business Communication	3
WX 457	Weather Operations Seminar	3
WX 491	Advanced Dynamic Meteorology II	3
HU/SS 3XX/4XX	Upper-Level Humanities -OR- Social Sciences	3
	ROTC	3
<b>Total Credits</b>		<b>30</b>
<b>TOTAL DEGREE CREDITS</b>		<b>122</b>

### Meteorology for Aviation Operations AOC

#### FRESHMAN YEAR

Course	Title	Credits
AS 119	Private Pilot Operations	4
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
<b>Total Credits</b>		<b>29</b>

#### SOPHOMORE YEAR

Course	Title	Credits
AS 221	Instrument Pilot Operations	3
AS 309	Aerodynamics	3
CS 125	Introduction to Computing for Engineers	4
MA 243	Calculus and Analytical Geometry III	4
PS 105	General Chemistry I	4
PS 105L	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 Interpretation	3
<b>Total Credits</b>		<b>30</b>

\*Courses offered only in the Spring semester

### JUNIOR YEAR

Course	Title	Credits
<b>FALL</b>		
AS 310	Aircraft Performance	3
PS 160	Physics II for Engineers	3
MA 345	Differential Equations and Matrix Methods	4
WX 354	Dynamics of the Atmosphere	3
WX 420	Advanced Atmospheric Thermodynamics	3
<b>SPRING</b>		
AS 350	Domestic and International Navigation	3
MA 222	Business Statistics	3
WX 355	Weather Analysis	5
WX 390	Atmospheric Physics	3
<b>SUMMER</b>		
COM 219	Speech	3
EC/SS 1XX/2XX	Lower-Level Economics -OR- Social Sciences	3
HU 14X	Lower-Level Humanities	3
<b>Total Credits</b>		<b>39</b>

### SENIOR YEAR

Course	Title	Credits
<b>FALL</b>		
AT 200	Air Traffic Management I	3
EC/SS 1XX/2XX	Lower-Level Economics -OR- Social Sciences	3
WX 270	Weather Information Systems	3
WX 427	Forecasting Techniques	3
WX 490	Advanced Dynamic Meteorology I	3
<b>SPRING</b>		
AS 410	Airline Dispatch Operations	3
COM 221	Technical Report Writing -OR-	
COM 222	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
<b>Total Credits</b>		<b>30</b>
<b>TOTAL DEGREE CREDITS</b>		<b>128</b>



## *Master of Science in Safety Science*

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### Introduction

The Master of Science in Safety Science (MSSS) degree program is designed to provide students with a practical course of study in occupational health and safety. The degree will produce safety professionals who are skilled in providing safety management expertise in a variety of industries. Graduates will be able to provide leadership and guidance in compliance issues involving EPA, OSHA, DOD, FAA, DOE, NTSB and state health, hygiene, and workplace standards, and will be prepared for service in numerous industries, including but not limited to the aviation/aerospace industry and the military.

The MSSS degree prepares graduates for professional safety positions in a variety of industrial settings including aviation. Students will qualify for jobs such as aircraft accident investigator, aviation or general safety management, operations safety, and safety design. The degree offers the opportunity for students to explore both the theoretical and pragmatic discipline that occupational health and safety has become. Particularly in light of extensive interest by the private sector and by government entities, this degree offers occupational health and safety professionals the advanced education and credentials necessary to succeed in the practice of safety.

The MSSS is a 36 credit hour program of study composed of a General Core (15 credit hours), a Research Core (9 to 12 credit hours), and electives (9 to 12 credit hours). Elective coursework must be selected from the elective list on the following page. All elective courses may not be offered every year. **Check with an**

**advisor for a schedule of course offerings.**

Preference will be given to applicants with an undergraduate background in college-level mathematics, the physical and natural sciences, computer applications, behavioral science, and statistics. Students who lack prerequisite knowledge in algebra and trigonometry, physics, and chemistry will be required to take deficiency coursework. The prerequisite knowledge for any graduate course must be satisfied before enrollment in the course is permitted.

### Degree Requirements

#### SAFETY SCIENCE GENERAL CORE

Course	Title	Credits
MSF 580	Industrial Hygiene and Environmental Protection . . . . .	3
MSF 601	Ergonomics . . . . .	3
MSF 602	Human Factors* . . . . .	3
MSF 603	Occupational Safety . . . . .	3
MSF 613	Aviation Safety . . . . .	3
<b>Total Credits</b>		<b>15</b>

\* Prerequisite MSF 600

#### SAFETY SCIENCE RESEARCH CORE

Course	Title	Credits
MSF 600	Quantitative Methods . . . . .	3
MSF 612	Research Methods* . . . . .	3
AND		

#### *Option I*

MSF 700	Thesis* . . . . .	6
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\* Prerequisite MSF 600 and MSF 612

OR

#### *Option II*

MSF 690	Graduate Research Project* . . . . .	3
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\* Prerequisite MSF 600 and MSF 612

<b>Total Credits</b>		<b>9-12</b>
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### ELECTIVES

Course	Title	Credits
MSA 602	The Air Transportation System.....	3
MSA 613	Airport Operations Safety.....	3
MSF 530	Aircraft Accident Investigation.....	3
MSF 605	Industrial Hygiene Measurement**.....	3
MSF 607	Epidemiology*.....	3
MSF 609	System Safety*.....	3
MSF 610	Industrial Security.....	3
MSF 611	Case Studies in Safety*.....	3
MSF 614	Safety Ethics.....	3
MSF 630	Aircraft Accident Analysis.....	3
MSF 635	Advanced Aircraft Survivability Analysis and Design***.....	3
MSF 655	Airline and Operations Safety Management.....	3
MSF 675	Aviation Maintenance Safety.....	3
MSF 685	Aviation Security.....	3
MSF 696	Graduate Internship in Safety Science...	3
MSF 699	Special Topics in Safety Science.....	3
TM 621	Regulations, Ethics, and the Legal System.....	3
<b>Total Credits</b>		<b>9 – 12</b>

\* Prerequisite MSF 600

\*\* Prerequisite MSF 580

\*\*\* Prerequisite MSF 530

### Graduate Assistantships

Graduate assistantships are academic appointments that are normally reserved for qualified graduate students. A graduate research assistant is involved in research activities under the direction of a faculty member or a research associate. A graduate administrative assistant assists departments or faculty with curriculum development, special projects, and other duties as assigned. To be eligible for a graduate assistantship, a student must have full graduate status in a degree program, must have maintained a CGPA of 3.00 out of a possible 4.00 or above through the end of the semester (graduate or undergraduate) preceding the appointment, and must demonstrate adequate communication and technical skills.

Each department has the responsibility to post the availability of its graduate assistantships. Students interested in applying should

submit a an application form and a 500-word essay directly to the department. Incoming students should contact departments directly about the availability of assistantships.

Full graduate assistantships carry a stipend set by the University and a tuition waiver. Graduate assistants with such appointments are expected to devote up to 20 hours each week to effectively carry out their assignments. Under some circumstances, partial assistantships providing either tuition or a stipend may be granted. Expected time to be devoted is set by the assigning department. Graduate assistants are permitted to accept other University employment; however, University policies limit all students to a total of 25 hours of work per week, including the graduate assistantship. All graduate research and administrative assistantships, both full and partial, require that the recipient be registered for at least three graduate credits at Embry-Riddle for any semester of their appointment. Summer registration is not required, but encouraged.

### Graduate Internships

Graduate internships are temporary professional or industrial work opportunities available to graduate students. There are two types of internships: resident and nonresident. Resident internships are professional work activities supported by a partnership between the University and industry and conducted on campus under the supervision of a faculty/staff sponsor. Nonresident internships are professional work activities conducted off campus at the supporting organization facility. Full-time employees of the offering organization are not eligible for an internship appointment and cannot receive elective credit for their professional work service.

Graduate students who have full graduate status are in good standing with a minimum

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of six completed graduate credit hours, and who earn a cumulative GPA of 3.00 on a 4.00 basis, are eligible to apply for graduate internships. Students must demonstrate adequate communication and technical skills.

Students selected for an internship must register for the approved number of credit hours in the departmental internship course, and pay all fees. Graduate academic credit is awarded at a rate of one credit hour for every 200 clock hours of work completed, up to a maximum of three credit hours in one semester. Three internship credit hours may be applied as an elective toward degree requirements. Students are advised to consult with their Safety Science graduate program coordinator for approval to use internship credits toward their degree program.

### Guidelines for Graduate Research Projects and Theses

#### Introduction

The graduate program in the Department of Safety Science offers the degree of Master of Science in Safety Science (MSSS), which is a 36 credit-hour program. In addition to course work, this degree requires the completion of a research project, either a three-hour Graduate Research Project (GRP, with 33 hours of course work) or a six-hour Master's Thesis (with 30 hours of course work). Those students who are planning to do a GRP should have registered for a total of three hours of MSF 690 before graduation. Those planning to do a thesis should register for six hours of MSF 700 before graduation. The detailed information in this section is intended to assist graduate students in the completion of this research requirement.

#### The Difference between a GRP and a Thesis

The difference between a GRP and a thesis is primarily a question of scope, but there are other distinguishing features.

If the student has any aspirations to later pursue a doctorate, a thesis should be considered since this is good preparation for writing a dissertation. A thesis is a project that requires the collection and analysis of data in an original fashion. This work should be suitable for submission to a peer-reviewed journal for publication.

In contrast, a GRP does not necessarily involve original work in the form of collection and analysis of data. If it does, it will be on a scale smaller than a thesis. A GRP may also consist of the results of an internship, such as the design of a safety program for a specific industry or a report developed from a hazard analysis. Both of these examples are appropriate GRP topics, but are not appropriate for a thesis.

#### Steps in the Completion of the Research Requirement

1. **IDEA:** Generate ideas for research in consultation with the graduate faculty. This will allow the student to arrive at an idea that is consistent with the curriculum of the MSSS program and is of genuine interest to the student.
2. **COMMITTEE SELECTION:** Choose a committee of three people. This committee must consist of two members of the MSSS graduate faculty, one of whom must chair the committee. The third member may be anyone from the faculty or from outside the university who can contribute to the project (MSSS students are not eligible). For instance, if you are writing a safety program plan in consultation with an outside corporate entity, the third member could be a representative from that entity.

3. **PROPOSAL:** Write a proposal and have this proposal approved by all members of the committee. The proposal need not be more than a few pages (3-5). The proposal must consist of:

- An introduction
- A clear problem statement (probably an hypothesis, but not necessarily)
- An annotated bibliography of approximately 20 resources
- Methods for investigating the problem

The format for the proposal should conform to the APA Guide. Note that a faculty member may remove him or herself from the committee at this (or any) stage of the process. If this happens, the student must then choose an alternate member. A copy of the proposal signed by the entire committee should be placed on file with the Graduate Admissions Coordinator.

4. **Institutional Review Board (IRB):** For all projects that require the use of human subjects, the student must submit an approval form through the University's Institutional Review Board (IRB). Forms for this process are available through the Sponsored Programs Pre-Award Office at Daytona Beach. It should be noted that almost all research conducted in the Department of Safety Science will require the submission of these forms. If there is any question, the student should consult his or her committee.
5. **RESEARCH:** The research should be conducted in close consultation with the committee. If the committee is not consulted on a regular basis through this process, the chance of approval of the final product diminishes.
6. **DOCUMENT PREPARATION:** Do not begin writing the GRP or thesis until

you have the approval of the committee. The process of writing should begin at least at the beginning of the semester of anticipated graduation and no later. Submit the introduction to the committee first, and do not move to subsequent sections until the committee has approved that section. As the committee approves each section, the student may move on to the next section so that it may be approved by the committee. Even if the student begins submitting sections at the beginning of the semester of graduation, this will not guarantee that the committee will approve the final document by the end of the semester. It is wise to begin this process as early in your graduate career as possible. Despite any plans that you may make to leave campus or begin work, the committee cannot guarantee that you will have this process completed in any predetermined time frame. You will be allowed to finish when and only when you have satisfied the committee. Also note that summers are allocated for the purpose of completing your research.

7. **FINAL DEFENSE:** Once the final document is prepared and approved in its final form by the committee, the oral defense will be scheduled. The student is responsible for arriving at a mutually agreeable time with the committee, and issuing invitations to the graduate faculty, the administration of the College of Aviation, the deans of the Colleges of Arts and Sciences and Engineering, and the entire graduate student body. Again, note that this is the student's responsibility. Be aware that this is a time-consuming process and allow sufficient time. The final defense of the GRP or thesis will require a formal presentation using PowerPoint or other presentation software; this

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presentation will be limited to 30 minutes, with another 15 minutes allowed for questions from the committee and the audience. After the defense, the student's committee will advise the student whether he or she has passed and what revisions are necessary. At this point the committee will decide whether to sign the signatory page.

8. **COMPLETION:** Finally, the student must complete all necessary paperwork for graduation (assuming that all coursework has been completed as well). For the GRP, a copy must be provided to the Graduate Admissions Coordinator. For the thesis, bound copies must be provided for the library and the Graduate Admissions Coordinator. Copies of either the GRP or thesis may be provided to other recipient(s) as deemed appropriate by the student.
9. **ENROLLMENT:** Once a student has enrolled for 3 hours of GRP (MSF 690) or 6 hours of thesis (MSF 700) credit, the student must continuously enroll for 1 credit of GRP or Thesis. This policy is outlined in detail in the Graduate Research Project Grading and the Thesis Grading sections of the University catalog.

### **Deadlines for GRP and Thesis Preparation**

Each student should generate ideas for research in consultation with the graduate faculty. These ideas should be generated as soon as possible after starting your graduate program.

#### ***Committee Organization***

Fall 2009	Due Friday, April 17, 2009
Spring 2010	Due Friday, December 4, 2009
Fall 2010	Due Friday, April 16, 2010
Spring 2011	Due Friday, December 3, 2010

The committee is officially formed by this date. Student has requested and received an acceptance from a Safety Science faculty to be the Chair of the committee. Prospective committee members have contacted the Chair indicating his/her willingness to serve on the committee. Note that a faculty member may request removal from the committee at any stage of the process. If this happens, the student must then choose an alternate member. A copy of the committee approval sheet signed by the entire committee should be placed on file with the Graduate Admissions Coordinator and GRP/Thesis manager.

#### ***Proposal***

Fall 2009	Due Friday, September 11, 2009
Spring 2010	Due Friday, January 22, 2010
Fall 2010	Due Friday, September 10, 2010
Spring 2011	Due Friday, January 21, 2011

Each student will write a proposal and have this proposal approved by all members of the committee. The proposal need not be more than 3-5 pages. The proposal must consist of an introduction, a clear problem statement, an annotated bibliography of approximately 20 resources, and methods for investigating the problem. The format for the proposal should conform to the Publication Manual of the American Psychological Association, fifth edition.

#### ***First Three Chapters – Introduction, Review, and Methodology***

Fall 2009	Due Friday, October 23, 2009
Spring 2010	Due Friday, March 5, 2010
Fall 2010	Due Friday, October 22, 2010
Spring 2011	Due Friday, March 4, 2011

An acceptable draft of the first three chapters of the project must be presented to the committee by the due date.

#### ***Defense Confirmation***

Fall 2009	Due Friday, November 13, 2009
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Spring 2010 Due Friday, March 26, 2010  
Fall 2010 Due Friday, November 12, 2010  
Spring 2011 Due Friday, April 1, 2011

The committee chair and committee members must agree that the student is near enough to completion to schedule the GRP/Thesis defense.

### ***GRP or Thesis Completed and Delivered to the Committee***

Fall 2009 Due Friday, November 24, 2009  
Spring 2010 Due Friday, April 16, 2010  
Fall 2010 Due Friday, December 3, 2010  
Spring 2011 Due Friday, April 22, 2011

### ***GRP and Thesis Defense***

The GRP and Thesis Defense presentations will occur during the final week of classes.

Fall 2009 Friday/Saturday,  
December 4 & 5, 2009  
Spring 2010 Friday/Saturday,  
April 30 & May 1, 2010  
Fall 2010 Friday/Saturday,  
December 10 & 11, 2010  
Spring 2011 Friday/Saturday,  
April 29 & 30, 2011

The presentation and defense will be one hour, including:

- 30-minute presentation
- 15-minute question-and-answer period
- 15-minute committee discussion

# College of Engineering

*Dr. Richard F. Felton, Interim 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 on aircraft and spacecraft 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 engi-

neering 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.

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.

Graduating seniors will be competent in fundamental math and basic science subjects.

All graduating engineering students

## Academic Programs at the Prescott Campus

will be competent in a subgroup of core engineering fundamentals appropriate to their discipline.

Engineering students graduating from our programs will demonstrate proficiency in core topics in their program listed below:

1. 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.
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:
  - a. **Aerospace Engineering (Aeronautics Option)**  
Aerodynamics, Thermal Sciences, Structures, Flight Mechanics, Aircraft Design, Propulsion, Electronics, Aerospace Materials, Astronautics, and Design.
  - b. **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
  - c. **Electrical Engineering**  
Analog/Digital Circuits, Electronic Devices, Controls, Electromagnetics,

Power Conversion, Telecommunications, Hardware and Software Systems, and Design

- d. **Computer Engineering**  
Electrical Circuits, Electronics, Controls, Logic Circuits, Computer Architecture, Computer Operating Systems, Algorithms and Data Structures, and Design
  - e. **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 subdiscipline 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.
  7. 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 accepted its first freshman class in the fall semester of 2007. Mechanical Engineering will be eligible by ABET to seek accreditation after its first



## Academic Programs at the Prescott Campus

graduate in spring 2010.

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 pro-

gram 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 Program

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
COM122	English Composition and Literature . . . . .	3
COM219	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- Social Sciences 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)
<b>Total Credits</b>		<b>32</b>

\* In excess of degree requirements.

## *Aerospace Engineering*

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### Bachelor of Science

The Bachelor of Science 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, 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:

## Academic Programs at the Prescott Campus

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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
	Lower-Level Humanities -OR- Social Sciences* . . . . .	3
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	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
UNIV 101	College Success** . . . . .	(1)
<b>Total Credits</b>		<b>32</b>

\*\* In excess of degree requirements.

#### SOPHOMORE YEAR

Course	Title	Credits
COM 221	Technical Report Writing . . . . .	3
EGR 200	Computer Aided Conceptual Design of Aerospace Systems . . . . .	3
ES 201	Statics . . . . .	3
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 160	Physics II for Engineers . . . . .	3
PS 220	Physics III Laboratory . . . . .	1
PS 250	Physics III for Engineers . . . . .	3
<b>Total Credits</b>		<b>33</b>

# Academic Programs at the Prescott Campus

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## JUNIOR YEAR (AERONAUTICS OPTION)

Course	Title	Credits
AE 301	Aerodynamics I	3
AE 302	Aerodynamics II	3
AE 304	Aircraft Structures I	3
AE 314	Experimental Aerodynamics	1
AE 315	Experimental Aerodynamics Lab	1
AE 404	Aircraft Structures II	3
AE 413	Airplane Stability and Control	3
EC	Lower-Level Economics*	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
PS 105	General Chemistry I	4
<b>Total Credits</b>		<b>33</b>

## JUNIOR YEAR (ASTRONAUTICS OPTION)

Course	Title	Credits
AE 301	Aerodynamics I	3
AE 304	Aircraft Structures I	3
AE 313	Space Mechanics	3
AE 325	Experimental Space Systems Engineering I	1
AE 326	Experimental Space Systems Engineering Laboratory	1
EC	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
<b>Total Credits</b>		<b>33</b>

## SENIOR YEAR (AERONAUTICS OPTION)

Course	Title	Credits
	Upper-Level Humanities -OR- Social Sciences*	3
	Technical Electives	6
AE 313	Space Mechanics	3
AE 408	Turbine and Rocket Engines	3
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 I	3
<b>Total Credits</b>		<b>31</b>

## 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	3
AE 427	Spacecraft Preliminary Design	4
AE 430	Control Systems Analysis and Design	3
AE 445	Spacecraft Detail Design	4
AE 416	Aerospace Structures and Instrumentation	1
	-AND-	
AE 417	Aerospace Structures and Instrumentation Laboratory	1
<b>Total Credits</b>		<b>31</b>

## TOTAL DEGREE CREDITS

**129**

### Technical Electives:

- AE: All AE courses with the exception of 399<sup>††</sup>
- CEAE: With prior approval of the Aerospace Engineering Department.
- CS: 325, 335, 344, 350, 420
- EGR: Upper level
- EP: 320, 394, 410, 420, 455
- ES: 306, 315, 395, 399<sup>††</sup>, 403, 412, 495, 499<sup>††</sup>
- 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

†† 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.

## Academic Programs at the Prescott Campus

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### 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/PSY/RS course under 300 level.

*UPPER-LEVEL:*

Any SS/PSY/RS course equal or above 300 level.

#### Economics

*LOWER-LEVEL:*

Any EC course under 300 level.

Prior approval by the Aerospace Engineering Department chair is required for any substitutions for general education electives.

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# *Computer Engineering*

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Bachelor of Science

The Bachelor of Science 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 cog-

## Academic Programs at the Prescott Campus

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nizant 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 full-time enrollment. Successful completion of a minimum of 127 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. The B.S. degree requires that students have a minimum cumulative grade point average of 2.00 in all CEC, EE, SE, CS, and EGR courses that fulfill any degree requirement. The Computer Engineering degree includes a space option in which EP 394, AE 427, and AE 445 substitute for a technical elective, CEC 420, and CEC 421.

### Suggested Program of Study

#### FRESHMAN YEAR

Course	Title	Credits
	Lower-Level Humanities -OR- Social Sciences* . . . . .	3
CEC 220	Digital Circuit Design . . . . .	3
CEC 222	Digital Circuit Laboratory . . . . .	1
COM219	Speech . . . . .	3
COM122	English Composition and Literature . . . . .	3
EGR 101	Introduction to Engineering . . . . .	2
EGR 115	Introduction to Computing for Engineers . . . . .	3
HU 14X	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
UNIV 101	College Success* . . . . .	(1)+
<b>Total Credits</b>		<b>32</b>

\* Meets open elective or credit in excess of degree requirements.

#### SOPHOMORE YEAR

Course	Title	Credits
CEC 320	Microprocessor Systems . . . . .	3
CEC 322	Microprocessor Systems Laboratory . . . . .	1
COM221	Technical Report Writing . . . . .	3
CS 125	Computer Science I . . . . .	4
CS 222	Introduction to Discrete Structures . . . . .	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 160	Physics II for Engineers . . . . .	3

# Academic Programs at the Prescott Campus

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PS	250 Physics III for Engineers	3
PS	220 Physics III Laboratory for Engineers	1
<b>Total Credits</b>		<b>33</b>

## JUNIOR YEAR

Course	Title	Credits
	Lower-Level Humanities - OR- Social Sciences	3
CEC	460 Telecommunications Systems	3
CS	420 Operating Systems	3
EC	2XX Economics	3
EE	302 Electronic Devices and Circuits	3
EE	309 Signals and Linear Systems Analysis	4
MA	412 Probability and Statistics	3
SE	300 Software Engineering Practices	3
	Open Elective	3
	Technical Elective**	3
<b>Total Credits</b>		<b>31</b>

## SENIOR YEAR

Course	Title	Credits
	Upper-Level Humanities -OR- Social Sciences*	3
CEC	420 Computer Systems Design	3
CEC	421 Computer Systems Design II	3
CEC	450 Real Time Systems	3
CEC	470 Computer Architecture	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**	6
<b>Total Credits</b>		<b>31</b>

<b>TOTAL DEGREE CREDITS</b>	<b>127</b>
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\* 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 101.

### UPPER-LEVEL:

Any SS or EC course equal to or above 300 level, or PSY 350.

SIS 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 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.

# Academic Programs at the Prescott Campus

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## 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.
5. 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. 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 B.S. degree requires a minimum cumulative grade point average of 2.00 in all EE, ES, CEC, EGR, and CS courses that fulfill any degree requirement. The Electrical

Engineering degree includes a space option in which EP 394, AE 427, and AE 445 substitute for the ES elective, EE 420, and EE 421.

## Suggested Program of Study

### FRESHMAN YEAR

Course Title	Credits
CEC 220 Digital Circuit Design .....	3
CEC 222 Digital Circuit Laboratory .....	1
COM122 English Composition and Literature .....	3
COM219 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
PS 150 Physics I for Engineers .....	3
UNIV 101 College Success* .....	(1)+
<b>Total Credits</b>	<b>32</b>

\* In excess of degree requirements.

### SOPHOMORE YEAR

Course Title	Credits
CEC 320 Microprocessor Systems .....	3
CEC 322 Microprocessor Systems Laboratory ....	1
COM221 Technical Report Writing .....	3
CS 125 Computer Science I .....	4
EE 223 Linear Circuit Analysis .....	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 250 Physics III for Engineers .....	3
PS 220 Physics Laboratory for Engineers .....	1
<b>Total Credits</b>	<b>30</b>

### JUNIOR YEAR

Course Title	Credits
EE 302 Electronic Devices and Circuits .....	3
EE 304 Electronic Circuits Laboratory .....	1
EE 309 Signals and Linear Systems Analysis ....	4
EE 340 Electric and Magnetic Fields .....	3
EE 406 Digital Signal Processing .....	3
EE 407 Digital Signal Processing Laboratory ....	1
ES 207 Fundamentals of Mechanics .....	3

## Academic Programs at the Prescott Campus

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ES	312	Energy Transfer Fundamentals.....	3
ES		Core Selection .....	3
MA		Math Elective (above 300-level) .....	3
MA	441	Advanced Engineering Mathematics I ...	3
		Specified Elective++ .....	3

**Total Credits** 33

### SENIOR YEAR

Course	Title	Credits
EC	2XX Economics .....	3
EE	Advanced Elective** .....	6/7
EE	401 Control Systems Analysis and Design. ...	3
EE	402 Control Systems Laboratory .....	1
EE	410 Communication Systems .....	3
EE	412 Communication Systems Laboratory ...	1
EE	420 Avionics Preliminary Design .....	3
EE	421 Avionics Detail Design .....	3
HU	330 Values and Ethics .....	3
	Technical Elective ** .....	3
	Specified Elective++ .....	3

**Total Credits** 32/33

**TOTAL DEGREE 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 101.

#### UPPER-LEVEL:

Any SS or EC course equal to or above 300 level, PSY 350.

SIS and RS courses may be substituted for Humanities and Social Sciences courses at the appropriate level.

\*\* Advanced/technical 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, EGR 200, 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.

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### *Mechanical Engineering*

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#### Bachelor of Science

Mechanical Engineering became a degree offering in Fall 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 the 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 or 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 turbomachinery. 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
- 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:

## Academic Programs at the Prescott Campus

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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 turbomachinery.
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	Title	Credits
CEC 220	Digital Circuit Design . . . . .	3
CEC 222	Digital Circuit Laboratory . . . . .	1
COM122	English Composition and Literature . . . . .	3
COM219	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
PS 150	Physics I for Engineers . . . . .	3
UNIV 101	College Success* . . . . .	(1)+
<b>Total Credits</b>		<b>32</b>

\* In excess of degree requirements.

#### SOPHOMORE YEAR

Course	Title	Credits
COM221	Technical Report Writing . . . . .	3
EGR 200	Computer-Aided Conceptual Design of Aerospace Vehicles . . . . .	3
ES 201	Statics . . . . .	3
ES 202	Solid Mechanics . . . . .	3
ES 204	Dynamics . . . . .	3
ES 206	Fluid Mechanics . . . . .	3
MA 243	Calculus and Analytical Geometry III . . . . .	4

# Academic Programs at the Prescott Campus

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MA	345	Differential Equations & Matrix Methods.....	4
PS	160	Physics II .....	3
PS	220	Physics III Laboratory .....	1
PS	250	Physics III for Engineers .....	3

**Total Credits** 33

## JUNIOR YEAR

Course	Title		Credits
AE	408	Turbines and Rocket Engines .....	3
AE	430	Control System Analysis and Design .....	3
ME	430L	Control System Laboratory .....	1
ME	304	Introduction to Machine Design.....	3
ME	305	Machine Design Laboratory .....	1
ES	305	Thermodynamics .....	3
ES	320	Engineering Material Science .....	2
ES	321	Engineering Material Science Laboratory .....	1
EE	335	Electrical Engineering I .....	2
EE	336	Electrical Engineering I Laboratory.....	1
HU/SS		Lower-Level Elective .....	3
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 Credits** 33

## SENIOR YEAR

Course	Title		Credits
EE	Course**	for students taking EE Capstone.....	3
EC	225	Engineering Economics.....	3
ES	403	Heat Transfer.....	3
HU	330	Values and Ethics .....	3
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

### 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 Spacecraft capstone sequence are required to take:

Course	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:

Course	Title		Credits
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:

Course	Title		Credits
EE	420	Preliminary Design I .....	3
EE	421	Senior Capstone Project.....	3

\*\*In addition, students choosing the Robotics sequence will take one additional CEC or EE 2 or 3 credit course as determined by the student 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/PSY/RS: Lower-Level

Prior approval by the Mechanical Engineering program coordinator is required for any substitutions for general education electives. Language courses, other than the student's native language, substitute for Humanities.

# MINOR COURSES OF STUDY

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Minor courses of study are academic programs designed to satisfy a student's 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. 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. A minor must be in a discipline outside the student's major field of study. Designed to include a minimum number of required courses, minors provide students, whenever possible, with flexibility in fulfilling program requirements.

- A minor consists of 15-24 semester hours of related courses, of which at least six hours must be completed in residence at Embry-Riddle. It includes six hours of upper-division hours; at least three of these must be completed in residence.
- Students should declare their minors as soon as possible, before the beginning of the senior year, by completing an Official Declaration form approved and signed by their academic advisor.

- Minor requirements are subject to the catalog in effect at the time it is officially declared.
- Students must earn a minimum GPA of 2.00 based on all courses in the minor.
- Courses cannot be shared between minors and no more than two substitutions are permitted in any one minor or in any combination of multiple minors. Substitutions must be approved by the department offering the minor.

In addition to specific minors described in this catalog, students may earn an interdisciplinary minor by completing the required courses approved by the department chair and the dean of the college offering the minor. Please see your academic advisor or the Records Office for more information. An interdisciplinary minor must have at least six credits hours in the discipline from courses that are not specifically required in the student's degree program. No substitutions are allowed in the interdisciplinary minor. A new form must be submitted with the appropriate signatures to make changes.

## The following minors are offered at the Prescott Campus.

- Aeronautical Studies
- Air Traffic Control
- Applied Meteorology
- Arabic and Middle Eastern Studies
- Asian Studies
- Aviation Safety
- Business Administration
- Computer Applications
- Computer Security
- Computer Science
- Electrical Engineering
- Environmental Studies
- Flight
- Helicopter Flight
- Helicopter Operations & Safety
- Humanities
- Mandarin Chinese
- Mathematics
- Psychology
- Security Studies
- Space Studies
- Technical Intelligence

### Minor in Aeronautical Studies

This minor gives students in non-Aeronautical Science and non-Aeronautics programs an increased exposure to advanced aviation knowledge by taking a sequence of 18 hours of mostly upper-level Aeronautical Science courses. 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 . . . . .	3
AS 402	Airline Operations . . . . .	3
AS 405	Aviation Law . . . . .	3
AS 408	Flight Safety . . . . .	3
AS 410	Airline Dispatch Operations . . . . .	3
AS 411	Jet Transport Systems . . . . .	3
AS 420	Flight Technique Analysis . . . . .	3
<b>Total Credits Required</b>		<b>18</b>

### 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 pre-requisites, listed below, and the four ATC courses.

Course	Title	Credits
AT 200	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	Survey of Meteorology . . . . .	3

One of the following is required:

AS 119	Private Pilot Operations . . . . .	4
-OR-		
AS 120	Principles of Aeronautical Science . . . . .	3
	FAA Private Pilot Certificate . . . . .	1

**Total Credits Required** **17-20**

\* 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, 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.

Course	Title	Credits
WX 201	Survey of Meteorology . . . . .	3
WX 301	Aviation Weather . . . . .	3

Recommended Electives for flight students:

WX 261	Applied Climatology . . . . .	3
WX 363	Thunderstorms . . . . .	3
WX 364	Weather for Aircrews . . . . .	3
WX 365	Satellite and Radar Weather Interpretation . . . . .	3
	Or any combination of WX courses . . . . .	9

**Total Credits Required** **15**

Note: Non-aviation students may take WX 252 in lieu of WX 201 and WX 301 plus another 12 hours of Weather (WX) courses. Six hours of upper-level courses are required for a minor.

### Minor in Arabic and Middle Eastern Studies

The Arabic and Middle Eastern Studies Minor



## Minor Courses of Study

introduces the student to the cultures and histories of Arab countries and languages. A student can earn this minor by successfully completing at least 18 related credit hours, with six upper-level credits in Middle Eastern Studies in residence at Embry-Riddle. These credits can be chosen from the following options.

**Option I:** Courses may be chosen from the list of Arabic language and Middle Eastern Studies.

**Option II:** May apply transfer credits in Arabic language and area studies for a minor in Arabic and Middle Eastern Studies with departmental approval. Six credits must be taken at Embry-Riddle.

Course Title	Credits
LAR 101 Arabic I . . . . .	3
LAR 102 Arabic II . . . . .	3
LAR 201 Arabic III . . . . .	3
LAR 202 Arabic IV . . . . .	3
RS 306 Studies in Middle Eastern History & Cultures . . . . .	3
RS 307 Islam and Arabic Culture . . . . .	3
-OR-	
RS 399 Directed Studies . . . . .	3
<b>Total Credits Required</b>	<b>18</b>

### 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 U.S. 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.

Course Title	Credits
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LCH 101 Mandarin Chinese I . . . . .	3
LCH 102 Mandarin Chinese II . . . . .	3
LCH 199 Special Topics in Lower-Level Chinese Language . . . . .	3
-OR-	
LCH 201 Mandarin Chinese III . . . . .	3
LCH 202 Mandarin Chinese IV . . . . .	3

Upper Level Courses:

RS 300 Observing Asian Cultures . . . . .	3
RS 305 Asian Literature . . . . .	3

**Total Credits Required** **15**

### 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.

Course Title	Credits
SF 210* Introduction to Aerospace Safety . . . . .	3
-OR-	
SF 201 Introduction to Health, Occupational, and Transportation Safety . . . . .	3
SF 320 Human Factors in Aviation Safety . . . . .	3

AND any three of the following:

Course Title	Credits
SF 330 Aircraft Accident Investigation . . . . .	3
SF 335 Mechanical and Structural Factors in Aviation Safety . . . . .	3
SF 341 Safety and Security of Airport Ground Operations . . . . .	3
SF 345 Safety Program Management . . . . .	3
SF 350 Aircraft Crash and Emergency Management . . . . .	3
SF 375 Propulsion Plant Investigation . . . . .	3
SF 435 Aircraft Crash Survival Analysis and Design . . . . .	3
SF 445 System Safety in Aviation . . . . .	3
SF 399/499 Special Topics in Aviation Safety . . . . .	3

**Total Credits Required** **15**

NOTE: Students in the Aeronautical Science degree program pursuing the Safety minor who complete SF 210/320 and one other upper-level SF course will not be required to take AS 408. Students taking AS 408 are not required to take SF 210. Students selecting this option must still meet the minimum number of hours required for degree completion in their declared area of concentration.

### Minor in Business Administration

Students may earn a minor in Business

## Minor Courses of Study

Administration by successfully completing the following. This minor is not open to students pursuing the Aviation Business Administration degree.

Course	Title	Credits
BA 201	Principles of Management.....	3
EC 210	Microeconomics	3
	-OR-	
EC 211	Macroeconomics .....	3
BA 210	Financial Accounting .....	3
BA 311	Marketing.....	3
	Specified Electives .....	6
<b>Total Credits Required</b>		<b>18</b>

### Specified Electives\*

BA 308	Public Administration .....	3
BA 319	Managerial and Organizational Behavior	3
BA 320	Business Information Systems .....	3
BA 324	Aviation Labor Relations.....	3
BA 332	Corporate Finance I .....	3
BA 333	Personal Financial Planning .....	3
BA 335	International Business .....	3
BA 342	International Finance .....	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
BA 418	Airport Administration and Finance.....	3
BA 421	Small Business Management .....	3
EC 225	Engineering Economics .....	3
EC 312	Money and Banking.....	3
<b>Total Credits Required</b>		<b>18</b>

\*Other substitutions for Specified Electives may be approved by the Business Department Chair.

## Minor in Computer Applications

The minor in Computer Applications is designed to provide utilitarian knowledge in a variety of common PC computer applications, including word processing, graphic presentations, database, programming, and web page design.

Course	Title	Credits
CS 117	Computer Configurations.....	3
CS 118	Fundamentals of Computer Programming*.....	3
IT 210	Web Page Authoring and Design	3
	-OR-	
BA 221	Advanced Computer Based Systems.....	3

BA 320	Business Information Systems**.....	3
CS 308	Practicum (Capstone Project Course) .....	3

\* Or equivalent programming course approved by the Chair of the Mathematics and Computer Science Department.

\*\* Or upper-level course approved by the Chair of the Mathematics and Computer Science Department.

<b>Total Credits Required</b>	<b>15</b>
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## Minor in Computer Science

Students may earn a minor in Computer Science by successfully completing the following:

Course	Title	Credits
CS 125	Computer Science I.....	4
CS 225	Computer Science II .....	4
SE 300	Software Engineering Practices .....	3
XX 300-400*	CS/SE/CEC Electives .....	6
<b>Total Credits Required</b>		<b>17</b>

\* 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 Mathematics and Computer Science Department.

## 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.

Course	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
<b>Total Credits Required</b>		<b>19</b>

## Minor Courses of Study

### Minor in Electrical Engineering

This minor will provide knowledge of analog or digital electronics and its application to the fields of aerospace and mechanical engineering. Not open to Electrical Engineering students.

Course Title	Credits
EE 223 Linear Circuit Analysis I . . . . .	3
EE 224 Electrical Engineering Laboratory I . . . . .	1
EE 309 Signal and Linear System Analysis . . . . .	4

Select either the Digital or Analog option:

#### Digital Option

Course Title	Credits
CS 125 Computer Science I . . . . .	4
CEC 320 Microprocessor Systems . . . . .	3
CEC 322 Microprocessor Systems Laboratory . . . . .	1

#### Analog Option

Course Title	Credits
EE 302 Electronic Devices and Circuits . . . . .	3
EE 304 Electronic Circuits Laboratory . . . . .	1
EE 4XX Elective and Laboratory . . . . .	4

**Total Credits Required** **16**

### 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 Aviation Environmental Science students.

Course Title	Credits
PS 107 Elements of Biological Science . . . . .	3
PS 101 Basic Chemistry	
-OR-	
PS 105 General Chemistry I	
-OR-	
PS 108 Contemporary Chemistry	
-OR-	
PS 140 Chemistry for Engineers . . . . .	3/4
PS 142 Introduction to Environmental Science . . . . .	3

PS 304 Environmental Science	
-OR-	
PS 309 Principles of Ecology . . . . .	3
SS 360 Environmental Law	
-OR-	
COM350 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 multi-engine 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.

Course Title	Credits
AS 119 Private Pilot Operations . . . . .	4
AS 221 Instrument Pilot Operations . . . . .	3
AS 321 Commercial Pilot Operations . . . . .	3
Upper-Level AS Course . . . . .	3
-AND-	

#### SINGLE ENGINE FLIGHT TRACK\*

FA 119 Private Single Flight . . . . .	1
FA 221 Instrument Single Flight . . . . .	1
FA 321 Commercial Single Flight . . . . .	1
FA 323 Commercial Multi Add On . . . . .	1
-OR-	

#### MULTI ENGINE FLIGHT TRACK\*

FA 119 Private Single Flight . . . . .	1
FA 122 Private Multi Flight with Laboratory . . . . .	1
FA 222 Instrument Multi Flight . . . . .	1
FA 322 Commercial Multi Flight . . . . .	1

**Total Credits Required** **17**

\*See the Advanced 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 Helicopter Flight

This minor incorporates courses required to obtain the FAA private and commercial pilot certificates and either the helicopter instrument rating or the 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.

Course Title	Credits
AS 142 Private Helicopter Operations . . . . .	3
AS 252 Instrument Helicopter Operations . . . . .	3
AS 372 Commercial Helicopter Operations . . . . .	3
AS 442 Flight Instructor Helicopter Operations -OR-	
Any upper-level (300/400) AS, SF, or WX course . . . . .	3
Advanced standing for:	
Helicopter Private Pilot Certificate . . . . .	1
Helicopter Commercial Pilot Certificate . . . . .	1
Helicopter Instrument Rating . . . . .	1
-OR-	
Helicopter Flight Instructor Certificate . . . . .	1
<b>Total Credits Required</b>	<b>15</b>

### 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:

Course 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
<b>Total Credits Required</b>	<b>18</b>

### Minor in Humanities

Students may earn a minor in Humanities by successfully completing 18 hours. Within those 18 hours, students must select two courses from the HU 140-146 series for a subtotal of six credits.

Additionally, students must complete one or more courses selected from each of the lists below for a subtotal of 12 credits.

#### NARRATIVE

Course Title	Credits
HU 300 World Literature . . . . .	3
HU 305 Modern Literature . . . . .	3
HU 310 American Literature . . . . .	3
HU 325 Exploring Film . . . . .	3

#### SPECULATIVE

Course Title	Credits
HU 330 Values and Ethics . . . . .	3
HU 335 Technology and Modern Civilization . . . . .	3
HU 341 World Philosophy . . . . .	3

#### RELIGION AND FINE ARTS

Course Title	Credits
HU 320 Aesthetics of Visual and Musical Arts . . . . .	3
HU 345 Comparative Religions . . . . .	3
HU 355 Creative Writing . . . . .	3
<b>Total Credits Required</b>	<b>18</b>

HU 399/HU 499, Special Topics in Humanities, may be included with advance permission of the department chair.

## Minor Courses of Study

### Minor in Mandarin Chinese

The Mandarin Chinese Language minor prepares students for intermediate proficiency in the languages defined by the American Council of Teachers of Foreign Languages and the Interagency Language Roundtable. Any student can earn this minor by successfully completing 15 credit hours, with at least 3 lower-level and 3 upper-level credits earned at Embry-Riddle. These 15 credits can be earned from the following options:

*Option 1: Take courses from the following list, provided that a student is not using the same course for the Asian Studies Minor.*

*Option 2: Pass Embry-Riddle course equivalency tests for up to 9 credits (provided that a student is not using the course equivalency test for credits in the Asian Studies Minor), and earn 6 credits at the upper level from the following list.*

Course Title	Credits
LCH 201 Mandarin Chinese III . . . . .	3
LCH 202 Mandarin Chinese IV . . . . .	3
LCH 301 Intermediate Chinese I . . . . .	3
LCH 302 Intermediate Chinese II . . . . .	3
LCH 401 Modern Chinese Films -OR-	
LCH 399 Special Topics in Chinese Language . . . . .	3
<b>Total Credits Required</b>	<b>15</b>

### 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
<b>Total Credits Required</b>	<b>21</b>

### 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

Course Title	Credits
PSY 101 Introduction to Psychology . . . . .	3
PSY 350 Social Psychology . . . . .	3
-AND-	
HF 201 Introduction to Human Factors -OR-	
HF 210 Human Factors I: Principles and Fundamentals . . . . .	3

Two of the following courses are also required:

Course Title	Credits
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
<b>Total Credits Required</b>	<b>15</b>

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 Security Studies

This course sequence has the goal of enhancing students' knowledge and employability by giving them 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.

## Minor Courses of Study

Course Title	Credits
SS 327 International Relations . . . . .	3
SIS 317 Political Change, Revolution, and War . . . 3	3
SS 340 U.S. Foreign Policy . . . . .	3

Two courses selected from the following list:

Course Title	Credits
SIS 312 Global Crime and International Justice System . . . . .	3
SIS 315 Studies in Global Intelligence I. . . . .	3
SIS 400 International Security and Globalization . 3	3

**Total Credits Required** 15

### Minor In Space Studies

The minor in Space Studies provides an introduction to most aspects of space exploration. It is intended to enhance the student's knowledge and employability by providing those basics of space exploration that will be important for understanding the role and impact of space exploration on society and the workplace. While a familiarity with algebra, geometry, trigonometry, and non-calculus-based physics is assumed, the necessary mathematical and science skills will be reviewed prior to their use. This minor is open to all majors. Students earn a minor in Space Studies by completing 15 credits from the following list of courses.

Course Title	Credits
SP 110 Introduction to Space Flight . . . . .	3
PS 301 Astronomy . . . . .	3
SP 302 STS and ISS Operations . . . . .	3
SP 400 Introduction to Space Navigation . . . . .	3
SP 425 Selected Topics in Space Studies. . . . .	3

**TOTAL CREDITS REQUIRED** 15

### Minor in Technical Intelligence

This minor is primarily aimed at students in the Space Physics and Engineering programs with an interest in intelligence applications. The minor is also accessible to motivated students in the Global Security and Intelligence Studies program. This course of study emphasizes the global aspects of technical intelligence gathering and reviews the technologies involved. The minor will prepare students to work in intelligence-gathering fields and research.

#### Required Courses:

Course Title	Credits
PS 330 Electricity and Magnetism I . . . . .	3
PS 420 Remote Sensing -OR-	
PS 490 Senior Research Thesis, Part I. . . . .	3
SIS 315 Studies in Global Intelligence I. . . . .	3
SIS 323 Intelligence and Technology -OR-	
SIS 400 International Security and Globalization . . . . .	3

Students must choose three of the following:

Course Title	Credits
PS 221 Intermediate Physics Laboratory . . . . .	2
PS 331 Electricity and Magnetism II. . . . .	3
SIS 400 International Security and Globalization . 3	3
SIS 405 Environment and Security. . . . .	3
SS 325 International Relations. . . . .	3

**Total Credits Required** 20/21

# SPECIAL OPPORTUNITIES

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## English Language Program - ELS Language Centers

In order to help students fulfill the English proficiency requirement, Embry-Riddle in Prescott works as a cooperating school with ELS Language Centers, one of the premier providers of English language learning in the United States. If you meet all other admission criteria beside the TOEFL requirement, ERAU-Prescott can conditionally admit you while you study English with ELS Language Centers. Upon completion of Level 112 with ELS Language Centers, you can be fully admitted to begin your studies at ERAU-Prescott.

Please visit the ELS Language Centers website at [www.els.edu](http://www.els.edu) for more information.

For direct information about ERAU – Prescott’s cooperating University arrangement with ELS Language Centers, and for a listing of the ELS Language Centers location nearest to our campus, please visit the following link: <http://www.collegedirectory.els.edu/scr/SchoolInfo.asp?sid=1158&mjrgrp=-&majors=->. For more information, contact International Admissions at the Prescott Campus at (928) 777-6600.

## 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 think-

ing. 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; at least 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.

## International Programs

Embry-Riddle offers its students a wealth of opportunities to study abroad in more than 50 destinations spanning five continents worldwide. Summer Study Abroad programs, consisting of 6 credit hours taught over a five-week summer session, offer stu-

dents the chance to learn language skills and the culture and history of the country they are studying in through Embry-Riddle classes taught at cooperating institutions overseas. A variety of semester-long and year-long exchange programs are also available, including the opportunity to complete a dual degree (bachelor's and master's) with a European university.

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 Prescott, Daytona Beach, 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 ability – from beginners to native speakers – are encouraged to take part. In fact, all Embry-Riddle summer Study Abroad programs are designed to accommodate students who have no prior foreign language experience. Embry-Riddle is affiliated with many universities offering specialized semester-long and year-long programs that are taught in English or other languages; appropriate language fluency will be required in non-English speaking programs. Qualified exchange program participants could also have the opportunity to be placed in paid internships with companies or research labs abroad. Students who qualify for financial aid are eligible to receive funding when enrolled in one of our international programs; there may also be 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 Corps 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 Corps programs are available at all University campuses or locations. Students should contact the Admissions Office to determine program availability.



## Special Opportunities

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### 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, national security affairs, and preparation for active duty.

### 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. Check with your local Air Force ROTC detachment for more information and the availability of this program.

### 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 \$300-\$500 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 of \$900, and a tax-free subsistence allowance of \$300-\$500 per month (see Financial Information). In addition to the Air Force's scholarship aid, Embry-Riddle also offers financial assurances to new high school Air Force ROTC scholarship winners. Scholarship winners should contact the Financial Aid Office for more information regarding financial incentives funded by the University. University funding includes any University scholar-

ships, need-based grants, and awards. University funding, in combination with funding from Air Force ROTC, cannot exceed the cost of education. This University assurance is offered at the discretion of the University financial aid department, not Air Force ROTC. 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
- Must commission prior to age 30 (up to 35 with waiver)
- Meet military and physical standards
- Pass the Air Force Officer Qualifying Test
- Have a minimum cumulative GPA of 2.50

For more information, contact:

Air Force ROTC Detachment 028  
Embry-Riddle Aeronautical University  
3700 Willow Creek Road  
Prescott, AZ 86301-3720  
(928) 777-3868  
1-800-888-3728 x3868  
<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 contract-eligible 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.

## Special Opportunities

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### 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 college-level 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 five-week 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 \$600 book allowance per semester
- Additional financial incentives sponsored by the University may be available to Tuition Scholarship winners. Contact the Financial Aid Office for more information about other opportunities.

### 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

### Admission 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. Four-year 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:

Embry-Riddle Army ROTC  
Bldg. 17  
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.

## Special Opportunities

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### 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 entry-level 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.

# UNDERGRADUATE COURSE DESCRIPTIONS

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Embry-Riddle Aeronautical University course offerings at the Prescott campus are listed in alphabetical order, according to the course designations below.

<b>AE</b>	Aerospace Engineering	<b>EC</b>	Economics	<b>MSL</b>	Military Science and Leadership
<b>AES</b>	Aviation Environmental Science	<b>EE</b>	Electrical Engineering	<b>PS</b>	Physical Science
<b>AF</b>	Air Force Aerospace Studies	<b>EGR</b>	Engineering	<b>PSY</b>	Psychology
<b>AS</b>	Aeronautical Science	<b>EP</b>	Engineering Physics	<b>RS</b>	Regional Studies
<b>AT</b>	Air Traffic Control	<b>ES</b>	Engineering Science	<b>SE</b>	Software Engineering
<b>BA</b>	Business Administration	<b>FA</b>	Flight-Academic	<b>SF</b>	Safety Science
<b>CE</b>	Cooperative Education	<b>HON</b>	Honors	<b>SIS</b>	Global Security and Intelligence Studies
<b>CEA</b>	Cooperative Education in Aeronautics	<b>HU</b>	Humanities	<b>SP</b>	Space Studies
<b>CEC</b>	Computer Engineering	<b>IS</b>	Interdisciplinary Studies	<b>SS</b>	Social Sciences
<b>COM</b>	Communication	<b>IT</b>	Information Technology	<b>UNIV</b>	College Success
<b>CS</b>	Computer Science	<b>L</b>	Languages	<b>WX</b>	Applied Meteorology
		<b>MA</b>	Mathematics		
		<b>ME</b>	Mechanical Engineering		

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.

# Course Descriptions

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## 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. Two-dimensional 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 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.

*Prerequisites:* AE 301, ES 305.

### 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 posi-

tion 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, 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 302.

### 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 302.

### 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.

*Prerequisites:* ES 204, 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.

*Prerequisites:* MA 345, ES 204.

*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



## Course Descriptions

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be discussed. Performance enhancements of nuclear rockets and electric propulsion will be covered.

*Prerequisites:* AE 301, PS 105, 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 used. The Structures and Instrumentation Laboratory, AE 417, must be taken during the same semester as AE 416.

*Prerequisites:* COM 221, EE 335, and either AE 304 or ME 304.

### 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, EE 335, and either AE 304 or ME 304.

### 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 pro-

file drawing, weight and balance, general arrangement drawing, aerodynamic drag analysis, and complete performance report.

*Prerequisites:* EGR 200, AE 314, AE 413, or consent of instructor.

### 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, or consent of the instructor.

### 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 three-axis stabilized spacecraft. Effects of gravity gradient, solar radiation pressure, atmospheric drag, and magnetic torque on spacecraft attitude.

*Prerequisite:* AE 313.

### 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 draw-

ings; weight and various subsystem budgets; and a series of trade studies, reviews, and design reports.

**Prerequisites:** EGR 200, 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 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 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:** EGR 200, 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.

**Prerequisite:** AE 304, AE 426, AE 427, or consent of instructor.

**Corequisite:** AE 430.

## AE 299 - 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.

## Aviation Environmental Science

## AES 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.

## AES 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.

## AES 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

## Course Descriptions

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that govern how nature works and the application of these concepts and principles to possible solutions to environmental and resource problems.

### AES 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.

### AES 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.

*Prerequisite:* AES 142 or permission of the instructor.

### AES 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.

### AES 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.

*Prerequisite:* AES 142 or permission of instructor.

### AES 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.

*Prerequisite:* AES 142 or permission of instructor.

### AES 310

#### 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.

*Prerequisite:* AES 142 or permission of the instructor.

### AES 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.

*Prerequisite:* AES 142 or permission of the instructor.

### AES 312

#### Plant Identification (2,3)

3 Credits

This course is designed to provide practical experience in the 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.

### AES 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.

### 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 402

#### Environmental Quality Laboratory (0,3)

1 Credit

A laboratory course using field techniques and equipment commonly found in the environmental workplace. Projects and demonstrations will use local flight-line and airport municipalities as examples.

*Prerequisites:* PS 306 and/or AES 310.

### AES 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.

### 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 timelines. Employees at a variety of levels are required to help manage projects, so terms and organizational contents will be covered.

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## 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. A weekly Leadership Laboratory is mandatory for Air Force ROTC pursuing 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 for Air Force ROTC pursuing cadets and complements this course by providing cadets with followership experiences.

*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. A weekly 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

## Course Descriptions

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is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

*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 302L.

### 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.

*Corequisite:* 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 402L.

### 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.

*Prerequisite:* Completion of the Professional Officer Course. These courses are graded Pass/Fail.

## Aeronautical Science

Enrollment in the following courses is restricted to students in the Aeronautical Science degree program unless approved by the Aeronautical Science Department Chair and the Director of Flight: AS 119, 121, 221, AS 252, AS 321, AS 372, AS 442.

### AS 109

#### Flight Transition Ground Course (2,0)

2 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.

### AS 119

#### Private Pilot Operations (4,0)

4 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.

### 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 122

#### Introduction into Careers in Aviation (3,0)

3 Credits

An introduction to the interdisciplinary aspects of flight and aviation fields demonstrating how the various facets of aviation are interrelated. Students are involved in an array of exercises, activities, and projects dealing with aviation and their selected course of study in Aeronautical Science. Students will be orientated to Aeronautical Science programs, the College of Aviation, the campus, the local community, and the geographic area. Students will be introduced to aviation history, weather, navigation, aerodynamics, aviation safety, air traffic management, and flight management systems. Additional instruction will be provided for the use of college resources, career planning, goal setting, developing study skills, and time management. Emphasis will be given to developing student personal, interpersonal, and social skills to be successful in college and in aviation career fields.

### 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 213

#### Resource Management – An Aviation Human Factors Perspective (1,0)

1 Credit

An introduction to the basics of crew resource management (CRM) based on established concepts of CRM with direct applications to dual instructional flight and both solo and solo cross-country flight training. Additionally, the course includes classroom team exercises allowing student demonstration and practice of basic CRM theory.

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### AS 220

#### Unmanned Aerial Vehicles and Systems (3,0)

3 Credits

This course is a survey of Unmanned Aerial Vehicles and systems, emphasizing the military and commercial history, growth, and applications of UAVs. Course will include basic acquisition, use, and operation of UAVs with an emphasis on operations.

### 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, decision-making, and crew resource management.

*Prerequisite:* AS 119.

### AS 246

#### Basic Air Navigation (3,0)

3 Credits

An introduction to navigation for Aeronautical Science students. The course content includes aircraft instruments and systems theory, aircraft performance, navigation theory and solution methods, application of electronic navigation systems, precision flight control principles, navigation information sources and planning procedures, and special problems in navigation with emphasis on flight planning.

*Prerequisite:* FAA Private Pilot written knowledge test.

### 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 U.S. 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 decision-making.

*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:* Private Pilot Certificate with Instrument Rating.

### 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 long-range 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 246, 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:* AS 120 or PPL FAA written.

### 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



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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:* PS 104 and 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, and 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, con-

duct 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:* Senior standing or approval of instructor.

### 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 on 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.

*Prerequisite:* 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.

*Prerequisite:* AS 387.

## 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 will 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.

*Prerequisites:* WX 301, AS 310, and AS 350.

*Corequisites:* AT 200 and AS 221; or Instrument Rating, or instructor approval.

## AS 411

### Jet Transport Systems (3,0)

3 Credits

This course will provide the student with detailed knowledge of complete turbojet systems. The student will: be exposed to complex air carrier aircraft systems and will conduct a detailed examination of the B-747-400. Air carrier procedures are examined from a crew member's operational perspective.

*Prerequisite:* AS 356, or permission of the instructor.

## 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 three-person 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

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transport aircraft are analyzed, including principles of flight deck resource management.

*Prerequisite:* AS 356 and AS 358.

### AS 421

#### Flight Instructor Ground Course (2,0)

2 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).

### 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.

*Prerequisite:* AS 350.

### 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 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, low-altitude 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 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, low-altitude 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 - 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.

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## Air Traffic Control

### AT 200

#### Air Traffic Management I (3,0)

3 Credits

AT 200 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 119 or AS 120.

### 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 200.

### 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.

*Prerequisite:* AT 200.

*Corequisite:* AT 315L.

## Course Descriptions

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### 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. Making “real-time” decisions, determining 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 200, 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 entry-level qualification as an air traffic control specialist.

*Prerequisites:* AT 200, 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 200, AT 305, AT 401, AT 405.

## Business Administration

### BA 102

#### Introduction to Aviation Business and Industry (3,0)

3 Credits

In this course, students gain the skills and strategies necessary for success in balancing student life and academics, while also being introduced to relevant business principles and practices associated with the aviation industry. To facilitate their development as an eventual aviation professional, students are familiarized with the common body of knowledge in aviation and learn about career planning; aircraft design, performance, operating characteristics, and maintenance; aviation safety and human factors; national and international laws/regulations; meteorology and environmental issues. Students explore current issues in the aviation industry and are introduced to airports, air cargo, ground operations, aircraft/engine manufacturers, regulatory agencies, military aviation, and general aviation.

### 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 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:* BA 201.

### BA 311

#### Marketing (3,0)

3 Credits

Marketing theory; marketing management, sales management; market research. Public and customer relations, advertising, distribution.

### 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.

*Prerequisite:* BA 210.

### BA 319

#### Managerial and Organizational Behavior (3,0)

3 Credits

This course will examine the functions to be accomplished in effectively exploring managerial and organizational behavior. A study of the interrelationship of staff managers, specialists, and line managers will assist the student in understanding and applying management theories to real-world human resource planning and execution. Areas of concentration

include human resource planning; recruitment and selection, training and development; compensation; safety and health; labor relations; and understanding individual, group, team, and social processes. Special attention is devoted to how technology has shaped the modern work environment.

*Prerequisite:* BA 201.

### 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.

*Prerequisite:* Advanced computer skills.

### 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.

### 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.

*Prerequisite:* BA 201.

### 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.

*Prerequisite:* BA 210.

## Course Descriptions

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### 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.

### 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 the 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.

### 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.

### 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.

### 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:* BA 201.

### 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.

### 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:* BA 408.

### 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.

*Prerequisite:* BA 201.

### 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.

*Prerequisite:* BA 408.

### 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.

*Prerequisite:* BA 210

### 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 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 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.



# Course Descriptions

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Aviation and aerospace related businesses are emphasized.

*Prerequisite:* BA 332.

## 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.

*Prerequisites:* Senior standing and ABA degree program.

## BA 299 - 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.

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## 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), Aviation Environmental Science (AES). 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 six credit hours will be considered full-time by all University departments other than Financial Aid. The Financial Aid Office will consider a six-hour co-op/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.

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## 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 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, CS 125.

*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 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 development during the second course (CEC 421) in the sequence.

*Prerequisites:* CEC 320, CEC 322.

*Corequisite:* EE 401.

## 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 computer-centered system with elements of both hardware and software.

*Prerequisites:* CEC 420, EE 401.

## 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 125, CEC 320, CEC 322.

*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, CEC 322.

## 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 architectures and computer systems will be covered.

*Prerequisites:* CEC 320, CEC 322.

## CEC 299 - 499

### Special Topics in Computer Engineering

1-6 Credits

Directed studies of selected topics in computer engineering.

*Prerequisite:* Consent of instructor and department chair.

# Course Descriptions

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## Communication

### 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 multi-paragraph 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 223

#### Intelligence Writing (3,0)

3 Credits

The purpose of this course is to teach the basic skills of intelligence writing. The most essential principle of intelligence writing is to communicate to the reader exactly the message the analyst wants to communicate. Clarity, precision, accuracy, and brevity are key elements of intelligence writing, but also crucial is the overall structure of the intelligence brief. Two further elements are part of the intelligence writing process: a capacity to accurately evaluate information and an ability to make analytical judgments about the significance of a development. All these elements will be covered intensively as part of the intelligence writing process.

*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 230

#### Digital Photography (3,0)

3 Credits

This course introduces fundamental photographic skills through digital technologies. Emphasis is placed on the tools, techniques, and aesthetics of

a range of photographic applications pertaining to graphic design and interactive media.

*Prerequisite:* Sophomore standing or permission of the program coordinator.

## 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 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.

## Course Descriptions

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### 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, and either COM 221, COM 222, or COM 223.

### 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 informa-

tion 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.

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## Computer Science

### 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:* 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 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.

## 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; segmen-

# Course Descriptions

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tation, 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 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.

*Prerequisites:* 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:* CS 420 or consent of the instructor. Junior status or consent of the instructor.

## 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 - 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.

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## Economics

## 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.



## Course Descriptions

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### 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 312

#### Money and Banking (3,0)

3 Credits

A preliminary investigation of the financial institutions of the U.S. and the relationship of monetary policy to income and price stabilization. Some analysis of international capital flows will also be undertaken.

*Prerequisite:* EC 210.

### 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.

*Prerequisite:* EC 210.

### 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.

*Prerequisite:* EC 210.

### EC 299 - 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 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 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:* EE 224, 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.

### 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.

*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.

## 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 309

### Signal and Linear System Analysis (3,1)

4 Credits

This course includes discussions of signals and systems, convolution, continuous time signals, spectra of continuous time signals, time-domain and spectral analysis of continuous time signals, Laplace transforms, discrete time signals, spectra of discrete time signals, time-domain and spectral analysis of discrete time signals, and the Z-transform.

*Prerequisite:* EE 223.

*Corequisite:* MA 441.

## 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 frequency-domain 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:* MA 345, PS 250.

## 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.

*Prerequisite:* PS 220.

## 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 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.

*Prerequisite:* EE 303 or EE 309.

*Corequisite:* EE 402.

## 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 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.

*Prerequisites:* EE 303 or EE 309, CEC 320.

*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.

# Course Descriptions

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## 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 currently in use, such as NAV, COMM, DME, ATCRBS, ILS, and others.

*Prerequisites:* EE 303 or EE 309, EE 340.

*Corequisite:* EE 412.

## 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 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.

*Prerequisites:* CEC 320, CEC 322.

*Corequisites:* EE 401, EE 410.

## 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.

*Prerequisites:* EE 401, EE 410, EE 420, or EE 428.

## 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.

*Prerequisites:* AE 430, EE 401.

*Corequisite:* EE 452.

## 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 299 - 499

### Special Topics in Electrical Engineering

1-6 Credits

Directed studies of selected topics in electrical engineering.

*Prerequisite:* Consent of instructor and department chair.

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## 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 project-based 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 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 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.

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## Engineering Physics

A grade of C or better is required in MA 241, MA 242, PS 105, and PS 150 for entry into all EP and ES courses.

### 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 199 - 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.

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## 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:* MA 242, PS 150, or PS 215.

*Corequisite:* EGR 115.

# Course Descriptions

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## 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.

*Prerequisites:* EGR 115, 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.

*Prerequisites:* EGR 115, 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 second 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.

## 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 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 electrical spacecraft subsystems and the space debris environment.

*Prerequisite:* 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.

## 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, ES 305, MA 345.

## 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 - 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)

1 Credit

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 119

### 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 119. *NOTE:* The FAA requires AS 119 to be completed at Embry-Riddle with a "C" or higher. Students who transfer credit for AS 119 will be required to complete additional ground training in FA 119 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.

# Course Descriptions

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**Prerequisite:** Private Pilot Certificate with an Airplane Single Engine Land Rating (FA 119).

**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 119).

**Corequisite:** AS 221. **NOTE:** 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:** 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 knowledge and skills 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:** 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:** 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 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 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 421

#### Flight Instructor Rating

1 Credit

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).

*Corequisite:* AS 421. *NOTE:* The FAA requires AS 421 to be completed at Embry-Riddle with a "C" or higher. Students who transfer credit for AS 421 will be required to complete additional ground training in FA 421 to meet the FAA requirement.

### FA 422

#### Airline Flight Crew Techniques and Procedures

1 Credit

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 421 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 - 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



## Course Descriptions

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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 three 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.

*Prerequisite:* HON 150.

### 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.

*Prerequisite:* HON 250.

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## Humanities

**Note:** Foreign language courses are listed under the Language discipline (L).

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### 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 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.

# Course Descriptions

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## HU 316

### Studies in Music (3,0)

3 Credits

Musical works, musical instruments, and the important developments in the technology of making the music of a specific style, a group of related styles, or a historical sequence. Social and intellectual context of the music studied. Course content varies from semester to semester and is listed in the schedule of courses.

*Prerequisite:* Any course from the HU 140 series.

## 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 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 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, beginning with a brief examination of the nature of religion and its study, as a vital aspect of human experience in history. This is followed by a survey of the eastern religions of Hinduism, Buddhism, Jainism, Taoism, Confucianism, and Shinto, and finally a survey of the monotheistic religions: Judaism, Christianity, Islam, and Sikhism.

*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 either COM 221, COM 222, or COM 223.

## 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 sub-cultural 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 usable 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 or COM 223.

## 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, 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.)

## Course Descriptions

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### 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, and either COM 221, COM 222, or COM 223.

### 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 faculty-guided 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 or COM 223.

### 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 - 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.

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## 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.

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## Interdisciplinary Studies

### IS 100

#### Interdisciplinary Studies - Issues in Facing the Future (3,0)

3 Credits

This is an introductory interdisciplinary course examining the demands and problems will confront our society, technology, science, institutions, and personal relations in the future. The course also examines the growing need for personal, institutional, and societal

responsibility, change, and paradigm shift in order to meet these demands and problems.

## IS 399

### Special Topics in Interdisciplinary Studies

1-6 Credits

Individual independent or directed studies of selected topics in interdisciplinary studies.

*Prerequisites:* Consent of instructor and approval of the program chair.

## 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.

### LAR 201

#### Arabic III (3,0)

3 Credits

A continuation of LAR 102.

*Prerequisite:* Satisfactory completion of Arabic II or consent of the instructor.

### LAR 202

#### Arabic IV (3,0)

3 Credits

A continuation of LAR 201.

*Prerequisite:* Satisfactory completion of Arabic III or consent of instructor.

### LAR 399, 499

#### Special Topics in Arabic Language

1-6 Credits

Individual independent or directed studies of selected topics in the Arabic language.

*Prerequisites:* Consent of instructor and approval of the department chair.

### LCH 101

#### Mandarin Chinese I (3,0)

3 Credits

Introduction to the Mandarin Chinese language, including the pronunciation system (pin yin), basic grammar, simplified or traditional character writing and reading, and 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 199

#### Special Topics in Lower-Level Chinese Language

1-6 Credits

Study Abroad in China or directed studies of lower-level Chinese.

*Prerequisite:* For directed studies, a student needs consent of instructor and approval of the Department Chair.

### 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.

### LCH 301

#### Intermediate Mandarin Chinese I (3,0)

3 Credits

This course empowers students with the performable ability for sustained appropriate discourse in sentence strings or paragraph chunks on a wide range of topics to be easily understood by native speakers of Mandarin. Topics may include but are not limited to biographical paragraphs, salaries and taxation, col-

## Course Descriptions

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lege curriculum for different degrees, international travel, government bureaus, and handy personal and emergency situations.

*Prerequisite:* Satisfactory completion of Mandarin Chinese IV or by course equivalency test.

### LCH 302

#### Intermediate Mandarin Chinese II (3,0)

3 Credits

Designed for students who are continuing to the second course in Intermediate Mandarin Chinese, this course provides a variety of real-life simulations such as but not limited to being a tour guide, a marriage counselor, an insurance sales person, a security firm manager, an environment consultant, and a professional in other fields.

*Prerequisite:* Satisfactory completion of Intermediate Mandarin Chinese I or by course equivalency test.

### LCH 401

#### Modern Chinese Films (3,0)

3 Credits

This course uses Chinese films for in-depth discussion and critical-thinking of issues concerning contemporary Chinese society in global transition. Students are required to discuss, analyze, and write short essays in Mandarin to bring out the films' cultural underpinnings.

*Prerequisite:* Satisfactory completion of Intermediate Mandarin Chinese II or by course equivalency test.

### LCH 399, 499

#### Special Topics in Chinese Language

1-6 Credits

Upper-level Study Abroad course or directed studies of selected topics in Chinese language.

*Prerequisite:* Consent of instructor and approval of department chair.

### 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.

*Prerequisite:* Satisfactory completion of Spanish I or consent of instructor.

### LSP 201

#### Spanish III (3,0)

3 Credits

A continuation of LSP 102.

*Prerequisite:* Satisfactory completion of Spanish II or consent of instructor.

### LSP 202

#### Spanish IV (3,0)

3 Credits

A continuation of LSP 201. Students will enhance their speaking skills, learn advanced forms of grammar, and begin reading and formal writing.

*Prerequisite:* Satisfactory completion of Spanish III or consent of instructor.

## LSP 399, 499

### Special Topics in Spanish Language

1-6 Credits

Individual independent or directed studies of selected topics in the Spanish language.

*Prerequisites:* Consent of instructor and approval of the department chair.

## Mathematics

### 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;



## Course Descriptions

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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; elements of infinite series; 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; line and surface integrals, 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 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 341

#### Introduction to Mathematical Analysis (3,0)

3 Credits

Careful treatment of the theoretical aspects of the calculus of functions of a real variable. Topics include the real number system, limits, continuity, derivatives, the Riemann integral, elementary notions of topology and metric spaces.

*Prerequisite:* MA 243.

### 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 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.

*Prerequisite:* MA 112 or MA 241.

### 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 243.

## 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.

*Corequisite:* 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, 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 Breen'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, and power series expansion.

*Prerequisite:* MA 441.

## 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 - 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.

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## Mechanical Engineering

## 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.

*Corequisite:* AE 430 or EE 401/402.

## ME 303

### Vehicle Dynamics (3,0)

3 Credits

This course covers design considerations for high-performance vehicles such as competition auto-

# Course Descriptions

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mobiles 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 hands-on 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. High-level 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 cell 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 as well as 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 devel-

oped. Software for computer-generated control laws are studied.

*Prerequisite:* ME 302.

## 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 cell 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.

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## 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 algebraic 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 nonlinearities, 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 at the 14,000+ suburban airports in the U.S. 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 spark-ignition 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.

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## 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 courtesies, 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:* MSL 101L.

### 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.

## Course Descriptions

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### 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:* MSL 102L.

### 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 201L.

### 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:* MSL 202L.

### 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:* MSL 301L.

### 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.

*Corequisite: MSL 302L.*

### 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: MSL 401L.*

### 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 U.S. 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: MSL 402L.*

### 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 experience.



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riences. 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.

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## 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, Electrical Engineering, or Space Physics.)

*Prerequisite:* MA 111 or MA 140.

*Corequisite:* MA 112 or MA 241, 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, Electrical Engineering, or Space Physics.)

*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.

### PS 105

#### 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.

*Prerequisite:* 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 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 decision-making 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 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 150

### Physics for Engineers I (3,0)

3 Credits

Vectors and scalar quantities, geometrical optics, kinematics, Newton's Laws of Motion, work, work-energy, 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 204

### General 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 208

### Physics II (3,0)

3 Credits

Fluids, temperature, heat, first and second laws of thermodynamics, wave motion, acoustics.

*Prerequisites:* MA 241, PS 215.

*Corequisite:* MA 242.

## 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.

*Prerequisites:* PS 215, PS 216, MA 241.

*Corequisite:* PS 208.

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## 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.

*Corequisite:* MA 241.

## 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:* PS 208, PS 210, MA 242.

*Corequisite:* MA 243.

## 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.

*Prerequisite:* PS 208 or PS 160.

*Corequisite:* MA 243, PS 219, or PS 250.

## PS 221

### Intermediate Physics Laboratory (0,6)

2 Credits

Two three-hour laboratory sessions per week with experiments chosen primarily from wave motion, thermodynamics, electricity, magnetism, and geometric optics.

*Prerequisites:* PS 215, PS 216.

*Corequisites:* MA 242, PS 208.

## PS 232

### Computational Methods in the Physical Sciences (3,0)

3 Credits

This course is designed to teach students the computational methods used in physics and the physical sciences. Students will learn the techniques required to solve complex problems in physics and display their graphical representations using both structured and symbolic math programming languages. Students will also learn data reduction and error analysis techniques, fitting linear and non-linear functions, minimizing chi-square, and interpreting error matrices.

*Prerequisites:* MA 241, PS 215.

*Corequisites:* MA 242, PS 208.

## 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.

## PS 290

### 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 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 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 315

### Modern Physics Laboratory (0,6)

2 Credits

Experiments in atomic and nuclear physics, including spectroscopy, nuclear particle analysis, X-ray analysis, and laser applications.

*Corequisite:* PS 303.

## PS 321

### Classical Mechanics I (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 322

### Classical Mechanics II

Advanced mechanics; celestial/orbital mechanics; dynamics of rigid bodies and systems of particles; non-inertial motion and gyroscopic motion; coupled oscillations; dynamics of continuous media and wave phenomena. Special theory of relativity. Students will write some simple computer programs.

*Prerequisites:* PS 303, PS 321.

## PS 330

### Electricity and Magnetism I (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.

*Prerequisite:* PS 303.

*Corequisite:* MA 441.

## PS 331

### Electricity and Magnetism II

An advanced undergraduate course in electromagnetism emphasizing electromagnetic radiation and culminating with the relativistic formulation of electrodynamics. Topics covered include electromagnetic waves, waveguides, scalar and vector potentials, retarded potentials, the fields of a moving charge, dipole radiation, radiation reaction, and relativistic electrodynamics.

*Prerequisites:* PS 330, MA 432, MA 441.

*Corequisite:* MA 442.

## PS 340

### Astrophysics I (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:* PS 204, PS 303, MA 345.

# Course Descriptions

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## PS 350

### Quantum Mechanics I (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:* PS 330 or instructor consent.

## PS 375

### 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.

*Prerequisites:* PS 303, PS 330.

## PS 380

### Optics Laboratory (1,3)

3 Credits

Study of geometrical and physical optics including plane waves, mirrors, lenses, emission and absorption line spectroscopy, diffraction gratings, lasers, and interferometers.

*Prerequisites:* PS 330, PS 315.

## PS 405

### Atomic and Nuclear Physics (3,0)

3 Credits

Quantum mechanics concepts; mathematical methods in quantum mechanics; the hydrogen atom; two particle systems; charge and mass distribution of the atomic nucleus; nuclear fission; nuclear structure; nuclear potentials; nuclear fusion.

*Prerequisite:* PS 350.

## PS 408

### Astrophysics II (3,0)

3 Credits

Radiative transfer in astrophysical environments; stellar atmospheres, stellar interiors, and gas-

eous nebulae. Emission and absorption processes. Interaction of radiation with matter.

*Prerequisite:* PS 340.

## PS 412

### Particle Physics and Cosmology I (3,0)

3 Credits

Study of modern particle physics and the foundations of general relativity including special relativity and Minkowski spacetime, particle collisions and conservation laws, the Standard Model of particle physics, and introduction to classical and quantum scattering theory.

*Prerequisites:* PS 350, MA 442

## PS 413

### Particle Physics and Cosmology II (3,0)

3 Credits

Study of the theory of general relativity and modern cosmology including the Einstein field equations and special solutions, Big Bang cosmology, dark matter, dark energy, and inflation.

*Prerequisite:* PS 412.

## PS 420

### Remote Sensing (3,0)

3 Credits

This course investigates the current technologies used in remote sensing. It emphasizes the scientific principles used in look-down satellite technologies, the same principles used in deep-space probes and non-invasive medical imaging. This course uses a physics-based approach to designing and developing remote sensing methodologies using the visible, infrared, and microwave spectrum. Students will learn to characterize target phenomenology from sensor system specifications to data modeling, collection, and analysis.

*Prerequisite:* MA 441.

*Corequisite:* PS 405.

## PS 422

### 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, PS 105 and ES 305 or PS 321.

### PS 430

#### 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, microcanonical ensemble, canonical ensemble.

*Prerequisite:* PS 303.

### PS 451

#### Quantum Mechanics II (3,0)

3 Credits

Multiparticle wave functions, second quantization, creation and annihilation operators, commutation relations, representations of one and two-body operators, simple applications, Wick's Theorem, and Hartree-Fock theory.

*Prerequisite:* PS 350.

### PS 490

#### Senior Research Thesis, Part I (2,3)

3 Credits

First semester capstone course required for all Space Physics students. Students will begin their senior research project in one of four areas of concentration: Astrophysics, Particle Physics & Cosmology, Remote Sensing, or Space Propulsion. Depending on the area of concentration, a student will work closely with a professor in the development of their thesis topic.

*Prerequisites:* PS 350, MA 442.

### PS 491

#### Senior Research Thesis, Part II (1,6)

3 Credits

The second semester capstone course required for all Space Physics students. Students will complete their senior research project culminating in a research paper that follows an accepted scientific publishing format.

*Prerequisite:* PS 490.

### PS 199 - 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.

*Prerequisites:* 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 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.

## 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

## Course Descriptions

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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.

### RS 306

#### Studies in Middle Eastern History and Culture (3,0)

3 Credits

This is an introductory survey to the history of the Middle East, politics, and diplomacy of the Israeli-Palestinian conflict. The students will be introduced to the challenges of politics in the Middle East and will develop their appreciation and better understanding of the historical events that led to establishment of the State of Israel, the Palestinian Authority, several wars, population displacement, terrorism, outstanding questions in the peace process, links between the Arab-Israel dispute and the Gulf/Islamic world. The course will also cover the expanding role of religion in the Middle East.

*Prerequisite:* Sophomore status or consent of the instructor.

### RS 307

#### Islam and Arabic Culture (3,0)

3 Credits

An interdisciplinary course that explores the basics of Islam and aspects of Arabic culture. The Arab-Islamic

culture has two main sources for legislation: the Holy Qur'an and the Sunna of the Prophet. There are other moral and social teachings from Pre-Islamic Arabia that have lasted and are part of the Arabic culture today such as the Bedouin code of ethics; however, the Holy Qur'an is the principal source of the Arab-Islamic culture and constitutes the framework that charts Arabic character and aspirations.

*Prerequisite:* Sophomore status or consent of the instructor.

### RS 299 - 499

#### Special Topics in Humanities

1-6 Credits

Individual independent or directed studies of selected topics in Regional Studies.

*Prerequisite:* Consent of instructor and approval of department chair.

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## Software Engineering

### SE 300

#### Software Engineering Practices (3,0)

3 Credits

This variable credit course introduces students to the fundamental principles and methodologies of large-scale 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.

*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 450

### Software Team Project I (2,3)

3 Credits

This is the first course in the sequence of a two-course 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 299 - 499

### Special Topics in Software Engineering

1-6 Credits

Individual independent or directed studies of selected topics in software engineering.

*Prerequisites:* Consent of the instructor and the department chair.

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## Safety Science

## 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 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 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 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 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 all-important followup work designed to avoid similar or related aircraft accidents.

*Prerequisite:* SF 201 or SF 210 or approval.

## 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.



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### 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 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 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 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 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 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 299 - 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 and department chair, consent of instructor, and 12 hours of SF courses.

### *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 U.S. Legal System (3,0)**

3 Credits

This course will provide a general overview of the legal system in the U.S. 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 U.S., 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 260

##### **Forensic Science Applications in Security and Intelligence (3,1)**

4 Credits

During this course students will learn the basic scientific principles and concepts underlying the use of forensic science in law enforcement, security, and intelligence. Students will become familiar with the various forensic techniques and their application in real-life situations. They will accomplish these learning objectives through a combination of academic work, practical field applications, and laboratory studies. The course material will focus on the avail-

able scientific equipment and tests employed in forensic science and their practical applications in criminal justice, civil proceedings, identification and intelligence analysis and confirmation. The students will learn the methodology employed in preserving a crime scene, collecting physical evidence, transporting and storing such evidence. The students will also review the various biological and chemical tests that could be employed to examine such evidence including their individual applicability, cost, and validity. The course will also address the legal issues arising from the use of existing and evolving forensic science techniques in legal proceedings. Throughout the course, students will discuss the professional, legal, and ethical issues surrounding forensic science applications in law enforcement, security, and intelligence applications. This course includes a laboratory limiting its enrollment to 20 students. This course may be credited toward the Physical and Life Sciences requirement or as one of the Designated Electives.

*Prerequisite:* AES 111, or equivalent basic biology course or instructor's approval.

#### 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 325, 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; intel-

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ligence 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.

*Prerequisite:* 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 325; 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 325; 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 325.

### 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 computer-based 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 330

#### World Political Thought (3,0)

3 Credits

This course will survey world political thought from the classical period to the present. The prevailing political philosophy in each major epoch of world history will be presented, with a particular focus on a key thinker. These will include Sun Tzu in classical China, Katuliya in ancient India, Plato in classical Greece, Cicero in the Roman Empire, Saint Augustine and St. Thomas Aquinas as Christian thinkers, Alfarabi in Islam, and Machiavelli in the Renaissance. Much of the course will deal with the Western political tradition: Thomas Hobbes, Hugo Grotius, Benedict Spinoza, John Locke, Montesquieu, the American Federalists, Edmund Burke, Hegel, Alexis de Tocqueville, Marx and Engels, John Dewey, and Leo Strauss. Two modern non-Western thinkers, Mohandas K. Gandhi and Mao Zedong, also will be examined. The student should become familiar with the major themes in political thought: realism, idealism, constitutional republicanism and the rule of law, liberal democracy, fascism, socialism, Marxism, and the "Third Way."

*Prerequisite:* SS 110.

### SIS 335

#### Counter-Intelligence (3,0)

3 Credits

Counterintelligence is the study of how to protect one's intelligence community from external penetration, including one's sources and methods, personnel, and assets, how to discover and evaluate successful outside penetrations, and how to penetrate hostile intelligence services. The course will cover the his-

tory of counterintelligence operations of the U.S. and provide case studies of successful operations against the U.S. and vice versa. It will look at motivations for betrayal, investigatory approaches, the legal domain, and the range of counterintelligence targets. Included in the latter will be an examination of how hostile powers increasingly attempt to acquire high technology, software, and economic information.

*Prerequisite:* SIS 315 or permission of the instructor.

### 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

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.

## Course Descriptions

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### SIS 410

#### Corporate Security Management and Operations (3,0)

3 Credits

During this course students will learn the basic security concepts and methods employed in protecting the personnel, assets, and information of domestic and international corporations. Students will become familiar with the best security practices and their application in private business. The students will review the types of corporate security organizations and the role of the key corporate security manager in a corporation's hierarchy. Another area of discussion is the expenditure of corporate resources for security and related budgetary planning. Students will gain a familiarity with physical security equipment including its application, effectiveness, and cost. Students will learn about access control and identification, security system design and application, close circuit television and surveillance, security and theft investigations, and executive protection. Protective measures against terrorism, natural disaster, and workplace violence will also be covered. During the course, students will be required to develop a security organization and budget for a fictitious corporation including designing and budgeting for a new facility to demonstrate their understanding of the course material.

*Prerequisite:* BA 201 or equivalent with instructor approval.

### 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 416

#### Introduction to Middle Eastern Comparative Law (3,0)

3 Credits

The most exciting development in American legal thinking in the last 50 years is the quest to understand and improve law by studying law in light of other disciplines and traditions. The Jewish legal and Middle Eastern tradition is studied in light of the disciplines of the humanities and in light of secular and religious legal traditions, such as American Constitutional law, Islamic law, and Canon law. The interdisciplinary and comparative study of Jewish and Middle Eastern law contributes to the understanding and development of Western principles of law and enhances the academic study of other fields of Judaism and Islam and, in turn, enriches the study of Constitutional law, other traditions, and the disciplines of the humanities.

*Prerequisites:* SIS 200, SS 320.

### SIS 418

#### Islam: Origins, History, and Role in the Modern World (3,0)

3 Credits

The course is a detailed introduction to Islam: its origins, history, and contemporary relevance in the worlds of thought, ideas, political mobilization, and military affairs. The course examines the life and teaching of the Prophet Muhammad, the Qur'an (Koran), the early history and territorial expansion of the Umayyads, the glories of the Abbasids, the major sectarian splits (Sunni, Shi'a, Ismailiyya), the Sharia and the Orthodox Tradition, Sufism, the Sultanates, the impact of Western colonialism, the modernizers and the orthodox reaction, the Iranian Revolution, and the rise of "political Islam" in the Sunni world, including the emergence of Islamism, neo-Wahabbism (Al-Qa'ida), and jihadi movements in Afghanistan, the Balkans, the Caucasus, the Philippines, and Kashmir.

*Prerequisite:* SS 110.

### 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 421

#### History and Philosophy of Law/Jurisprudence (3,0)

3 Credits

This course will examine the practice and theory of specified subject areas of law. This course is concerned with the development and critique of theories that have impacted the development of law as well as practices in specific subject areas. Hence, it is a course about general approaches to law and legal thinking. The course will examine a number of contemporary approaches actively pursued in U.S. law schools, looking at work in, feminist legal theory, legal pragmatism, critical race theory, law and literature, and some “centrist” legal theory. Other approaches may be included based on student interest. Students will be responsible for an in-class presentation on subjects to be arranged, as well as a final paper. Preparation and active participation will be expected.

*Prerequisites:* SIS 200, SS 320.

### 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 U.S., 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

#### Information Protection and Computer Security (3,0)

3 Credits

This course provides students with a familiarity with information protection programs in both the government and private sectors. The course also provides students with an overview of computer security including physical security practices and hardware and software protection. Students will learn the importance of applying proper security protection measures to classified and sensitive information to prevent its intentional or unintentional unauthorized disclosure. Students will review the U.S. government’s regulatory scheme for protection of its classified information including several case studies of unlawful information disclosure. Similarly students will review information protection practices in private organizations and their importance. Students will examine and discuss the various aspects of computer security including physical protection of hardware, software protective programs, and employee security awareness programs. The students will also learn how to detect and investigate computer crimes. Finally, students will draft an information security program for a fictitious government or private organization to demonstrate their full understanding of the course material.

*Prerequisite:* IT 109 or equivalent with instructor approval.

### SIS 430

#### Emergency Management and Contingency Planning (3,0)

3 Credits

This course provides students with a comprehensive overview of emergency management practices in both government and private organizations in the U.S. The students will become familiar with the basic concepts, principles, and terms used in the emergency management discipline that includes preparedness, mitigation, response and recovery operations. Students will focus on the planning and leadership roles during natural and man-made disasters and interaction between government and private organizations during such incidents. During the course, the students will discuss the individual roles of the federal, state, and local governments and the private sector in such emergencies. The students will become familiar with the National Response Framework and the National Incident Management System and their application during national disasters. Students will also examine the essentials of business contingency

# Course Descriptions

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planning in the private sector for disasters. Finally, students will plan and participate in a mock disaster drill to demonstrate their full understanding of the course material.

## SIS 475

### Senior Thesis (3,0)

3 Credits

The Senior Thesis is one of three options for students to choose in order to complete the Senior Project requirement. This course is for students who have at least a 3.40 GPA and who plan to attend graduate or law school. The course is a classic thesis research course on a topic that requires an intensive review of the relevant literature, extensive research, and superior organization and writing. The senior thesis should provide a degree of originality in research, research method, and/or analysis. Each student will be supervised by a faculty committee and will be required to defend his or her thesis before a faculty panel and the interested public. Students wishing to take this course must apply to the Chair of the Department of Global Security and Intelligence Studies within the last third of the first semester of their senior year.

*Prerequisite: Senior standing.*

## SIS 199 - 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.*

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## 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, 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 302

#### STS and ISS Operations (3,0)

3 Credits

A survey of the design, manufacture, and operations of the space shuttle and the International Space Station. In addition, the purpose, problems, and future of these vehicles will be studied.

*Prerequisite:* SP 110.

### 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 Studies (3,0)

3 Credits

This is the capstone course for the Space Studies Minor. Selected topics from the other space studies courses will be selected and the student will present a term paper on one of the topics.

### SP 299 - 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

#### U.S. History (3,0)

3 Credits

From 1865 to the present. Reconstruction, the age of big business, the U.S. 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 U.S.

### 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 260

#### Cultural Anthropology (3,0)

3 Credits

In a time of globalization, geopolitical movement, and increased cultural contact, an understanding of basic cultural constructs is necessary for global political, economic, military, and human behavior analysis. This course examines the nature of culture, with particular emphasis on theoretical and methodological approaches to studying culture. Cultural institutions, such as family, clan, tribe, and other kinship networks, customary political and religious organizations, and village communities will be studied. Social behaviors, shaped by various cultures, as exhibited in groups, as well as internalized social behaviors at the individual level, will be examined.



## Course Descriptions

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### SS 290

#### History of Modern Europe (3,0)

3 Credits

This course is a survey of the major social, economic, political, and cultural forces that shaped contemporary Europe. It traces the 19th century surge of optimism that the problems of humankind could be solved by ideologies such as liberalism, nationalism, and socialism through to the death of that optimism in the bloody conflicts of the 20th century. The class will also examine the 21st century directions of Europe and European unity.

### 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 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 312

#### Personality and Profiling (3,0)

3 Credits

This course provides a rigorous and comprehensive foundation for explaining, understanding, predicting, and influencing people. This foundation will be applied to stopping people from violating trust—namely, committing espionage—and to identifying and controlling them as quickly as possible after they have violated trust. The course will largely focus on personality theory and research based on scientific methodologies. The course also will explore other approaches to human knowledge and meaning including the philosophy of epistemology, literary criticism, and the interpretation of cultural products such as film, music, dance, and painting. By course's end, students will have profiled a U.S. citizen convicted of spying against his country.

### SS 320

#### Government of the U.S. (3,0)

3 Credits

Basic issues of democracy in the U.S., 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 326

#### Russian-U.S. Relations (3,0)

3 Credits

This course explores the development of Russian-United States economic and political relations, emphasizing the era of the 20th century.

*Prerequisite:* College-level history or permission from the instructor.

### SS 327

#### International Relations (3,0)

3 Credits

This course will examine historical and contemporary themes in international relations that set the stage for analyzing the current and future international system. Toward this, the curriculum is designed to introduce the student to the theory and practice of international relations with the objective of enabling a greater understanding of the global context that shapes issues and outcomes in world affairs. Extending beyond simple description, the student will develop an analytic and anticipatory capacity in which to explain foreign policy and international politics.

*Prerequisite:* College-level history or permission from the instructor.

### 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 U.S. 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 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

#### U.S. Foreign Policy (3,0)

3 Credits

A survey of the evolution of current U.S. 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 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 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 410

#### International Human Rights (3,0)

3 Credits

This course will address the issues of human rights at the global level from a historical and sociological perspective. It will provide an introduction to basic human rights philosophy, principles, instruments, and institutions. The course will cover the conceptual foundations of the idea of rights, the international human rights movement, and various human rights issues, including the Holocaust and other cases of mass genocide. As with any social science course, students are expected to engage in readings and write critical essays.

*Prerequisite:* SIS 200.

### SS 299 - 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.

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## 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 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.

# Course Descriptions

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## 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 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 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 func-

tions, 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. Students 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 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 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 (hand-drawn) 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 real-time 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.

*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

## Course Descriptions

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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 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 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 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 give 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 - 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.

# GRADUATE COURSE DESCRIPTIONS

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Embry-Riddle Aeronautical University graduate course offerings at the Prescott Campus are listed in alphabetical order, according to the following course designations:

**MSA** Master of Aeronautical Science

**MSF** Master of Science in Safety Science

**TM** Technical Management

The following courses are not necessarily offered every term, nor are they necessarily offered at all campus locations.

# Graduate Course Descriptions

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## MSA - Aeronautical Science

### MSA 602

#### The Air Transportation System

3 Credits

A study of air transportation as part of a global, multimodal transportation system. The course reviews the evolution of the technological, social, environmental, and political aspects of this system since its inception at the beginning of the 20th century. The long-term and short-term effects of deregulation, energy shortages, governmental restraints, and national and international issues are examined. Passenger and cargo transportation as well as military and private aircraft modes are studied in relation to the ever-changing transportation requirements.

*Prerequisites:* Demonstrated knowledge of aviation rules and regulations and economics.

### MSA 613

#### Airport Operations Safety

3 Credits

A study of airport operations safety as applied to day-to-day operations. A review and analysis of all federal regulations applicable to operations and safety are conducted.

*Prerequisites:* Demonstrated knowledge of performance of airports and airline operations management or related field.

## MSF - Safety Science

### MSF 500

#### Safety Science Foundations

1-6 Credits

Provided for students who may need to resolve deficiencies from undergraduate studies to be properly prepared for the advanced-level courses. A review of algebra and trigonometry, basic calculus, statistics, physics, chemistry, and biological science as they relate to the safety profession. (Credit not applicable to any degree.)

1. Algebra and Trigonometry. A study of the basic laws of fractions, exponents, radicals, inequalities, quadratic equations, complex numbers, and the elements of trigonometry.
2. Basic Calculus. Differentiation and integration of algebraic functions; applications to velocity, accelerations, area, curve sketching, and computation of extreme values.

3. Statistics. Descriptive statistics; populations and samples; measures of central tendency and dispersion; elementary probability; binomial and normal distributions and their interrelationship; random variables; one- and two-sample hypothesis testing involving proportions and means for large and small samples; estimation and confidence intervals; Chi square distribution; correlation coefficient; least squares line.

4. Physics. Survey course in physics. Stress will be placed on basic concepts and principles of physics. Presentation will include selected topics in mechanics, heat, light, sound, electricity and magnetism, and modern physics.

5. Chemistry. Covers basic atomic theory, elements, compounds, and mixtures, calculation of weight and weight volume relationships, basic descriptive chemistry. An overview of the current applications of chemistry and its future potential in human affairs. Applications to scientific decision-making in the business and industrial environment.

6. Biological Science. A survey course in general biological science, with emphasis on human biology. Includes basic cellular anatomy, biology, and biochemistry; viruses, bacteria, and protista; aerobic respiration and photosynthesis; mitosis and meiosis; genetics and inheritance, hereditary disorders in humans; and human tissues, organs, and organ systems.

### MSF 530

#### Aircraft Accident Investigation

3 Credits

An examination of investigation as it pertains to aircraft accidents from the perspectives of the administrative, regulatory, and practical field investigation aspects. Emphasis will be on the evidence-gathering, preservation, and processing phases of accident investigation. An overview of organizations that conduct and participate in investigations, and an analysis of their roles in those investigations will be completed. Use of a laboratory will provide practical field experience. Research into investigative concepts and techniques will be an integral part of the course.

### MSF 580

#### Industrial Hygiene and Environmental Protection

3 Credits

A study of the role and responsibilities of an industrial hygienist employed in technical industries. The course reviews the application of methods for the identification, evaluation, and control of industrial hygiene and environmental hazards encountered in

## Graduate Course Descriptions

the aviation and other workplaces. Specific hazards to be addressed include noise, vibration, ionizing and nonionizing radiation, thermal conditions, pressure, chemicals, airborne contaminants, and biological substances. Engineering and nonengineering controls as well as regulatory requirements will also be covered.

### MSF 600

#### Quantitative Methods

3 Credits

This course is a survey of quantitative methods pertinent for safety practitioners. Topics include descriptive statistics, probability distributions, the idea of statistical significance, the distinction between parametric and nonparametric statistics, confidence intervals and hypothesis testing, correlation, regression, analysis of variance (ANOVA), and epidemiology.

### MSF 601

#### Ergonomics

3 Credits

This course studies the most common source of musculoskeletal injuries in the American workplace. These injuries, commonly labeled as overexertion or repetitive stress, are found in various forms in all workplaces. The course begins with a study of work physiology and its implications for workplace design and workplace safety. It covers biomechanics and its implications for workplace design, low back pain, and other overexertion injuries. It covers the various cumulative trauma disorders, including the importance of risk factors such as force, frequency, and posture. Setting up and managing an ergonomics program are discussed.

### MSF 602

#### Human Factors

3 Credits

This course studies the role of human factors in workplace and work task design with emphasis on complex technical industries including aviation/aerospace. This study of human factors includes traditional material such as anthropometry, control/display design, visual and auditory acuity and their importance in work design, circadian rhythms and their implications for work design and shift work, psychomotor skills, and learning and memory. It also includes the human role as it relates to unsafe acts, attitudes, errors, and deliberate actions. Finally, the course studies the interface between human factors in workplace design and human error.

*Prerequisites:* MSF 600 and demonstrated knowledge of behavioral science, college-level mathematics, including introductory statistics, and basic computer operations.

### MSF 603

#### Occupational Safety

3 Credits

This course provides a broad overview of occupational safety. It begins with an exploration of the history of the subject, moves through the OSH Act, workers' compensation, safety program development and management, and finally addresses a series of specific hazards. These hazards include machine guarding, material handling equipment, fall protection, fire protection, building design, and lighting. The application of safety and health management principles to the management of complex technical industries including aviation/aerospace are covered using scenario evaluations to determine OSHA compliance, accident/injury data evaluation and analysis, and OSHA log completion.

### MSF 605

#### Industrial Hygiene Measurement

3 Credits

This course provides students with the knowledge and skills necessary to conduct basic industrial hygiene surveys. Hands-on laboratory experience is provided for the students, starting with equipment calibration and ending with completing a field-sampling project. Particulate sampling for both total and respirable, gravimetric analysis, gas/vapor sampling with tubes and impingers, dosimeters, use of direct reading instruments and detector tubes, are all covered. The fundamentals of sample analysis are presented. Case studies are presented to emphasize the strategies used to select sampling locations, times, and individuals.

*Prerequisite:* MSF 580.

### MSF 606

#### Control Methods in Occupational Safety and Health

3 Credits

This course studies the methods commonly used by OSH professionals to control aviation and industrial workplace exposures to health and safety hazards. The most commonly used control for industrial health hazards is industrial ventilation, so this control method is studied in detail, with students learning to complete basic ventilation system designs and to evaluate moderately complex designs. Students



# Graduate Course Descriptions

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may also learn to use ventilation system testing equipment to verify that a system is working as designed and to troubleshoot a system that is not working properly. The proper use of and the potential failure modes associated with personal protective equipment are evaluated. In addition, measurement and control methods for noise and vibration are examined through a series of lectures and class projects.

## MSF 607

### Epidemiology

3 Credits

Epidemiology is the basic science underlying all public health programs, whether implemented privately in industry or publicly by government organizations. This course will deal with the distribution and causes of diseases (including all forms of illness, injury, and accidents) in specified populations. This will be applied to the control of health problems through the understanding of the causes of those problems.

*Prerequisite:* MSF 600.

## MSF 609

### System Safety

3 Credits

An in-depth review of system safety management principles and system safety engineering techniques are combined in this course to enable students to fully comprehend their vital roles in preventing accidents. This course emphasizes the specialized integration of system safety analytical techniques and risk management into all phases of a system's life-cycle using a system safety program that is tailored to an organization's mission. System safety's relationship with other disciplines such as reliability, maintainability, human factors, and product liability will be examined in the context of government, military, and general industry.

*Prerequisite:* MSF 600 and demonstrated knowledge of college-level mathematics, including introductory statistics.

## MSF 610

### Industrial Security

3 Credits

This course will intensively focus on the various aspects of business intelligence and industrial security as they apply to complex and technical industries. Of prime concern are risks, threats, and countermeasures. Topics include intelligence theory and intelligence operations; foreign and domestic

organized crime; industrial espionage; riots and disasters; terrorism; sabotage; hijacking; internal security; cybercrime; legal and ethical issues; de facto and regulatory roles of local, regional, and national governments, international agencies, and nongovernmental organizations; social and cultural factors; strategic planning and investment vulnerabilities; and physical, operations, communications, and personnel securities.

## MSF 611

### Case Studies in Safety

3 Credits

This course will include a series of case studies that illustrate the role of human characteristics, behavior, performance, and preference in the failure of simple and complex systems. The case studies will be drawn from many domains, including aviation, transportation, manufacturing, process industry, construction, agriculture, consumer products, retail, public safety, communications, medicine and rehabilitation, and sport and recreation. Students will be given the opportunity to use system analysis and design techniques to evaluate common failure modes and explore the conditions conducive to system success or failure.

*Corequisites:* MSF 601, MSF 602.

## MSF 612

### Research Methods

3 Credits

This course will emphasize research methodologies leading to the development of research problems. The course will discuss problem and sample selection, data collection, and literature review.

*Prerequisite:* MSF 600.

## MSF 613

### Aviation Safety

3 Credits

This course is a study of the aviation system as it relates to human factors and safety. The application of human factors to aviation is inextricably connected with safety. The worldwide aviation system will be covered with an emphasis on managing safety through regulatory guidelines, industry initiatives, and airline crew operations. Human factors topics will include psychological and physical implications for error management.

## MSF 614

### Safety Ethics

3 Credits

Safe practices in any workplace require good decisions from the managing safety professional. Many of the decisions to be made are of a technical nature based on the good practices of that profession. Others, though, have a foundation in responsible relationships with other people whether they are colleagues, supervisors, or customers. These foundations have a central element of professional ethics or morality and will have a significant impact on the safety environment.

## MSF 630

### Aircraft Accident Analysis

3 Credits

A critical analysis of selected aircraft accidents that involves extensive field work, teaming, a thorough investigation, detailed examination, group-process discussions, and decision making. Each team of student investigators will produce a professional report that includes the facts, the scenario, and an analysis of all potential factors, findings, and recommendations. Identification of accident prevention measures as a product of the analysis process is stressed. Identification and analysis of available and future loss-prevention technologies will be completed.

## MSF 635

### Advanced Aircraft Survivability Analysis and Design

3 Credits

Entails a detailed analysis of the aircraft accident environment with particular emphasis on survivability factors. Explores factors and forces that cause injury and examines the injury-role played by impact forces and occupiable space compromises. Examines crashworthiness and delethalization technologies and concepts with a focus on the best ways to protect occupants during a crash. Selected aircraft accidents will be used as case studies. An in-depth review of basic kinematics and development of injury-related information will be completed.

*Prerequisite:* MSF 530.

## MSF 645

### Aircraft Fire Survivability Analysis and Design

3 Credits

Involves a detailed examination of basic fire science and the relationship of fire to aircraft accident survival. Examines current fire crashworthiness fac-

tors including fire development and propagation, injury and fatality mechanisms related to fire, and current evacuation systems in use. The focus will be on the configurational, procedural, environmental, and biobehavioral factors that influence survival in a fire situation. Case studies of accidents involving both in-flight and crash-related fires will be used. Identification and analysis of available and future fire-protection technologies will be completed.

## MSF 655

### Airline and Operations Safety Management

3 Credits

This course addresses the application of safety management principles and techniques to the management of airline operations and safety. Topics include hazard identification, accident/incident investigation, flight safety, cabin safety, ground safety, and emergency response programs. Regulatory requirements and airline standards as well as accident prevention strategies are included throughout the course.

*Prerequisite:* MSF 615.

## MSF 675

### Aviation Maintenance Safety

3 Credits

A study of the aviation maintenance safety practices, procedures, and policies in use throughout the aviation industry. Includes the role of maintenance safety in relation to the overall safety management program in the organization. Case studies of maintenance-related accident prevention and loss control scenarios. The influence and role of the regulatory and compliance agencies in aviation maintenance safety.

## MSF 680

### Integrated Safety Operations - Capstone

3 Credits

Study of management theory, integrated arrangements, common constraints, developmental level, essential guidelines, staff liaison, project improvement, effectiveness audits, and collaboration needed to ensure success of the safety function. May include a written document on a safety topic, which exposes the student to the technical aspects of writing. This course is included in the MSSS curriculum to provide the student with the opportunity to study how the various domains of the safety and health occupation are integrated into a single program.

## Graduate Course Descriptions

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### MSF 685

#### Aviation Security

3 Credits

This course will intensively focus on the various aspects of business intelligence and industrial security as they apply to aviation and to aviation safety. Of prime concern are risks, threats, and countermeasures. Topics include intelligence theory and intelligence operations; foreign and domestic organized crime; industrial espionage; riots and disasters; terrorism; sabotage; hijacking; internal security; cybercrime; legal and ethical issues; de facto and regulatory roles of local, regional, and national governments, international agencies, and nongovernmental organizations; social and cultural factors; strategic planning and investment vulnerabilities; and physical, operations, communications, and personnel securities. Readings, lectures, discussions, and case studies will be supplemented by team exercises resulting in security plans addressing risks, threats, countermeasures, and evaluative mechanisms.

### MSF 686

#### Emergency Preparedness and Preplanning

3 Credits

This course is designed to increase the student's knowledge of emergency response procedures, safety and health hazards, and enforcement issues for industry. Topics include a thorough discussion of scope, application, definitions, and other related standards; elements of an emergency response plan; training requirements; the incident command system; medical surveillance; and postemergency response. Major elements involved in disasters and emergencies, preparedness planning, systems use, and attention to essential human services, with emphasis on community action and the development of successful, cost-effective strategies for implementing emergency and mitigation plans.

### MSF 690

#### Graduate Research Project

3 Credits

A written document on a safety topic, which exposes the student to the technical aspects of writing. This course is included in the MSSS curriculum to provide students with the opportunity to pursue a project of special interest, but not to the level of a thesis. This is a required course for those students who choose not to write a thesis.

*Prerequisites:* MSF 600 and MSF 612.

### MSF 696

#### Graduate Internship in Safety Science

1-3 Credits

Temporary professional or industrial work appointments made available to students enrolled in graduate programs at the University. An internship provides graduate students with an opportunity to extend their academic endeavors through the application of the theories and philosophies studied in the classroom to specific professional activities common to the workplace. They are academic/professional activities coordinated by the University between offering organizations and a graduate student.

### MSF 699

#### Special Topics in Safety Science

1-3 Credits

Students may elect to perform a special, directed analysis and/or independent study in an area of particular interest. A detailed proposal of the desired project must be developed and presented to the center director or department chair for faculty review and recommendation at least three weeks prior to the end of registration for a term.

### MSF 700

#### Thesis

3 Credits

A written document on a safety topic supervised throughout its preparation by the student's thesis committee, which demonstrates the student's mastery of the topic and is of satisfactory quality for publication.

*Prerequisites:* MSF 600 and MSF 612.

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## Technical Management

### TM 621

#### Regulations, Ethics, and the Legal System

3 Credits

Understanding the complex regulatory and legal setting surrounding management. The Federal Acquisition Regulations and how they affect all projects' legal responsibility and accountability, ethical considerations in and external to the organization, the international environment and how it may affect projects.

# WORLDWIDE CONTACT/INFORMATION SOURCES

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## Embry-Riddle Aeronautical University Worldwide

### General Information

Telephone: (386) 226-6910  
-OR-  
(800) 522-6787  
Email: [wwinfo@erau.edu](mailto:wwinfo@erau.edu)

### International Regional Office

CMR 429  
APO AE 09054-0429  
DSN: 483-7811  
Civilian: 011-49-631-303-27811  
Fax: 011-49-631-303-27810  
Email: [europe.rdo@erau.edu](mailto:europe.rdo@erau.edu)  
Website: <http://www.erau.edu/intl>

### Enrollment Management Office

Embry-Riddle Aeronautical University  
600 S. Clyde Morris Blvd.  
Daytona Beach, FL 32114-3900

### *Admissions*

(866) 509-0743  
Email: [wwem@erau.edu](mailto:wwem@erau.edu)  
Fax: (386) 226-6984

### *Financial Aid*

(866) 567-7202  
-OR- (800) 943-6279  
Email: [wwfinaid@erau.edu](mailto:wwfinaid@erau.edu)  
Fax: (386) 226-6984

### *Registrar*

(866) 393-9046  
Email: [eeregist@erau.edu](mailto:eeregist@erau.edu)  
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

### Professional Education Programs

#### *Worldwide*

Embry-Riddle Aeronautical University  
600 S. Clyde Morris Blvd.  
Daytona Beach, FL 32114-3900  
Telephone: (386) 226-7694  
Fax: (386) 323-8692  
Toll Free: 1-866-574-9125

### 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](mailto:eccareer@erau.edu)

### Veterans Affairs

Embry-Riddle Aeronautical University  
600 S. Clyde Morris Blvd.  
Daytona Beach, FL 32114-3900  
Telephone: (386) 226-6350

### 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) 226-6363  
Fax: (386) 226-7627

## Worldwide

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### Embry-Riddle Aeronautical University Worldwide Campus Listing by State / Country

#### ALABAMA

<b>FORT RUCKER</b>	Fort Rucker	(334) 598-6232
<b>HUNTSVILLE</b>	Redstone Arsenal	(256) 876-9763
<i>Teaching Site:</i>		
Mobile, AL (out of Keesler, MS)	Mobile, AL	(251) 441-6737

#### ALASKA

<b>ANCHORAGE</b>	Elmendorf AFB	(907) 753-9367
<b>FAIRBANKS</b>	Fort Wainwright	(907) 356-7773

#### ARIZONA

<b>LUKE</b>	Luke AFB	(623) 935-4000
<b>PHOENIX/CHANDLER</b>	Chandler	(480) 279-1149
<b>SKY HARBOR</b>	Phoenix	(602) 275-5533
<b>TUCSON</b>	Davis Monthan AFB	(520) 747-5540

#### ARKANSAS

<b>LITTLE ROCK</b>	Little Rock AFB	(501) 983-9300
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#### CALIFORNIA

<b>BEALE</b>	Beale	(530) 788-0900
<b>CAMP PENDLETON</b>	Oceanside	(760) 385-4423
<b>CHINA LAKE</b>	Ridgecrest	(760) 939-4557
<b>EDWARDS</b>	Edwards AFB	(661) 258-1264
<b>INLAND EMPIRE</b>	March AFB	(951) 653-4074
<b>LEMOORE</b>	NAS Lemoore	(559) 998-6026
<b>LOS ANGELES (Metro Center)</b>	Los Angeles	(562) 627-5870
<b>NORTH ISLAND</b>	Coronado	(619) 435-6673
<b>OAKLAND</b>	Oakland	(510) 636-2424
<b>PALMDALE</b>	Palmdale	(661) 947-4025
<i>Teaching Site:</i>		
Victorville		(760) 530-0875
<b>SAN DIEGO</b>	San Diego	(858) 576-4375
<b>TRAVIS</b>	Travis AFB	(707) 437-5464
<b>VANDENBERG</b>	Vandenberg AFB	(805) 734-4076
<b>VENTURA</b>	Port Hueneme	(805) 271-9691

#### COLORADO

<b>COLORADO SPRINGS</b>	Fort Carson	(719) 526-3387
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#### CONNECTICUT

<b>HARTFORD</b>	East Hartford	(860) 565-0464
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## FLORIDA

<b>FT. LAUDERDALE</b>	Ft. Lauderdale	(954) 497-3774
<i>Teaching Site:</i>		
Miami	Miami	(305) 871-3855
<b>FORT WALTON BEACH</b>	Eglin AFB	(850) 678-3137
<i>Teaching Site:</i>		
Hurlburt Field	Hurlburt Field	(850) 581-2106
<b>JACKSONVILLE</b>	Jacksonville	(904) 645-0333
<i>Teaching Site:</i>		
NAS Jacksonville	Jacksonville	(904) 779-0246
N.S. Mayport	Jacksonville	(904) 249-6700
<b>ORLANDO (Metro)</b>	Orlando	(407) 352-7575
<b>PENSACOLA</b>	NAS Pensacola	(850) 458-1098
<b>SPACE COAST</b>	Patrick AFB	(321) 783-5020
<b>TAMPA</b>	MacDill AFB	(813) 828-3772
<i>Teaching Site:</i>		
St. Petersburg	Seminole	(727) 394-6218
<b>TYNDALL</b>	Tyndall AFB	(850) 283-4557
<i>Teaching Site:</i>		
Tallahassee	Tallahassee	(850) 201-8330

## GEORGIA

<b>NAS ATLANTA</b>	Marietta	(770) 426-9990
<i>Teaching Site:</i>		
Atlanta Delta	Atlanta	(404) 714-3248
<b>COLUMBUS</b>	Columbus	(706) 568-5485
<b>MOODY</b>	Moody AFB	(229) 244-9400
<b>ROBINS</b>	Robins AFB	(478) 926-1727
<b>SAVANNAH</b>	Savannah	(912) 355-0644
<i>Teaching Site:</i>		
Fort Stewart	Fort Stewart, GA	(912) 767-0339
Beaufort, SC	Beaufort, SC	(843) 228-7585

## HAWAII

<b>HONOLULU</b>	Honolulu	(808) 422-0835
<b>KANEOHE</b>	Kailua	(808) 254-2106
<b>SCHOFIELD BARRACKS</b>	Schofield Barracks	(808) 624-2334

## IDAHO

<b>MOUNTAIN HOME</b>	Mountain Home AFB	(208) 832-2222
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## ILLINOIS

<b>ROCKFORD</b>	Rockford	(815) 969-4001
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## Worldwide

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### INDIANA

**INDIANAPOLIS** Indianapolis (317) 487-6281

### KANSAS

**MCCONNELL** McConnell AFB (316) 687-3006

### KENTUCKY

**FORT CAMPBELL** Fort Campbell (270) 798-2775  
**LOUISVILLE** Louisville (502) 964-9204

### LOUISIANA

**BARKSDALE** Barksdale (318) 747-4508

*Teaching Site:*

New Orleans (out of Keesler, MS) New Orleans (504) 361-0335

### MAINE

**BRUNSWICK** Brunswick (207) 721-0664

### MARYLAND

**ANDREWS** Andrews AFB (301) 735-6340  
**PATUXENT RIVER** Lexington Park (301) 863-8776

### MINNESOTA

**MINNEAPOLIS** Eagan (651) 905-9595

### MISSISSIPPI

**KEESLER** Biloxi (228) 432-5312

*Teaching Site:*

Mobile, AL Mobile, AL (251) 441-6737

New Orleans, LA New Orleans, LA (504) 361-0335

### MONTANA

**GREAT FALLS** Malmstrom AFB (406) 727-9901

### NEBRASKA

**OFFUTT** Offutt AFB (402) 292-6655

### NEVADA

**LAS VEGAS** Nellis AFB (702) 643-0762

*Teaching Site:*

Fallon NAS Fallon (775) 423-4018

**NEW JERSEY**

**MCGUIRE** McGuire (609) 723-1337

**NEW MEXICO**

**ALBUQUERQUE** Albuquerque (505) 846-8946

**CANNON** Cannon AFB (505) 784-8763

**HOLLOMAN** Holloman AFB (575) 479-6892

*Classroom Location:*

White Sands White Sands Missile Range (575) 578-6347

**NORTH CAROLINA**

**ELIZABETH CITY** Elizabeth City (252) 331-2225

**FAYETTEVILLE** Fayetteville (910) 323-2126

*Teaching Site:*

Greensboro Greensboro (336) 605-3030

**SEYMOUR JOHNSON** Seymour Johnson AFB (919) 734-9211

**NORTH DAKOTA**

**GRAND FORKS** Grand Forks AFB (701) 594-5324

**MINOT** Minot AFB (701) 727-9007

**OHIO**

**CINCINNATI** Cincinnati (513) 733-3728

**DAYTON AREA** Fairborn (937) 878-3728

*Classroom Location:*

Georgian College Barrie, Ontario (937) 878-3728

**OKLAHOMA**

**ALTUS** Altus AFB (580) 481-5991

**OKLAHOMA CITY** Oklahoma City (405) 739-0397

**VANCE** Vance AFB (580) 213-7320

**OREGON**

**PORTLAND** Portland (503) 288-8690

**SOUTH CAROLINA**

**CHARLESTON** Charleston AFB (843) 767-8912

**GREENVILLE** Greenville (864) 233-5288

**SHAW** Shaw AFB (803) 666-7401

*Teaching Site:*

Beaufort (out of Savannah, GA) MCAS Beaufort (843) 228-7585



## Worldwide

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### SOUTH DAKOTA

ELLSWORTH	Ellsworth AFB	(605) 923-6291
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### TENNESSEE

MEMPHIS	Memphis Airport	(901) 507-9969
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### TEXAS

CORPUS CHRISTI	NAS Corpus Christi	(361) 937-4951
DYESS	Dyess AFB	(325) 692-2007
FORT WORTH	Dallas/Fort Worth	(817) 737-8180
HOUSTON	Houston	(281) 461-3728
SAN ANTONIO	Randolph AFB	(210) 659-0801
SHEPPARD	Sheppard AFB	(940) 851-6458

### UTAH

NORTHERN UTAH	Hill AFB	(801) 777-0952
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### VIRGINIA

FORT EUSTIS	Fort Eustis	(757) 887-0980
LANGLEY	Langley AFB	(757) 764-2662
NORFOLK	NS Norfolk	(757) 440-5078
<i>Teaching Site:</i> Oceana		(757) 437-8061

### WASHINGTON

EVERETT	Everett	(425) 514-0220
SEATTLE	Renton	(425) 226-2484
SPOKANE	Fairfield AFB	(509) 244-3832
TACOMA	McChord AFB	(253) 589-1728
WHIDBEY ISLAND	Oak Harbor	(360) 279-0959

### WYOMING

CHEYENNE	F.E. Warren AFB	(307) 634-9693
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## Worldwide Locations (International - U.S. Military)

## AFGHANISTAN

<b>AFGHANISTAN</b>	Afghanistan	011-44-1638-522464
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## GERMANY

<b>BERLIN</b>	Berlin	011-49-305-3063549
<b>KATTERBACH</b>	Katterbach	011-49-9802-832379
<b>RAMSTEIN AB</b>	Ramstein	011-49-6371-475755
<i>Teaching Site:</i> Wiesbaden	Wiesbaden	011-49-611-4118032
<b>SPANGDAHLEM</b>	Spangdahlem	011-49-6565-617553
<i>Teaching Site:</i> Geilenkirchen	Geilenkirchen	011-49-2451-632246

## ITALY

<b>AVIANO</b>	Aviano AFB	011-39-0434-305140
<i>Teaching Site:</i> Naples	Napoli	011-39-0815-684364
Sigonella	Sigonella	011-39-095-564550

## IRAQ

<b>IRAQ - BALAD</b>	Balad AFB	Contact: (800) 522-6787
<b>IRAQ - VICTORY</b>	Baghdad	Contact: (800) 522-6787

## KUWAIT

<b>DEPLOYED LOCATIONS</b>	Kuwait	011-49-631-303-27816
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## SPAIN

<b>ROTA</b>	Rota	011-34-956-822984
<i>Teaching Site:</i> Lajes Field	Portugal	011-351-295-573375

## TURKEY

<i>Teaching Site:</i> Incirlik (out of Aviano, Italy)	Incirlik Air Base	011-90-322-3161098
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## UNITED KINGDOM

<b>LAKENHEATH</b>	Brandon, Suffolk	011-44-1638-522464
<b>MILDENHALL</b>	Bury St. Edmunds	011-44-1638-542916

### *Worldwide Administration*

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**VASQUEZ, REBECCA**

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### *Academic Affairs Administration*

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**ROTHWELL, BRUCE A.**

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**RODGERS, LAURETTE**

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# FACULTY AND ADMINISTRATION

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B.A. and M.S., Florida State University; Ph.D., Kent State University.

### **CARRELL, DANIEL L.**

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### **MCREYNOLDS, IRENE**

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### **MONTPLAISIR, DANIEL E.**

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### **WEEKES, ERIC**

*Senior Vice President, Chief Financial Officer.* B.S., New York Institute of Technology; M.B.A., New York University.

## *Legend*

Letter designations for aviation qualifications are as follows:

A – Airplane	ME – Multi-Engine	DWE – Designated Written Examiner
C – Commercial Pilot	SE – Single-Engine	HTA – Heavier Than Air
G – Glider	A&P – Airframe and Powerplant Maintenance Technician	IGI – Instrument Ground Instructor
H – Helicopter	AGI – Advanced Ground Instructor	LTA – Lighter Than Air
I – Instrument	ATP – Airline Transport Pilot	SME – Single- and Multi-Engine
L – Land	BGI – Basic Ground Instructor	FCC – Federal Communication Commission
P – Private Pilot	CFI – Certified Flight Instructor	FE – Flight Engineer
S – Seaplane	CTO – Control Tower Operations	AC – Advanced Graduate Credit
AD – Aircraft Dispatcher	DME – Designated Mechanic Examiner	
IA – Inspection Authorization		

## Faculty and Administration

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### *Prescott Campus Academic Administration*

**BECK, ANGELA**

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**CONE, MILTON L.**

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**JONES, PHILIP**

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### Administration

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### College of Aviation

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**BEDARD, RAYNALD**

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## Faculty and Administration

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### **SAVAGE, ERIC R.**

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### **WALDOCK, WILLIAM**

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## College of Engineering

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### **EL DOKOR, TAREK**

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### **LESTARI, WAHYU**

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### **LYALL, JAMES R.**

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### **MADLER, RONALD A.**

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*Aerospace Engineering*

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*Physics*

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*Physics*

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<i>Robert F. Overmyer, 1985</i>	<i>Charlie Hilliard, 1995</i>	<i>Jean Rosanvallon, 2006</i>
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