

# EMBRY-RIDDLE

Aeronautical University



2013-2014  
**Undergraduate/Graduate Catalog**  
[prescott.erau.edu](http://prescott.erau.edu)

# Table of Contents

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About the University .....	3	Naval .....	48
Message from the President .....	4	Degrees and Programs .....	50
Mission of the University .....	4	Undergraduate Requirements .....	50
Embry-Riddle's History .....	4	Graduate Requirements .....	51
Accreditations and Affiliations .....	5	College of Arts and Sciences .....	53
Embry-Riddle at a Glance .....	6	B.S. in Astronomy .....	54
Our Student Philosophy .....	7	B.S. in Aviation Business Administration .....	56
Calendar .....	8	B.S. in Aviation Environmental Science .....	59
Admissions .....	10	B.S. in Cyber Intelligence and Security .....	61
Undergraduate .....	10	B.S. in Global Security and Intelligence Studies .....	63
International Applicants .....	13	B.S. in Interdisciplinary Studies .....	69
Graduate .....	15	B.S. in Space Physics .....	71
International Applicants .....	16	College of Aviation .....	73
Program Specific Criteria .....	17	B.S. in Aeronautical Science .....	74
Academic Regulations and Procedures .....	18	B.S. in Aeronautics .....	80
Tobacco and Drug Policy .....	20	B.S. in Air Traffic Management .....	82
Flight .....	21	B.S. in Applied Meteorology .....	84
Undergraduate Regulations and Procedures .....	22	B.S. in Safety Science .....	86
Academic Standing .....	24	B.S./M.S. in Safety Science .....	88
Student Grievance Procedure .....	25	Master of Science in Safety Science .....	90
Graduation Requirements and Honors .....	26	Aircraft Dispatcher Certification .....	93
Graduate Regulations and Procedures .....	26	College of Engineering .....	94
Academic Standing .....	29	B.S. in Aerospace Engineering .....	96
Graduation Requirements and Honors .....	29	B.S. in Computer Engineering .....	99
Financial Information .....	31	B.S. in Electrical Engineering .....	101
Tuition and Fees .....	31	B.S. in Mechanical Engineering .....	103
Financial Assistance .....	33	B.S. in Software Engineering .....	107
Student Life and Services .....	36	Minor Courses of Study .....	109
Student Services .....	39	Systems Engineering .....	109
Health and Wellbeing .....	41	Aeronautical Studies .....	110
Eagle Card .....	42	Aerospace Engineering .....	110
Residence Life and Dining .....	43	Air Traffic Control .....	110
Athletics .....	44	Applied Meteorology .....	111
Special Opportunities .....	46	Arabic and Middle Eastern Studies .....	111
ROTC .....	46	Asian Studies .....	111
Air Force .....	46	Aviation Safety .....	111
Army .....	47	Business Administration .....	112
		Computer Science .....	112
		Computer Security .....	112
		Electrical Engineering .....	112

Engineering Science .....	112	Military Science Army ROTC (MSL) .....	151
Environmental Studies .....	113	Physical Science (PS) .....	152
Flight (Fixed Wing) .....	113	Psychology (PSY) .....	156
Helicopter Flight .....	113	Regional Studies (RS) .....	156
Helicopter Operations and Safety .....	114	Safety Science (SF) .....	157
Humanities .....	114	Security and Intelligence Studies (SIS) .....	159
Mandarin Chinese .....	114	Social Science (SS) .....	164
Mathematics .....	115	Spanish (LSP) .....	166
Mechanical Engineering .....	115	University Student Success (UNIV) .....	166
Psychology .....	115	Weather (WX) .....	166
Robotics .....	115	Graduate Courses .....	170
Security and Intelligence Studies .....	116	Business Administration (BA) .....	170
Technical Intelligence .....	116	Master Aeronautical Science (MSA) .....	170
Unmanned Aircraft Systems .....	116	Faculty and Administration .....	171
Undergraduate Courses .....	117	Board of Trustees .....	172
Aeronautical Science (AS) .....	117	University Administration .....	173
Aerospace Engineering (AE) .....	121	Campus Staff Administration .....	174
Air Force Aerospace Studies (AF) .....	123	Campus Academic Administration .....	175
Air Traffic Management (AT) .....	124	College of Arts and Sciences .....	176
Arabic (LAR) .....	125	College of Aviation .....	178
Aviation Environmental Science (AES) .....	126	College of Engineering .....	179
Business Administration (BA) .....	127	Emeriti .....	180
Chinese (LCH) .....	129	Legend .....	181
Communication (COM) .....	131	Contact Us .....	182
Computer Engineering (CEC) .....	133	Index .....	183
Computer Science (CS) .....	134		
Cyber Intelligence and Security (CI) .....	135		
Economics (EC) .....	136		
Electrical Engineering (EE) .....	137		
Engineering (EGR) .....	138		
Engineering Physics (EP) .....	138		
Engineering Science (ES) .....	139		
Flight Airplane (FA) .....	140		
Flight Helicopter (FH) .....	142		
Honors (HON) .....	143		
Humanities (HU) .....	143		
Information Technology (IT) .....	146		
Interdisciplinary Studies (IS) .....	146		
Mathematics (MA) .....	146		
Mechanical Engineering (ME) .....	147		

# About the University

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## Prescott

**Real Education. Above All.**

### 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 Campus and Online

Embry-Riddle Aeronautical University  
600 S. Clyde Morris Blvd.  
Daytona Beach, FL 32114-3900  
(800) 522-6787 -OR- (800) 359-3728  
Admissions: (386) 226-6397  
Financial Aid: (866) 567-7202  
E-mail (Admissions): [wwadmissions@erau.edu](mailto:wwadmissions@erau.edu)  
[worldwide.erau.edu](http://worldwide.erau.edu)

## This catalog becomes effective May 1, 2013.

The 2013-2014 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.



## Message from the President

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 100,000 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 88 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 more than 150 locations 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 and CEO

## Mission of the University

### Our Mission

At Embry-Riddle, our mission is to teach the science, practice and business of aviation and aerospace, preparing students for productive careers and leadership roles in service around the world.

Our technologically enriched, student-centered environment emphasizes learning through collaboration and teamwork, concern for ethical and responsible behavior, cultivation of analytical and management abilities, and a focus on the development of the professional skills needed for participation in a global community. We believe a vibrant future for aviation and aerospace rests in the success of our students. Toward this end, Embry-Riddle is committed to providing a climate that facilitates the highest standards of academic achievement and knowledge discovery, in an interpersonal environment that supports the unique needs of each individual.

Embry-Riddle Aeronautical University is the world's leader in aviation and aerospace education. The University is an independent, non-profit, culturally diverse institution providing quality education and research in aviation, aerospace, engineering and related fields leading to associate, bachelor, master and Ph.D. degrees.

## Our Vision

Embry-Riddle will be the world's source for innovation and excellence in aerospace education and applied research.

## Our Values

The strength of our university is firmly rooted in our values. We expect that our students, faculty and staff share and demonstrate the values of student success, a positive learning environment and mind-set, safety first in all situations, personal growth, integrity, honesty, trust, diversity, open communication, teamwork, character, change for progress, fiscal soundness, healthy investments, and a can-do attitude.

"The strength of our university is firmly rooted in our values"

## Embry-Riddle's History

### Aviation and Embry-Riddle: The Lifelong Partnership

In 1903 Orville and Wilbur Wright made history with their sustained, controlled flight of a powered aircraft. Only a few short years later, the advent of regular passenger service and the start of World War I combined to produce a dynamic new industry to meet the demands of commercial and military aviation.

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.

The 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 Dec. 17, 1925, exactly 22 years after the historic flight of the Wright Flyer, barnstormer John Paul Riddle and entrepreneur T. Higbee Embry founded the Embry-Riddle Company at Lunken Airport in Cincinnati, Ohio. The following spring the company opened the Embry-Riddle School of Aviation, coinciding with the implementation of the Air Commerce Act of 1926, which required, for the first time, the certification and medical examination of pilots.

Within three years the school had become a subsidiary of AVCO, the parent of American Airlines. Embry-Riddle remained dormant during most of the 1930s, mirroring the casualties of the Great Depression, and the Lunken Airport operation was phased out. 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.

In South 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.

With Jack R. Hunt as president, in 1965 Embry-Riddle consolidated its flight, ground school, and technical training programs in one location by moving northward to Daytona Beach, Florida. 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 1968, Embry-Riddle was accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award degrees at the associate, bachelor, and master levels, and in 1970 changed its name from “Institute” to “University.” Also in 1970, centers were established at U.S. military aviation bases to serve the educational needs of active-duty military personnel.

In 1978, under President Hunt’s leadership, Embry-Riddle opened a western campus in Prescott, Arizona, on the 511-acre site of a former college. With superb flying weather and expansive grounds, the Prescott campus has been an outstanding companion to the University’s eastern campus in Daytona Beach.

Continuing Hunt’s legacy was Lt. Gen. Kenneth L. Tallman, president of Embry-Riddle for five years. He came to the University after a distinguished 35-year military career that included service as superintendent of the U.S. Air Force Academy. Under Tallman’s leadership, a school of graduate studies and the electrical engineering degree program were introduced. He led the University into research with the addition of the engineering physics degree program. He also developed stronger ties between Embry-Riddle and the aviation/aerospace industry.

Dr. Steven M. Sliwa led the University from 1991 through 1998. Sliwa, the University’s third president, is best known for creating an entrepreneurial environment and for developing strategic partnerships with industry. These partnerships included a joint venture with FlightSafety International; a partnership with Cessna Aircraft Company; a technology alliance with IBM; and an exclusive educational partnership with the Aircraft Owners and Pilots Association. He also spearheaded a \$100+ million capital expansion program, which included an \$11.5 million congressional line-item appropriation. In addition, new academic and research programs were created at his direction to respond to structural changes in the industry while increasing market share in the University’s core programs.

Embry-Riddle’s fourth president, Dr. George H. Ebbs, led the University from 1998 through 2005. During his tenure the annual college guide produced by U.S. News & World Report consistently ranked Embry-Riddle’s Aerospace Engineering program No. 1 in the nation among schools without doctoral programs, a ranking the University has achieved every year since 2001. Embry-Riddle’s program in Aerospace Engineering is the largest in the nation, as are its programs in Aeronautical Science and Engineering Physics.

Under the leadership of Dr. Ebbs, a new graduate degree program in safety science was introduced, as well 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 initiated at the Daytona Beach and Prescott 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; trained 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.

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. Before joining Embry-Riddle, he 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.

Under Dr. Johnson’s leadership Embry-Riddle has expanded its research activity; has launched its first Ph.D. degree programs, in Aerospace Engineering, Aviation and in Engineering Physics; and is developing a global strategy to take its aviation and aerospace expertise overseas, most recently by opening a Singapore location and by establishing collaborative degree programs with Chinese universities. Working with the FAA and industry leaders, Dr. Johnson has positioned the University as one of the nation’s leaders in the development of next-generation air traffic management technology.

For his leadership in aerospace education and research he received the Jimmy Doolittle Fellowship Award from the U.S. Air Force Association in 2007. He also received the 2010 John K. Lauber Award for Aviation Safety from the University Aviation Association, honoring the University’s record of safe flying and operations as part of the safety-culture initiative established by Dr. Johnson. The National Aeronautic Association awarded Embry-Riddle the prestigious 2008 Collier Trophy for the development and implementation of ADS-B technology under his stewardship.

## Accreditations and Affiliations

### University Accreditation

Embry-Riddle Aeronautical University, including the Daytona Beach Campus, the Prescott Campus, and the Worldwide Campus, is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award degrees at the associate, bachelor, master, and doctoral levels. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, GA 30033-4097 or call 404-679-4500 for questions about the accreditation of Embry-Riddle Aeronautical University.

The Commission is to be contacted **only if there is evidence that appears to support an institution’s significant non-compliance with a requirement or standard.**

### Program Specific Program Accreditation

#### Daytona Beach Campus

The bachelor degree programs in Aerospace Engineering, Civil Engineering, Computer Engineering, Electrical Engineering,

Engineering Physics, Mechanical Engineering, and Software Engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET) (<http://www.abet.org>). The bachelor degree programs in Aeronautical Science, Air Traffic Management, Applied Meteorology, and Aerospace and Occupational Safety 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 programs (associate and bachelor degrees) are accredited by AABI; for the bachelor degree, this includes two areas of concentration: Maintenance Management and Flight. The certificate programs in Aviation Maintenance Technology (airframe, power plant, and airframe and power plant) are certified by the Federal Aviation Administration (FAA).

## Prescott Campus

The bachelor degree programs in Aerospace Engineering, Computer Engineering, Electrical Engineering and Mechanical Engineering are accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>). The bachelor degree programs in Aeronautical Science and Aviation Business Administration are accredited by the Aviation Accreditation Board International (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.

Please note: Normal inquiries about the institution, such as admission requirements, financial aid, educational programs, etc., should be addressed directly to the institution, not to any accreditor's office.

- For Embry-Riddle - Daytona Beach, call (386) 226-6000
- For Embry-Riddle - Prescott, call (928) 777-3728
- For Embry-Riddle – Worldwide, call (386) 226-6910

## Embry-Riddle at a Glance

Embry-Riddle Aeronautical University is the world's oldest and largest fully accredited university specializing in aviation and aerospace. A truly international institution, the University educates undergraduate and graduate students at its residential campuses in Daytona Beach, Florida and Prescott, Arizona; at its Worldwide Campus locations around the globe; and through online learning.

Embry-Riddle offers its students a wide array of undergraduate and graduate degree programs in aviation, aerospace, transportation, business, engineering, and related high-tech fields.

The University recently launched its first Ph.D. degree programs, the Ph.D. in Aerospace Engineering, the Ph.D. in Aviation, and the Ph.D. in Engineering Physics. The Aviation Doctorate, the first of its kind in the nation, is designed for working professionals who want to enhance their contributions to the aviation and aerospace organizations that employ them. The Engineering Physics doctorate builds on the University's solid program of space research, which is funded by NASA, the National Science

*About the University 09/20/13*

Foundation, the U.S. Air Force, and other agencies. The new Ph.D. in Aerospace Engineering provides the pinnacle to Embry-Riddle's undergraduate and master's degrees in Aerospace Engineering, a program that in its entirety is the largest of its kind in the nation.

These new Ph.D. programs expand the applied research opportunities in which Embry-Riddle faculty and students assist the aviation/aerospace industry, government agencies, and others in meeting real-world challenges.

The University's 185-acre eastern campus in Daytona Beach is adjacent to Daytona Beach International Airport, with Kennedy Space Center and Orlando each only an hour's drive away. On campus, the new College of Arts & Sciences building will open in 2013. Other near-term construction projects are a Research Park and Greek housing. The Jim W. Henderson Administration & Welcome Center opened in 2012. Other recent additions to the campus include the James Hagedorn Aviation Complex, the High-Altitude Normobaric Lab, the College of Business academic hall, and the Apollo residence hall. Other complexes worthy of note include: the College of Aviation academic hall, the Lehman Engineering & Technology Center, and the Advanced Flight Simulation Center.

With active faculty advisement, student teams from the Daytona Beach campus regularly take top honors in competitions such as SAE engineering events and NASA Means Business, as well as in flight competitions such as NIFA SAFECON and the Women's Air Race Classic.

The University's 539-acre western campus is located in Prescott, Arizona, 100 miles north of Phoenix. Recent additions to the campus include the Aviation Safety and Security Archives and four labs that support study and research in the areas of Air Traffic Control, Ergonomics, High Performance Vehicles, and Industrial Hygiene. Also worthy of note are the Udvar-Hazy Library & Learning Center, the Aerospace Experimentation & Fabrication Building, Haas Memorial Chapel, the Visitors Center, Academic Complex I, the King Engineering & Technology Center, and the Robertson Flight Simulation Center.

The Worldwide Campus provides educational opportunities for working civilian and military professionals. Its academic programs are offered at more than 150 locations in the United States, Europe, Asia, Canada and the Middle East and through Web-based online learning. Based on their unique requirements, classroom students can select online courses, and deployed military students can shift from classroom to 100% online course delivery. With Worldwide's new EagleVision technology, students at different geographical locations can receive instruction at the same time.

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.

## Our Student Philosophy

*Adopted by Jack R. Hunt in 1975*

*Updated and reaffirmed by President John P. Johnson, Ph.D., in 2010*

### **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?



# Calendar

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## Summer A 2013

(May 9 – June 24)

Date	Event
May 8	Orientation and Registration
May 9	Classes Begin
May 27	HOLIDAY - Memorial Day
June 20	Last Day of Classes
June 21	Study Day
June 22, 24	Final Examinations

## Summer B 2013

(June 27 – August 12)

Date	Event
June 26	Orientation and Registration
June 27	Classes Begin
July 4	HOLIDAY - Independence Day
August 8	Last Day of Classes
August 9	Study Day
August 10, 12	Final Examinations

## Fall Semester 2013

(August 26– December 12)

Date	Event
August 22-25	Orientation and Registration
August 26	Classes Begin
September 2	HOLIDAY – Labor Day
October 11	Fall Break
November 11	HOLIDAY - Veterans Day
November 27 – 29	HOLIDAY - Thanksgiving
December 5	Last Day of Classes
December 6	Study Day
December 7, 9-12	Final Examinations
December 14	Commencement

## Spring Semester 2014

(January 8 – May 1)

Date	Event
January 7	Orientation and Registration
January 8	Classes Begin
January 20	HOLIDAY - Martin Luther King Jr. Day
February 17	HOLIDAY - Presidents Day
March 10-14	Spring Break
April 24	Last Day of Classes
April 25	Study Day
April 26, 28 - May 1	Final Examinations
May 3	Commencement

## Summer A 2014

(May 8 – June 23)

Date	Event
May 7	Orientation and Registration
May 8	Classes Begin
May 26	HOLIDAY - Memorial Day
June 19	Last Day of Classes
June 20	Study Day
June 21, 23	Final Examinations

## Summer B 2014

(June 26 – August 11)

Date	Event
June 25	Orientation and Registration
June 26	Classes Begin
July 4	HOLIDAY - Independence Day
August 7	Last Day of Classes
August 8	Study Day
August 9, 11	Final Examinations

## Fall Semester 2014

(August 25 – December 11)

Date	Event
August 21-24	Orientation and Registration
August 25	Classes Begin
September 1	HOLIDAY - Labor Day
October 10	Fall Break
November 11	HOLIDAY - Veterans Day
November 26-28	HOLIDAY - Thanksgiving
December 4	Last Day of Classes
December 5	Study Day
December 6, 8-11	Final Examinations
December 13	Commencement

## Spring Semester 2015

(January 7 – April 30)

Date	Event
January 6	Orientation and Registration
January 7	Classes Begin
January 19	HOLIDAY - Martin Luther King Jr. Day
February 16	HOLIDAY - Presidents Day
March 9-13	Spring Break
April 23	Last Day of Classes
April 24	Study Day
April 25, 27-30	Final Examinations
May 2	Commencement

# Admissions

## 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 end of their junior year. You may apply online or download the application at: [www.erau.edu](http://www.erau.edu).

Term	Filing Priority	Notification	Deposit
Fall	January 15	Rolling	May 1
Spring	November 1	Rolling	November 1
Summer A	April 1	Rolling	As requested
Summer B	April 1	Rolling	As requested

For more information 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: [pradmit@erau.edu](mailto:pradmit@erau.edu)

## Immunization Requirements

A Medical Report Form is required. All entering students born after Dec. 31, 1956, must provide proof of two doses of MMR (Measles, Mumps, and Rubella) administered on or after January 1, 1968 and on or after their first birthday. All students who reside in University housing must either document the immunizations for Hepatitis B and Meningococcal Meningitis or sign a waiver declining vaccination. A tuberculin test may be required of International students upon arrival on campus.

## Flight Training Requirements

All students planning to begin flight training at Embry-Riddle are required to hold a current First or Second Class Federal Aviation Administration (FAA) medical certificate and provide proof of citizenship before beginning flight training. In addition, the Aviation and Transportation Security Act (ATSA) requires all flight students to show acceptable documentation of U.S. citizenship OR complete background check requirements. Upon acceptance to the University, all students will be sent specific, detailed information on requirements for flight students.

## Undergraduate Admissions

### First Year Applicants

The University defines a first-year candidate as one who is applying for degree status directly from high school. The University may offer admission to first-year applicants who present an academic record that demonstrates their ability to graduate from high school. To reach an admissions decision, the following information is considered: overall academic performance and grades, rank in class (if available), extra-curricular activities, letters of recommendation, 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 vary between technical and non-technical degrees.

Technical Majors: Aerospace/Computer/Electrical/Mechanical/Software Engineering, Astronomy, Space Physics, and Applied Meteorology.

Entrance requirements into a technical major include 4 years of English, 4 years preferred college preparatory mathematics, 2 years of social science, and 2 years of science with labs (3 years preferred), including chemistry and/or physics.

Non-Technical Majors: Aeronautical Science (Professional Pilot), Aeronautics, Air Traffic Management, Aviation Business Administration, Aviation Environmental Science, Cyber Intelligence and Security, Global Security and Intelligence Studies, Interdisciplinary Studies, and Safety Science.

Entrance requirements into a non-technical major include 4 years of English, 3 years preferred college preparatory mathematics, 2 years of social science, and 2 years of science with labs.

## Home School Students

Home-schooled students need to provide a transcript of course work or portfolio, letters of recommendation, and SAT 1 reasoning test or ACT scores.

## Standardized Testing

SAT I reasoning test or ACT is required for admission for traditional first-time 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.

## Admitted Student Information

Important information regarding University policies and procedures will be sent to students upon acceptance. All students accepted for admission must submit a non-refundable \$200 advance tuition deposit by the stated date in order to accept the offer of admission. This deposit confirms your intent to attend 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 National Candidates 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.

Embry-Riddle Aeronautical University's admission decision is valid for one term only. Further, when a scholarship is awarded, it is only valid beginning the specific term indicated in the award and/or admissions notification letter. Because admission and scholarship criteria may change from one term to another, admission decisions and scholarship awards are not automatically deferred.

Students requesting a deferral outside of the academic year into which they were originally accepted are required to submit their request in writing to the Director of Admissions. The request must include the reason/s for the deferral. Scholarship deferrals for one term are at the discretion of the Director of Financial Aid as these awards are offered for full term enrollment.

## English Language Proficiency

The Office of Admissions strongly recommends that all of our applicants, for whom English is not the primary language, 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.

## Advanced Standing

Advanced standing may be awarded for prior learning achieved through postsecondary education. 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 submitted 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's 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 U.S. FAA 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.

## 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 after graduating from high school. Transfer applicants are required to submit transcripts from each institution attended.

In making transfer admission decisions, the Admissions Office reviews official transcripts of all college-level work attempted and completed, and letters of recommendation provided. 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 2.50 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 that was earned more than ten years ago will be reviewed and accepted on a case by case basis. 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 the catalog and University policies in effect at the time the student begins courses at Embry-Riddle. 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 or other life 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:

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

## 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 Continuous Enrollment section of the catalog.

## Non-Degree 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.

## 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.

## International Applicants

This refers to non-resident, non-immigrant 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 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. Test of English as a Foreign Language (TOEFL)

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 Associates in Cultural Exchange (ACE) Language Institutes and ELS Language Centers; for more information, please see the English Language Program section. The Office of Admissions also encourages all applicants for whom English is not the primary language 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 TOEFL 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 International Admissions and Programs Office 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) 293-9161  
fax: (202) 872-8857

Educational Credential Evaluators Inc. (ECE)  
P.O. Box 514070  
Milwaukee, WI 53203-3470  
(414) 289-3400  
[www.ece.org](http://www.ece.org) (<http://www.ece.org>)

Foreign Credential Evaluations Inc.  
1425 Market Blvd.  
Suite 330  
PMB #305  
Roswell, GA 30338  
(770) 642-1108  
fax: (770) 641-8381  
[www.fceatlanta.com](http://www.fceatlanta.com) (<http://www.fceatlanta.com>)

International Education Research Foundation Inc.  
P.O. Box 3665  
Culver City, CA 90231  
(310) 258-9451  
fax: (310) 342-7086  
[www.ierf.org](http://www.ierf.org) (<http://www.ierf.org>)

Josef Silny & Associates  
7101 SW 102 Ave.  
Miami, FL 33173  
(305)273-1616  
fax: (305) 273-1338  
email: [info@jsilny.com](mailto:info@jsilny.com)

World Education Services (WES)  
Bowling Green Station, P.O. Box 5087  
New York, NY 10274-5087  
(212) 966-6311  
fax: (212) 739-6100  
email: [info@wes.org](mailto:info@wes.org)  
[www.wes.org](http://www.wes.org) (<http://www.wes.org>)

6. Letters of recommendation are highly recommended.
7. I-20 Requirements for International Students. Upon application, international students must submit the following:
  - A. Affidavit of Financial Support for International Students.
  - B. Supporting bank letter verifying appropriate funds on deposit. This amount will reflect the amount needed to cover tuition, fees, books, health insurance, and living expenses for one year, plus \$3,000 for each accompanying dependent. In the case of sponsored students, an official notification of public or private sponsorship will take the place of a bank letter. A University assistantship contract does not relieve a student from the requirement to provide both a financial affidavit and a supporting bank letter, unless waived by the appropriate University official. International students must be fully prepared upon arrival on campus to meet all normal living expenses and manage their finances for the period of time required to complete the degree.
  - C. At least 30 days prior to matriculation, students accepted for admission must submit a non-refundable \$200 advance tuition deposit to confirm their enrollment to the University. 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.

8. 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 Wellness Center.
9. All flight students are required to hold a current First or Second Class Federal Aviation Administration (FAA) medical certificate. Aviation Medical Examiners (AMEs) are designated by the FAA to issue these certificates, following completion of an application and a physical examination. Aviation Medical Examiners can be found at the FAA Web site, [www.fafsa.gov/pilots/amelocator/](http://www.fafsa.gov/pilots/amelocator/) (<http://www.fafsa.gov/pilots/amelocator/>). International students desiring flight programs will be required to complete federal screening procedures in compliance with U.S. Department of Homeland Security (DHS) notification requirements. Specifics will be provided during the admissions 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 Language Program – Associates in Cultural Exchange (ACE) and ELS Language Centers

In order to help students fulfill the English proficiency requirement, Embry-Riddle in Prescott works as a cooperating school with two agencies: Associates in Cultural Exchange (ACE) and ELS Language Centers. If you meet all other admission criteria beside the TOEFL requirement, Embry-Riddle - Prescott can conditionally admit you while you study English with ACE or ELS Language Centers.

Upon completion of Level 6 with ACE or Level 112 with ELS Language Centers, you can be fully admitted to begin your studies at Embry-Riddle – Prescott.

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

For direct information about Embry-Riddle – Prescott’s cooperating University arrangements with ACE or ELS Language Centers, and for a listing of the ELS Language Centers location nearest to our campus, please contact International Admissions at 001.928.777.6600.

## Graduate Admissions

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.

### 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) 777-6600  
fax: (928) 777-6613  
email: [pradmit@erau.edu](mailto:pradmit@erau.edu)  
<http://www.erau.edu/pr/degrees/>

Apply online at <http://prescott.erau.edu/admissions/graduate>

### 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 Alien Registration Card.
2. **Transcripts.** Official sealed transcripts for all college coursework earned (both graduate and undergraduate). Transcripts 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 letters of recommendation for graduate admission,** 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).

## Admission Time Limit

Applicants who have been accepted for admission into Embry-Riddle graduate programs must enroll in Embry-Riddle graduate courses within 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 non-refundable \$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 Department of Veteran Affairs 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 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, prior course work will be evaluated on a case by case basis. This credit may include prior work on a Graduate Research Project or thesis.

The combined total transfer 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 an Embry-Riddle graduate degree program, a student may elect to apply to another Embry-Riddle graduate degree program. 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.

## International Applicants Special Requirements for International Applicants

Embry-Riddle is authorized under federal laws to enroll non-immigrant alien students. An international applicant is defined as a

non-resident, non-immigrant applicant who enters the USA with a visa allowing for full-time study.

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 79 internet based TOEFL (ibt)/550 written test/213 computer-based test.
2. Official sealed transcripts must be submitted. For any transcript not in English, a notarized English translation must also be provided with the application.

- 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.

## I-20 Requirements for International Students

Upon admission, international students who will be studying at ERAU with an F-1 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 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.

Transfer students should seek the assistance of the international student advisor at their current university to assist them with the transfer procedures. Upon receiving their admission letter, 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, provided that proof of funding has been submitted to ERAU.

## Program Specific Criteria

### M.S. in Safety Science (MSSS)

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

- Mathematics



# Academic Regulations and Procedures

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## 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 published in the next catalog.

## 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. Students in academic difficulty must see their academic advisor for approval of course selection prior to registering. Registration must be completed and payment of all tuition deposits and fees must be made according to instructions published in the Financial Handbook by the Bursars 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. Registration will continue through the first five class days of the semester if circumstances prevent the student from registering during the regular registration period. Except for flight courses, registration will not be allowed after the fifth class day of the semester. Special circumstances can be appealed through the dean of the student's 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.

## Academic Integrity/Conduct

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; and these sanctions 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:
  1. Giving or receiving help from unauthorized persons or materials during examinations.
  2. The unauthorized communication of examination questions prior to, during, or following administration of the examination.
  3. Collaboration on examinations or assignments expected to be individual work.
  4. 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 will be converted to semester credit hours on the following basis: A quarter hour equals two-thirds of a semester hour.

## 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 through the first five class days of the semester or the first three days for summer terms. Change from credit to audit requires an instructor's signature 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 who withdraw from a flight course before their initial attempt at the final phase check receive a W.

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

## 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 actively flying. The grade of IP will be maintained until such time as the student completes the course and receives a letter grade.

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

## 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. Students may request the delivery of an electronic transcript via the Scrip-Safe Transcripts on Demand website: <https://iwantmytranscript.com>.

## Privacy of Student Records

The University respects the rights and privacy of students in accordance with the Family Educational Rights and Privacy Act (FERPA). 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 requests for non-disclosure with the Records Office. Non-disclosure forms remain in place permanently, unless the office is notified otherwise. Students may designate up to three individuals to make payments or access their student records by logging into ERNIE (Embry-Riddle Network for Information Exchange) portal, going to "Student Center", finding the "Personal Information" section, and completing the "Auxiliary Access" process.

Directory information consists of: student name; permanent or local mailing addresses and telephone numbers\*; ERAU e-mail or box address; non-ERAU email addresses or account information\*; date of birth\*; major courses of study and areas of specialization; dates admitted, attended, and graduated; enrollment and class status; campus, school or college attended; degrees sought or earned and dates received or anticipated; awards, honors, and special programs or recognitions; most recent previous school attended; for student athletes and scholarship recipients the ERAU ID and photograph; factual disciplinary history, including results of pending disciplinary processes at time of withdrawal\*; information from public sources.\*

\* These Directory information items may be released without student consent, but only for compelling reasons and only with advanced approval of the Registrar.

The University shall 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:

1. Specify the records to be released.
2. Specify 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.
5. Be signed and dated by the student or former student.

The law authorizes 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 from the request. FERPA allows disclosure of educational records or components thereof under certain conditions. Students desiring additional information regarding FERPA may contact the Records Office.

## Tobacco and Drug Policy

### Student Education and Assistance

Embry-Riddle promotes substance abuse awareness by sponsoring educational programs and distributing literature. The University is 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.

### Tobacco Policy

Embry-Riddle Aeronautical University recognizes the need to ensure an educational and work environment that is reasonably free from various health hazards. It is well established that the use of tobacco products is attributable to certain forms of health problems. In keeping with our core value of making our environment safer for everyone, the university will implement a comprehensive tobacco-free policy for all of our campus locations effective Aug. 1, 2013.

This policy prohibits the use of any tobacco product whether in the form of cigarettes, cigars, pipes, dipping/snuff, smokeless cigarettes or chewing tobacco.

It is the policy of the University that tobacco products will not be allowed anywhere on University owned or leased property (including buildings, parking lots, personal vehicles, etc.). Additionally, tobacco products are prohibited in all University vehicles including vans, trucks, buses, and all University aircraft.

Any University employee or student who violates this policy shall be reminded that the use of tobacco products is not permitted anywhere on campus. Any employee or student who continues to violate or disregard this policy is subject to appropriate disciplinary actions.

Any individual conducting business with the University, or engaged in contracted services, or any visitor to the University who violates this policy, shall be reminded that use of tobacco products prohibited on campus. Continued violations or disregard for this policy shall result in the individual being required to leave University property.

## 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, synthetic or designer 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, synthetic or designer 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 drugs, alcohol and any other substance which may compromise safety 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 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.
3. Pre-employment testing will be required for any student who applies to work in a safety-sensitive student assistant position at the University.
4. The University, in conjunction with judicial proceedings, may also require drug testing. Students will follow the guidelines outlined in the Student Handbook.
5. 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, synthetic, designer or non-prescribed drug, as verified by a medical review officer, will be dismissed from the Flight program and possibly 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 in the flight operations manual.

## Medical Marijuana

Arizona voters recently approved the Arizona Medical Marijuana Act (Proposition 203), which, under certain circumstances, authorizes the possession and use of marijuana for medical purposes by people with debilitating medical conditions who obtain a written certification from a physician. Notwithstanding the passage of Proposition 203, because of the University's obligations under federal law, marijuana, including medical marijuana, will continue to be banned on campus. Additionally, campus health care providers, in accordance with federal law as well as University policies and regulations, will not prescribe medical marijuana.

## Flight

### 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.

Newly matriculated/enrolled flight students who possess the FAA Private Pilot Single Engine Airplane certificate, must register for AS 109 and FA 109. Similarly, students with the FAA Private Pilot

Rotorcraft certificate (or higher) must register for AS 145 and FH 145. During the Add/Drop period at the beginning of the semester, they will be given the opportunity to take the final comprehensive examination for AS 109 or AS 145. If they pass with a grade of 70% or higher, they will be withdrawn from that class and permitted to enroll in the next higher class (AS 221 or AS 252, AS 372 or AS 442). Note: This course challenge can only be taken during the Add/Drop period posted by the Records Office for that semester. All new students who hold a Private Pilot certificate for Airplane Single Engine Land must enroll in FA 109 and all certified helicopter students must enroll in FH 145 for transition flight training.

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 flight training for credit after matriculation must obtain written approval in advance from 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) Fixed-Wing 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 or FH) course must satisfactorily complete at least one FA or FH 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 AOC's requiring FA or FH 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's, 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 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/FS 240 Consular Report of Birth  
-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 and an online application, including identification and a processing fee and be granted permission to initiate training. This information and fee, but not the fingerprints, must be sent prior to beginning each initial rating during flight training and will be coordinated through the Flight Department Records office. Please contact the International Students Office or the Flight Department for more information.

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.

# Undergraduate Regulations and Procedures

## 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 session is 6 credit hours. Students enrolled in fewer credits than the minimum full-time load are classified as part-time. All audited courses and courses taken for credit are counted in determining the student's load for a semester.

The maximum credit hour load is 17 credit hours for spring or fall semester or 9 credit hours for summer term. Students may register for an overload of hours with advisor approval. A student with more than 27 completed ERAU credit hours and a cumulative GPA of 3.00 or higher may register (with advisor written approval) for up to 18 credit hours in a fall or spring semester, with no increase in tuition for hours over the block. Registration for credit hours over 18 will be charged at the per credit hour rate. Registration for the additional credit hours above 17 must be completed at the Office of Records and Registration. The completed credit hours and cumulative GPA will continue to be calculated until the semester start date. A preregistered student's tuition may be recalculated if there is a change in the cumulative GPA or number of completed credit hours.

## Class Attendance

Because regular attendance and punctuality are expected in all courses, attendance may be included in the grading criteria of an individual class. Absences are counted from the first scheduled meeting of the class. Students that do not attend the first week of classes without notifying their instructors will be dropped from the course.

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.

## 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

## 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

## Grade Appeal Process

Students are first encouraged to informally address their issues of concern regarding grades with the course instructor. If a resolution cannot be reached, the student may initiate the formal procedure by submitting a Final Course Grade Challenge form to the Chair of the department responsible for the course, outlining the reasons in detail. The student is encouraged to discuss the grade challenge with the department chair for a solution at this level. The student may obtain the Final Course Grade Challenge form and instructions from the Records Office or the Department Chair. This form must be submitted to the appropriate Department Chair no later than four weeks after the start of the subsequent semester (not including summer terms.)

Reference: Prescott Academic and Administrative Policies 2-3

## 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 wishing to take course equivalency exams must submit their applications to the chair of the academic department offering the course.

## 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 advisors 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.

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

A student may pursue more than one bachelor's degree concurrently and must declare which is to be considered the primary degree, for graduation purposes. For awarding of two bachelors degrees, students must complete all of the required courses for both degrees. The second degree must contain a minimum of 25% more credit hours than is required for the primary degree; at least two-thirds of the additional hours must be in

upper division (300-400) courses; at least 60 credit hours must be completed in residence at the University

## 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 first semester of study remains applicable as long as the student remains in the original degree program.

If a student does not maintain continuous enrollment at the University, they 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 degree with the University unless advance written authorization is granted.

Students in good academic standing must petition in advance to take and 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 or any other institution. Under certain circumstances, 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 18 semester hours (or the equivalent) at another institution. The last 30 hours toward a bachelor's degree must be completed in residence at Embry-Riddle.

## Intra-University Transfer

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 another. 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.

## Academic Standing

### Dean's List and Honor Roll

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 semester. 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. An appropriate notation is made on the academic transcript of a student earning semester honors.

### 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 and may lose eligibility for financial aid programs. The academic programs of students on probation may be restricted. Students who are placed on academic probation will be allowed to complete any flight course in which they are currently enrolled. However, they will not be allowed to enroll in subsequent flight courses until they return to good academic standing. A student who has a semester GPA of less than 1.00 may be placed on academic probation or suspension in accordance with University academic policies.

## Suspension

A student whose CGPA is less than 2.00 for three consecutive 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. A student who has a semester GPA of less than 1.00 may be placed on academic probation or suspension.

## Dismissal

A student suspended for academic reasons and 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 and whose academic performance subsequently deteriorates to a level that would qualify for initial suspension will be dismissed.

Students desiring to appeal an academic dismissal must submit a petition, within 30 calendar days of notification, to the Registrar in the Records Office. The petition will be forwarded to the student's College Dean. The student will provide documentation to the Dean and may appeal in person. The Dean will provide a decision, along with stipulated conditions for a dismissal reversal if appropriate. 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.

## Suspension and Dismissal for Cause

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

1. Actions that pose a risk to the health, safety, or property of members of the University community, including, but not limited to, other students, faculty, staff, administrative officers, or the student himself/herself;
2. Conduct that disrupts the educational process of the University;
3. Any other just cause.

## Readmission

A student who has been suspended from the University for any reason must apply for readmission 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.

## 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 remedied.

Students are first encouraged to address their grievance, whether personal or academic, directly with the appropriate faculty/staff member with responsibility concerning the issue. This is considered an "informal" process and is meant to empower the student to confront the source of their concern, as well as minimize the length of time involved in achieving a resolution. If no agreement is reached, students may choose to put their grievance in writing directly to the next appropriate department head or director with responsibility for the area of concern. Students may seek assistance from the Dean of Students Office to file and process a formal written grievance. Any student, at any time, may choose to file a formal written grievance with the Dean of Students Office. The Dean of Students Office will provide advice and guidance to students who present grievances or complaints, whether personal or academically related. Appeals concerning previously assigned grades are specifically addressed through the academic administrative chain, beginning with the course instructor (see Grade Appeal Process).

## 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 Records 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 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 faculty, staff and students. 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>

## Graduation Requirements and Honors

### 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. A nonrefundable graduation fee will be charged to the student's account.
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.
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 Bachelor of Science in Aerospace Engineering, Computer Engineering, Electrical Engineering, Mechanical Engineering and Software 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 disciplinary probation.
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 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:

Honors Level	CGPA
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

## Graduate Regulations 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.

### Course Load

While full-time status is six credits, students are expected to carry nine credit hours per semester. 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	Incomplete (Passing)	0
IP	In Progress	0



N	No grade submitted by instructor 0 (also used for 690C GRP continuation course)	
P	Passing grade (applies to the grading of the Graduate Internship, GRP, or Thesis)	0
T	Credit accepted by transfer	0

## 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.

## 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.

## 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 another. 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.

## 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 the end of the first calendar month following the end of the semester in which the I grade was assigned. The Dean or Chief Academic Officer (CAO) may waive/extend this period.

## 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. This applies to thesis credit as well. For purposes of repeating a course, all credits for GRP or thesis will be considered as one course.

## Thesis Registration and Grading Registration

1. A student is expected to register for at least one hour of thesis credit from the time the student begins the thesis until it is completed. Academic credit will be granted only for the number of hours designated in the Graduate Catalog for the thesis for the degree being pursued.
2. Students who register for thesis credit during the summer sessions must register for the entire summer (also known as "summer C").
3. An interruption in thesis registration requires written approval in advance from the department chair or designee and is permissible only for educationally sound reasons and only if the student is not making use of University facilities or personnel. Failure to obtain permission will result in a change from IP to F for all thesis credits.
4. The maximum number of credits a student may take at the 700 level is seven. Special permission of the CAO is required to register for additional credits.

## Grading

1. A student enrolled for a thesis will receive a grade each term, as determined by the student's thesis committee. If the student is making progress toward completion of the thesis, a grade of IP will be issued. 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.
2. Upon completion of the thesis a final grade of P or F will be awarded. That grade will replace the IP for all terms in which the student was enrolled for the thesis course.
3. A student who receives a thesis grade of F and wishes to repeat the course must register for the number of thesis hours required by the degree program plus any continuation credit taken, up to a maximum of 7 hours.

## Graduate Research Project (GRP) Registration and Grading

### Registration

1. The initial registration for the GRP course is three semester/term credit hours (course designation 690). Thereafter, the student is expected to register for one hour of GRP each term/semester until the GRP is completed (course designation 690C). Both 690 and 690C will appear on a student's transcript, but academic credit is only granted for 690.



2. Students who register for GRP during the residential campus summer sessions must register for the entire summer (also known as “summer C”).
3. An interruption in GRP registration requires written approval in advance from the department chair or designee and is permissible only for educationally sound reasons and only if the student is not making use of University facilities or personnel. Failure to obtain permission will result in a change from IP to F for 690 and from IP to N for 690C.
4. Students may register for one additional consecutive semester/term only, unless approval is given by the Dean and CAO.

## Grading

1. A student enrolled for a GRP will receive a grade each term, as determined by the student’s project review committee. If the student is making progress toward completion of the GRP, a grade of IP will be issued. 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 690 and from IP to N for 690C.
2. Upon completion of the GRP, a final grade of P or F will be awarded. That grade will replace the IP for 690. All grades of IP will change to N for 690C.
3. A student who receives a GRP grade of F and wishes to repeat the course must register to repeat 690.

## Internship Grading

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

## 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.

## 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’s 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’s 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.

## 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 remedied.

Students are first encouraged to address their grievance, whether personal or academic, directly with the appropriate faculty/staff member with responsibility concerning the issue. This is considered an “informal” process and is meant to empower the student to confront the source of their concern, as well as minimize the length of time involved in achieving a resolution. If no agreement is reached, students may choose to put their grievance in writing directly to the next appropriate department head or director with responsibility for the area of concern. Students may seek assistance from the Dean of Students office to file and process a formal written grievance. Any student, at any time, may choose to file a formal written grievance with the Dean of Students office. The Dean of Students office will provide advice and guidance to students who present grievances or complaints, whether personal or academically related. Appeals concerning previously assigned grades are specifically addressed through the academic administrative chain, beginning with the course instructor (see Grade Appeal Process).

## 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 Records Office.

## Grade Appeal Process

Students are first encouraged to informally address their issues of concern regarding grades with the course instructor. If a resolution cannot be reached, students may initiate the formal procedure by submitting a Final Course Grade Challenge form to the Chair of the department responsible for the course outlining the reasons in detail. The student is encouraged to discuss the grade challenge with the department chair for a solution at this level. The student may obtain the Final Course Grade Challenge form and instructions from the Records Office or the Department Chair.

Reference: Prescott Academic and Administrative Policies 2-3

## 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. See Student Conduct in the Student Life section of this catalog for more information.

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>

## Academic Standing

### 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

Students will be dismissed from their graduate program whenever any of the following conditions occur:

1. Students on conditional status who fail to satisfy the conditions of their admission;
2. A final grade of less than B is received in any three graduate courses;
3. A final grade of F has been received for any two graduate courses;
4. A final grade of F is received in any course worth 6 credit hours or more;
5. The cumulative grade point average has not been raised to at least 3.00 within the first twelve graduate hours attempted after the semester/term in which the student is placed on academic warning;
6. 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 Chief Academic Officer (CAO) or designee within 30 days of the receipt of the dismissal notice. The CAO or designee will refer the petition to the appropriate appeals committee for recommendation. Upon recommendation of the appeals committee, the CAO 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 entered on the student's permanent record and is final.

Students may only appeal a dismissal one time.

## 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.

## 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:

1. A student voluntarily withdraws from the University.
2. A student is dismissed from the University and the dismissal becomes final.
3. 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.
4. 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.

## Graduation Requirements and Honors

### 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. A nonrefundable graduation fee will be charged to the student's account.
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.

# Financial Information

## 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 a 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.

## Payment Procedures

Students may view all account activity, including balance due, online in ERNIE> Student Center>Finances>My Account. 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's Office, 3700 Willow Creek Rd., Prescott AZ 86301, and timed to arrive prior to the 10 day payment deadline. Payments can also be made using the Student Center in Campus Solutions. Charges incurred after the payment deadline are due immediately through the end of the add/drop period. Charges incurred subsequent to the add/drop period 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.

## Payment Plans and Deferments

Payment plans are available each semester for all charges, excluding flight costs. You may enroll in a payment plan for each semester that you are registered. Plans are available online, 30 days prior to the start of each semester, and must be on file by the payment due date. An enrollment fee is added to your first payment.

Anticipated Financial Aid will place a deferment on your account for the amount awarded.

Any student whose tuition and fees are paid by a third party, (Foreign Embassy, U.S. Government, Trust Account, sponsor, etc.) is considered a Sponsored student. Formal arrangements for sponsor payments should be made with the Cashier's Office. Veteran's Education benefits are obtained by contacting the Veteran's Affairs Office.

## 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 anticipated financial aid is higher than the total amount for tuition and fees may request that these funds be transferred to their Eagle Card by the Cashier's Office for book purchases.

## Delinquent Accounts

When a student's account is delinquent, registration for that term is subject to cancellation and registration for any subsequent semester will be denied. Delinquency will result in administrative

withdrawal from the University. Administrative withdrawal will not relieve a student of the obligation to pay outstanding debts. A delinquent student account will result in suspension of all academic processing and information on class performance, grades, and transcripts will be withheld.

Sums remaining unpaid may be charged interest at the maximum rate allowed by law. The student is also subject to the costs of collection, including pre-collection fees up to 9% and collection agency fees (33-50%). In addition, the student will also be subject to attorney's fees if litigation becomes necessary. Delinquent accounts may be reported to one or all three major credit bureaus.

Embry-Riddle Aeronautical University is a not-for-profit institution of higher learning. As such, student receivable accounts are considered to be educational loans offered for the sole purpose of financing an education and are not dischargeable in bankruptcy proceedings.

Financial Responsibility for Tuition, Fees and Other University Charges:

- **Electronic Communication Policy:** Students registering for classes or obtaining other goods and services provided through Embry-Riddle Aeronautical University are advised that the Cashier's Office provides all financial account information using the Student Center in ERNIE. We also send you important notices via your ERAU email account. It is your responsibility to review your ERAU account status and email account twice weekly and make payment by the published due date. You will need to contact the Cashier's Office in writing if you choose not to have your accounts receivable charges paid with your financial aid disbursement. However, this may delay your disbursement.
- If you are receiving an institutional loan, you are obligated to repay the amount of your loan in accordance with the terms outlined in your Promissory Note.
- It is your responsibility to either pay or make arrangements to satisfy all University debts, which may exceed your financial aid, on or before the tuition payment deadline.

## Tuition and Fees

### Residential Campus Tuition and Fees Fall 2013 / Spring 2014 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.

A student with more than 27 completed ERAU credit hours and a cumulative GPA of 3.00 or higher may register (with advisor written approval) for up to 18 credit hours in a fall or spring semester, with no increase in tuition for hours over the block. Registration for credit hours over 18 will be charged at the per credit hour rate. Registration for the additional credit hours above 17 must be completed at the Office of Records and Registration. The completed credit hours and cumulative GPA will continue

to be calculated until the semester start date. A preregistered student's tuition may be recalculated if there is a change in the cumulative GPA or number of completed credit hours. 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 2013/2014 financial insert at: <http://www.erau.edu/er/costs.html>

## 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>.

Student internship fees (based on the cost of one credit hour in a student's degree program) are charged for the semester of internship.

## 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 signature) 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.

## Payment for Helicopter Instruction

The University uses an outside contractor to provide helicopter flight training. Payment is made "Pay-As-You-Go." Eagle Card Flight Dollars are the only accepted form of payment. Students are required to deposit adequate funds in order to start training.

## 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 may be required to live in University-managed housing and participate in the Embry-Riddle Dining Services meal program. A variety  
*Financial Information 09/20/13*

of meal plans are offered that may be supplemented with the Eagle Card to suit individual needs. Please refer to the campus financial brochure for the appropriate campus for current options, requirements, and costs.

## 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 the add/drop period.

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
- International student service fee
- Health service fee
- Technology fee
- Housing fees (on a pro-rated basis - cancellation fee may apply)
- Meal plans (on a pro-rated basis)

## 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 V	Class days 16-20	40%



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

## Summer A/B Sessions

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 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.

## Housing Contracts

Students who have housing contracts must contact the Department of Student Life 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 at <http://prescott.erau.edu/financial-aid/available-programs/index.html> under the Financial Aid section. 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

Students that are applying for admission to the University should complete their federal application (FAFSA). To complete your FAFSA, you must first request a federal PIN (personal identification number) at [www.pin.ed.gov](http://www.pin.ed.gov) (<http://www.pin.ed.gov>), then complete your FAFSA at [www.fafsa.gov](http://www.fafsa.gov) (<http://www.fafsa.gov>). In order to receive federal aid, you must complete your FAFSA every year. Embry-Riddle's school code is 00147900, and our priority deadline is March 1<sup>st</sup> of each year.

## 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 (FSEOG)

### State (Undergraduate Only)

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

## Loans

### Federal

- Federal Direct Stafford Loan (Undergraduate and Graduate)
- Federal Direct Parent Loan for Undergraduate Students (PLUS)
- Federal Perkins Loan (Undergraduate only)
- Federal Direct GRAD 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.

## 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 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

Most Embry-Riddle degree programs are approved by the U.S. Department of Veterans Affairs for enrollment of persons eligible to receive education benefits.

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 requirements. 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) (<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.

*Financial Information 09/20/13*

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. Athletic awards are available for men and women's cross-country, men and women's golf, men and women's soccer, softball, 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.

## 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 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 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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## Dean of Students Office

The Dean of Students Office offers services to assist students seeking resolution and support with difficulties they may encounter, including personal and family emergencies, grievances, and other non-academic concerns and challenges. The Dean of Students oversees all non-academic student conduct and judicial issues as well as disciplinary records. Reporting to the Dean of Students are the Department of Student Life (Residential Housing, Student Activities, Fraternity and Sorority Life, and Clubs and Organizations), International Student Services, the Wellness Center (Health, Counseling, and Campus Ministry), Safety Department, and Veteran's Services. The liaison for the Embry-Riddle Prescott Parents Association is also located in the Dean of Students Office.

The Dean of Students Office is located in Building 17 - 928-777-3770.

## Department of Student Life

The Department of Student Life (DSL) (located in Building 73 - 928-777-3744) is responsible for providing a safe and welcoming environment for all students. In addition to residential housing responsibilities, DSL provides various activities for all students including educational programs, entertainment and off campus trips, student clubs and organizations as well as managing operations for the J. R. Hunt Student Union (Building 16 - 928-777-3781). DSL offers all students an opportunity for engagement, leadership, connection and personal development. DSL works with more than ninety (90) student clubs/organizations to provide resources and leadership opportunities for all.

## Women's and Diversity Center

Building 51 (928) 777-3968

### Purpose/Objectives:

The purpose of the Prescott Campus Women's and Diversity Center is to act as both a resource and an advocate for diversity, including groups underrepresented on the Embry-Riddle campus (women, people of color, LGBTQ, diverse socioeconomic groups, etc.). Its goal is to assist in the improvement of the diversity climate on campus for students, staff, and faculty by promoting mutual respect for the celebration of differences. The Center accomplishes this through educational programs, recommendations to various University departments, and development of long-term initiatives focused on increasing campus diversity. Activities include:

- Producing programs for and about diverse groups on campus.
- Reaching out to the campus at large with programs, training, and consultation.
- Supporting (financially and otherwise) the activities of campus groups who contribute to the diversity of ERAU – Prescott.

- Providing a safe outlet for individuals and groups to voice their diversity concerns.
- Providing advocacy for individual and group interests.
- Performing campus-wide assessment activities to identify the current climate, obstacles to diversity, and fruitful initiatives for the future.
- Reporting to the Senior Administration and the Deans' Council regarding specific diversity initiatives and/or issues, as well as the general diversity climate on the campus.

The Women's and Diversity Center is supported by the Diversity Advisory Board, comprised of student, faculty, and staff representatives from the Embry-Riddle Prescott Campus. The Board advises the Director and campus on policy and program issues, contributes to various programming efforts, and provides direct financial support to diversity-focused efforts on campus.

## Student Activities on Campus

The mission of the Office of Student Activities on the Prescott campus is to provide students with the opportunity to experience co-curricular activities and programs that support and complement the educational process and contribute to a well-rounded education. Through all of its programs and services, the Office of Student Activities supports and fosters five core values in the students of Embry-Riddle Aeronautical University: Leadership, Citizenship, Academics, Excellence, and Practical Competence.

Acknowledging that students are individuals possessing dignity, worth, and the ability to be self-directed, the Department provides the opportunity and support for students to develop social responsibility, group dynamics experience, social interaction, leadership/management skills, communication skills, a greater world view and decision-making skills which encourage personal and professional success.

As a member of the Department of Student Life, the Office of Student Activities develops and implements programs including Carpe Noctem, Passport to ERAU, and the Eagle Leadership Series, while providing comprehensive support to all registered campus clubs and organizations. The Prescott Campus offers a wide variety of student organizations, including: sports clubs, special interest groups, Fraternity and Sorority Life, honor societies, aviation clubs, military organizations, and religious clubs. Involvement in any student 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 Student Organizations Fairs.

The Office of Student Activities is located in the Hunt Student Union (Building 16).

## Carpe Noctem

Latin for "Seize the Night", Carpe Noctem is a late-night activity series, sponsored by the Department of Student Life. Events are held after 9pm and are open to all Embry-Riddle students. Programs vary per semester, but past Carpe Noctem activities have included:

- S' mores
- Private movie screenings

- Paintball trips
- Midnight Laser Tag
- Haunted House Visits
- The infamous finals breakfast
- And much more!

Although most programs are offered for free, some require a small fee paid in Eagle Dollars. Carpe Noctem activities are posted on the University Events calendar and advertised through e-mails and flyers.

## Passport to ERAU

To encourage student success, the Office of Student Activities designs programs to promote the resources available across the campus. Passport to ERAU is a program designed specifically with students in mind. This six-week experience connects students with various resources and social entities both on and off the campus. Two distinct programs, one for first year students and another for upperclassmen, provide unique experiences designed to meet specific needs, increase retention, and build a connection between the student and the University.

To participate in the program, students record progress on "passports" as they complete program activities. Over the six weeks, students collect "stamps" for their passport which make them eligible to win prizes such as movie tickets, ERAU gear, electronics, and even free housing! At the conclusion of the program, students submit their passport and a grand prize drawing is held to celebrate.

## Eagle Leadership Series

Embry-Riddle Aeronautical University is proud to announce a new leadership program, designed specifically for students at Embry-Riddle Aeronautical University. Made possible by a partnership between the Office of Student Activities and the *Ignite Program*, the Eagle Leader Series provides leadership training and opportunities to explore the broad field of leadership. The series includes sets of workshops held each month, which ignite inner passion for leadership while building on the personal leadership skills each student already possesses.

In addition to increasing leadership skills and abilities, students engaged in the program will receive priority consideration for volunteer leadership opportunities with the Office of Student Activities and across campus. Additionally, in recognition of furthering their personal growth, all participants who complete the series by attending at least 6 different workshops will be awarded Eagle Leader Medals during the spring Leadership Ceremony.

## Students Under Age 18

A student under the age of 18 is required to have a signature from a parent or guardian to participate in certain campus events such as field trips, recreational activities, and sporting events. Attempting to obtain a signature for each would be burdensome for both the student and the parent or guardian, possibly causing the student to miss activities normally associated with college life.

A waiver form may be signed one time by the parent or guardian and the student giving consent for the student to sign in place of the parent or guardian for all activities and events that require written consent. Waiver forms are available in the Dean of

Students Office and will be mailed to each underage student prior to their scheduled arrival. The waiver expires the day the student reaches the age of 18.

## Student Government Association (SGA)

The Student Government Association Student Council (SGA) is elected each spring semester by the student body and is responsible for providing a communication link between the students and the faculty, staff, and administration. While representing the student body and serving as the voice of the students, the SGA also provides many services and is actively involved with student activities. SGA services to the students include, but are not limited to: free beverage service, free taxi rides to students when they are in unsafe situations through the Safe Ride program, a weekly shuttle service for shopping, discount cards for local businesses, legal assistance, lockers, free faxing in the Copy Center and free printing in the Student Union. SGA members are actively involved in many of the committees on campus and the president of the SGA serves as a student delegate to the Embry-Riddle Board of Trustees. For questions, comments, or concerns, contact the SGA located in the Student Union, e-mail is prsga@erau.edu or call (928) 777-3784.

## Medical Marijuana

Arizona voters approved the Arizona Medical Marijuana Act (Proposition 203), which, under certain circumstances, authorizes the possession and use of marijuana for medical purposes by people with debilitating medical conditions who obtain a written certification from a physician. Notwithstanding the passage of Proposition 203, because of the University's obligations under federal law, marijuana, including medical marijuana, will continue to be banned on campus. Additionally, campus health care providers, in accordance with federal law as well as University policies and regulations, will not prescribe medical marijuana.

Under Federal legislation entitled The Drug Free Workplace Act of 1988, and The Drug Free Schools and Communities Act of 1989, "no institution of higher education shall be eligible to receive funds or any other form of financial assistance under any federal program, including participation in any federally funded or guaranteed student loan program, unless it has adopted and has implemented a program to prevent the use of illicit drugs and abuse of alcohol by students and employees." Federal law entitled The Controlled Substances Act, prohibits the use, manufacture, distribution, dispensing, or possession of marijuana; it also classifies marijuana as a controlled substance and makes no exception for medical use. Proposition 203 does not change the fact that marijuana remains illegal under federal law; the University will therefore continue to enforce its current policies prohibiting the unlawful manufacture, distribution, dispensation, possession or use of a controlled substance, including medical marijuana, on its property or as part of any of its activities.

In summary, despite popular misconception, Proposition 203 only made possession and use of medical marijuana legal under Arizona law. It did not generally legalize marijuana possession and use. Marijuana remains a controlled substance under federal law and possession and use of marijuana remains illegal under federal law, regardless of whether a person has a prescription or is otherwise complying with Proposition 203. In order to remain



eligible to receive federal grant funding and participate in federally funded student financial aid, the University must require that students, faculty, and staff do not unlawfully possess or use marijuana on campus or as part of any of its activities. As a result, the possession or use of marijuana on campus, even in accordance with the exceptions granted by Proposition 203, is a violation of federal law and the University's current policies and regulations. Employees and students who violate these policies will continue to be subject to disciplinary action.

## Student Grievance Procedure

It is the policy of Embry-Riddle Aeronautical University 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. Students are provided an opportunity to express any complaint, grievance or dispute to be investigated for possible resolution.

The Dean of Students office will provide advice and guidance to students who present grievances or complaints, whether personal or academically related. Appeals concerning previously assigned grades are specifically addressed through the academic administrative chain, beginning with the course instructor (see Grade Appeal Process in Catalog and Student Handbook). The Dean of Students office will provide general guidance on the Grade Appeal process and other academically related issues.

Students are first encouraged to address their grievance, whether personal or academic, directly with the appropriate faculty/staff member with responsibility concerning the issue. This is considered an "Informal" process and is meant to empower the student to confront the source of their concern, as well as minimize the length of time involved in achieving a resolution. If no agreement is reached, students may choose to put their grievance in writing directly to the next appropriate department head or director with responsibility for the area of concern. Students may seek assistance from the Dean of Students office to file and process a formal written grievance. Any student, at any time, may choose to file a formal written grievance with the Dean of Students office.

## Formal Process

1. The Dean of Students or his/her designee will meet with the student to discuss options.
2. Students who wish to file a written grievance or complaint will be requested to submit a report via electronic means, if possible. Students are encouraged to include details, specific information, and a complete description of the issue of contention.
3. The written complaint will be electronically filed in the Student Conduct Data Management System for record keeping purposes. A copy of the report will be forwarded with High Importance notation to the Department Chair, Director or College Dean as appropriate, along with a request for review and follow up.
4. Students will be encouraged to follow up with the Dean of Students office regarding the status of their grievance and/or to seek guidance regarding any phase of the process.

5. The Dean of Students office will keep a record of all correspondence regarding student grievance cases, up to and including resolution, for a minimum of three (3) years following final disposition.

In the event that a student wishes to file a grievance or complaint against another student, the ERAU Student Conduct Board and applicable judicial procedures may be applied (See Student Conduct Board Process – Student Handbook).

When it is appropriate, the Dean of Students office offers formal mediation services for dispute resolution. Mediation may take place in lieu of Student Conduct Board proceedings, but requires commitment on the part of both parties that the process and the outcome are formal and that both parties will accept the final decision.

## Student Rights/Disciplinary Appeals

Embry-Riddle's Standards of Conduct, policies and regulations are established to protect the health, safety, and daily operations of the University community. Students are responsible for knowing and adhering to all published (including electronic) standards, policies and regulations.

The aim of the University Student Conduct proceedings is to arrive at fair, impartial decisions which ensure that individuals assume full responsibility for their actions. As a part of the student's rights and responsibilities, students accused of violating University policies, rules, and regulations shall be entitled to a hearing before an adjudicating person or body. Student conduct proceedings in the University community are administrative rather than criminal in nature. This process is an educational, administrative process, and does not apply the rules of evidence, the rules of civil or criminal procedure, or the standards of the legal system. The authority of the University to hold students accountable for violations of University policies and procedures differs from the power of civil authority to deal with violations of criminal law. Responding to requests to meet with University officials investigating cases and at hearing conferences is the responsibility of every student and is critical to the educational component of the adjudicating process.

Restitution, punitive, disciplinary, corrective or educational actions by the University may be required if a student is determined to be in violation of the Standards of Conduct or if his/her actions may endanger the property or well-being of individuals (including themselves) or organizations.

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 faculty, staff and students. Students may elect to adjudicate an appeal through a University Administrator rather than the Student Affairs Student Conduct Board.

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>

## Student Services

### 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 faculty advisors and an embedded academic advisor. The embedded Academic Advisors conduct new student registration, and both the faculty advisors and embedded Academic Advisors facilitate academic planning and scheduling, assist students in overcoming academic hurdles, and help students comply with academic requirements. Additionally, all advisors serve as role models and mentors, working to build strong relationships with students, and assist students with educational, career, and life decisions.

A Career Services program manager is available in each college to assist students in searching for intern or cooperative education opportunities and in finding a position in industry upon graduation.

Each of the colleges provides a first-semester class designed to transition first-time students into the University and their chosen degree program. In addition, academic assistance (tutoring) is available for all students who wish to participate.

### Safety and Security

The Department of Safety and Security at Embry-Riddle is comprised of a highly dedicated and professional staff. Our officers strive to provide the members of our campus community with a safe and orderly environment that preserves the well-being of the campus community, the University's physical assets, and supports the educational mission of the University. The Safety Department is available 24 hours a day, seven days a week (Building 14, 928-777-3739). We provide campus patrol, communications/dispatch, safe walk, Lost and Found, parking and traffic services/enforcement, Life Safety systems and event management, as well as crime prevention programs to the campus community. These services cover both the main campus and the University's Flight Line. The department also maintains a close liaison with local law enforcement agencies to aid in our goal of providing the safest possible learning environment. The Campus Safety and Security Department is located in Building 14, Phone: (928) 777-3739. To review all Safety Department Policies see the Safety and Security page of the campus website at <http://www.erau.edu/pr/safety/index.html>. To see the Secure Environment Document, Missing Student Protocol and Active Shooter on Campus video go to: [https://ernie.erau.edu/portal/page/portal/safety\\_services](https://ernie.erau.edu/portal/page/portal/safety_services).

## Christine and Steven F. Udvar-Hazy Library and Learning Center

The mission of the Hazy Library and Learning Center is to promote academic success and enrich the learning experience for ERAU students, faculty and staff on the Prescott, Arizona campus.

The library 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 Computer Commons provides 40 computer work stations with several 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 (<http://library.pr.erau.edu>) serves as a gateway to the library catalog, scholarly databases, and thousands of electronic journals and books. The collection is comprised of books, DVDs, technical reports, and current periodical subscriptions and newspapers. The Library also participates in local, state, and national network consortia that allow students access to unlimited information. Professional librarians and expert staff promote academic success by assisting students in locating and evaluating a wide range of information resources. 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 **Undergraduate Research Institute**, located in the Hazy Library and Learning Center (1) connects students with faculty mentors and co-curricular learning opportunities for the purpose of engaging in research and (2) provides education and support for all research activities across all academic disciplines—especially faculty-student collaborations. The **Instructional Design Center** provides assistance in the design, development, and assessment of engaging online and hybrid courses.

The Hazy Library and Learning Center, Building 43, is open seven days a week, for a total of 102 hours throughout the Fall and Spring semesters, with extended hours during final examinations. For more information, visit <http://library.pr.erau.edu> or phone 928-777-3811 for library hours, or 928-777-3761 for research assistance.

### Aviation Safety and Security Archives

The Aviation Safety and Security Archives, located in RASC2 (Building 22), is a repository of research materials donated by leaders in the aviation safety industry. The archives' holdings include accident investigation files, records of safety organizations, photographs, books, reports, and subject reference files. ASASA's web site, <http://archives.pr.erau.edu> provides information about the

collections as well as access to selected items online through the Digital Library.

## 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 university's 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. This is where you will find the Campus Solutions' Student Services Center for access to various services, such as enrollment, unofficial transcripts, class grades, class schedules, account balances, and flight schedules. Information Technology also provides the following services:

- Blackboard online learning system for access to classes and online course materials
- Computerized labs and classrooms
- Various academic software titles (access via the labs and some available through ERNIE)
- Email accounts
- Network storage space
- Storage space for personal Web pages
- Assistance in connecting to the Residential Network (ResNet) for on-campus housing
- Free software downloads, including popular Microsoft titles and anti-virus software
- Wireless Internet access in many buildings and Residence Halls

The ERAU mobile application is available for iPhone, Android and Blackberry devices. Enjoy convenient access to classes and coursework, news and events, campus maps and directories, sports, and videos.

## Mail

All new and continuing, registered students are assigned a campus mailbox and are required to check it daily. 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

## Disability Support Services

The University is committed to ensuring access and providing reasonable accommodation for qualified students with disabilities in accordance with Section 504 of the Rehabilitation Act of 1973

*Student Life and Services 09/20/13*

and the Americans with Disabilities Act (ADA) of 1990. The Disability Support Services (DSS) Office works with students, faculty, and other departments to address a student's academic goals with consideration to their specific disabilities.

Students (admitted or enrolled) who believe they have a need for disability accommodations are responsible for requesting accommodations, filling out an *Intake Form*, and providing qualifying documentation to the DSS Office. Please allow six weeks for this application process. Prospective students with a documented disability are strongly encouraged to contact the DSS Office by email or telephone several months prior to arriving on campus.

For disabilities that may require accommodations related to Housing on campus, incoming students must contact DSS at least three months prior to their expected term start date

Qualifying documentation is defined as medical evaluation(s) on a doctor's letterhead verifying the nature and extent of the disability. While the university does not provide diagnostic testing, we can make referrals for evaluation by area specialists. Costs associated with medical evaluations and testing are the responsibility of the student.

Academic programs that are FAA-certified 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.

Contact the DSS Office with questions at 928-777-6750, or the Disability Support Services Director at: [Marcee.Keller@erau.edu](mailto:Marcee.Keller@erau.edu)

## Veteran's Affairs

The Coordinator for Veteran's Affairs provides assistance for student veterans by assisting with advising, obtaining VA benefits and credit for military training, and serving as an advocate for veteran issues throughout the campus community. The Coordinator, along with veteran student employees, has office hours in the Student Veterans Office, Building 18. The Coordinator also serves as a liaison within the local community, coordinating support from such agencies as Veteran's Upward Bound and the Mobile Vet Center.

The Student Veteran's Organization (SVO) is a recognized club of registered veteran students. The SVO provides activities and programs to support the college experience of all veteran students. The SVO operates out of the Veteran's Office in Building 18 and can be reached by telephone at (928) 777-6733 or fax at (928) 777-6660.

The University provides counseling and mentoring services for our veteran students. In addition, educational programs to support veteran students in adapting to college life, tutoring to support academic excellence and social activities to build collegiality with staff, faculty, and other students are offered through the Veteran's Coordinator and the Student Veteran's Organization.

Specific information for veterans as it relates to Veteran's Administration benefits, the Post 9/11 GI Bill, Montgomery G.I. Bill, Yellow Ribbon Program and University financial responsibilities are available in the Financial Aid Office, in Building 41.

## Center for International Programs and Services (CIPS)

The Center for International Programs and Services (CIPS) at Prescott, houses International Admissions, Study Abroad and the International Student Services. CIPS is the central point of contact for issues concerning international education at Embry-Riddle such as information regarding study abroad and exchange programs, as well as cultural programming. An international student orientation is held each semester to familiarize students with University and immigration policies as well as the education system in the United States. The office advises students on admission to the University and immigration regulations, in addition to financial and personal matters.

CIPS also assists international students with processing forms and documentation of status required by foreign governments, sponsors, the U.S. government and the University. CIPS staff members continually strive to provide opportunities for all students to become involved on campus and in community programs that promote cross-cultural awareness with University faculty, staff, and students as well as the local community.

Some activities include the International Festival – a cultural and social celebration every year, International Education Week, programs with the local community, speaking engagements with local service organizations and schools, and trips to area attractions such as national parks and cultural festivals held in the area.

To learn more about CIPS, contact (800) 888-6600 or (928) 777-3410 or visit our offices in Building 51.

## 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.

The Student Employment office is located in Human Resources in Building 42, the Visitor's Center.

## Career Services

Career Services encourages students to contact them early in their education to explore career options and to develop a successful

internship, full-time professional position, or graduate school search strategy.

We are dedicated to bringing together potential employers and talented professionals to meet their co-op/internship education and full-time needs. Career Services provides our students and alumni with the best job search tools and techniques available in order for them to excel in today's highly competitive job market. This includes providing valuable expertise and resources in the areas of one-on-one career advisement; resume writing and critique services; job search and application links and techniques; interview tips and practice interviews; and The EagleHire Network, a web-based resume referral system, to view postings of regular full-time positions and internship opportunities, which also allows employers to search for candidates.

Industry/Career Expos are held in the fall, where companies visit the Prescott campus to recruit students for full-time, cooperative education, and internship opportunities and to provide information on the industry. Virtual Hiring Events are held in spring, which provide a special showcase of employers' opportunities. On-campus company visits, interviews and informational presentations are also scheduled year-round.

## Health and Wellbeing Wellness Center

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

Services include physician/nurse assessment, prescriptive care, chiropractic care, massage therapy, referrals, wellness education, women's health care, medical grounding of flight students, and assistance with aerospace medical concerns. Mental Health Counseling and Chapel Services are also coordinated through the Wellness Center.

Students must satisfy the mandatory immunization requirement prior to enrollment. The Medical Report form found on the Wellness Center Web page (<http://prescott.erau.edu/campus-services/wellness/medical-forms/index.html>) 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 Wellness Center clinical staff for information on eligibility for medical certification.

The Wellness Center is located in Haas Commons.

## Health Insurance Requirement for Students

All students must have health insurance and provide proof of coverage on an annual basis and 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.

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) (<http://www.uhcsr.com>). 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 into the ERNIE portal. Click on Campus Solutions, Main Menu, Campus Community, ERAU Health Services, Complete Health Insurance Data and Submit.

International students with an F1 or J1 visa must demonstrate proof of coverage that meets the State Department's requirements for international students. The International Student Representative will review each International Students policy and place the waiver code on their account if the policy meets the requirements.

## Counseling Services

The college experience is often complex, offering students tremendous intellectual and personal opportunities, as well as difficult challenges and demands. Many students seek counseling as a means to learn, grow, and enhance their personal and professional skills. College students are faced with many transitions such as moving away from home and ending and beginning relationships.

Individual counseling provides an opportunity for students to meet with a counselor to discuss and explore important aspects of their college experience. Counseling sessions may include adjustment to college life, relationship problems, stress, and more serious personal concerns. Counseling is available without cost to students. Content and records of sessions are confidential.

The Counseling Services office is located in the Wellness Center in Haas Commons.

## SMRT (Sexual Misconduct Resource Team)

"Our mission is to create a learning, working, and living environment that reflects and promotes personal integrity, civility, and mutual respect."

The ERAU Sexual Misconduct Resource Team was established to provide information, education, prevention, response, and to offer resources to students involved with sexual misconduct. It is our hope, that through education and raising consciousness, ignorance around sexual misconduct can be drastically reduced.

### On Campus Resources Include:

Campus Safety (928) 777-3739  
Student Life (928) 777-3790  
Dean of Students (928) 777-3770

*Student Life and Services 09/20/13*

Wellness Center (928) 777-6653  
Counseling (928) 777-6653  
Title IX coordinator (928) 777-3747

### Off Campus Resources Include:

Call 911  
Yavapai Crisis Line 1-928-753-4242  
Yavapai County Victims Services (928) 771-3485  
National Sexual Assault Crisis Line 1-800-656-HOPE (4673)

## Chapel Services

The University recognizes that students may feel challenged by the many questions, experiences, and world views encountered during their college experience. We also recognize 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 is the center where students, faculty, and staff can go to for their spiritual needs - be it meditation, quiet time and reflection, or for activities offered by religious clubs and churches. It is also a place where special events are scheduled during the religious calendar.

Contact (928) 777-6653 for Chapel inquiries and information.

## Eagle Card

The Eagle Card is the official Embry-Riddle Aeronautical University identification card and should be readily available at all times to present to University officials who may request identity verification. The Eagle Card is the property of ERAU, 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 through ETA or at UHI.
- **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 withdrawals permitted from the account(s). The funds will stay there semester-to-semester, year-to-year, and will not be refunded unless the cardholder withdraws, graduates, or is dismissed from the University, with proof required. Flight Account refunds can be requested upon flight course completion or withdrawal from the flight program. A request for a refund must be submitted to the Cashier's Office.

## Lost or Stolen Card

The cardholder is required to immediately contact the Eagle Card Center in Building 13 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 non-functioning 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 transaction in question. In order to resolve the problem, we will require the following:

- Name and student ID 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.

## Residence Life and Dining

### Residence Life Program

Located in Haas Commons, the Department of Student Life 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), and cable TV access. Although computer labs are conveniently located in academic buildings, 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 areas specifically for first year 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 Disability Support Services located in Building 17 or (928) 777-6750.

### Housing Application Policies

Housing information is sent to students who have been accepted to the University. All housing applications and deposits are made online by accessing the Student Tab within ERNIE. Contracts must be submitted online to the Department of Student Life, with a \$200 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 all requests for housing.

## New Students

Students released from their housing contract 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.

## 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 seven-day access or five-day access meal plan.

### Mingus Mountain Complex (Halls 1-5)

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

### Upper Class and Non-Traditional Student Housing

### Mingus Mountain Complex (Hall 5)

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

### Village Complex (Halls 6-10)

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

### Thumb Butte Complex (M100-M400)

- 1-bedroom suite shared by 2 people with a private bath

## Dining Services

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

## Meal Plans

Meal plan costs are listed on the Meal Plan Application and may be obtained by calling Campus Dining at (928) 777-3768. 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 at any campus dining location. Other plan options are available for students not required to live in University-managed housing.

## Meal Plan Options for non-required students

- All You Can Eat (during the hours of Earhart's Dining 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 for non-required students (number of meals for the semester)

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

## Athletics

### Intramural and Recreational Sports

Intramural and Recreational Sports strive to create an atmosphere of competition and fun by offering a wide variety of activities ranging from team sports such as flashball (flag football variation), volleyball, basketball, dodgeball, soccer, and softball to individual competition in such sports as table tennis, racquetball, tennis, and disk golf. Other sports are also available on request.

The director assists individual students, 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 basketball courts, playing fields, indoor racquetball, gymnasium, and fitness center). Hours of operation vary for each facility and are posted at the respective facility.

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.

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.

## 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 Prescott Campus is a member of the California Pacific Conference (CAL PAC) within the National Association of Intercollegiate Athletics (NAIA) and successfully competes against opponents from all divisional levels of college athletics. The collegiate men's and women's soccer team each won the CAL

PAC Soccer Championships in 2012. Women's volleyball finished second in the Cal Pac Volleyball Championships in 2012. Our student-athletes continue to excel in the class room as well with 17 Academic All-Americans since 2011.

The National Soccer Coaches Association of America recognized the ERAU-Prescott Men's and Women's Soccer teams for the Team Award for the Academic Year 2010- 2011. The men's soccer program was recognized with the award for the seventh time in program history for their cumulative GPA of 3.10. The women's soccer team received the recognition for a fourth consecutive year with their 3.48 GPA. The University sponsors nine intercollegiate sport programs at the Prescott Campus: men's and women's cross-country, men's and women's golf, men's and women's soccer, men's wrestling, women's softball, 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 tryout information, contact the Intercollegiate Athletics Department, located in building 80, adjacent to the Eagle Gym.

For more information on Eagle Intercollegiate Athletics, including game schedules, rosters, results, and statistics, log on to <http://www.embryriddlesports.com>.

# Special Opportunities

## Embry-Riddle Honors Program

The Honors Program at Embry-Riddle is highly selective, offering students an enriched educational experience while also giving them opportunities to enhance campus and community life for others. Honors Program students enroll in several general education seminars focused on relevant, stimulating, interdisciplinary topics that encourage critical and creative thinking. Honors classes are small, the faculty is 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 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, typically consisting of 6 credit hours taught over a five-week summer session, offer students the chance to learn language skills and the culture and history of the country they are studying in through Embry-Riddle classes taught overseas. A variety of semester-long and year-long exchange and study abroad 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 and study abroad programs except under special circumstances) from the Prescott, Daytona Beach, and Worldwide campuses have the opportunity to take courses through our partner schools that will be directly applicable to their degree programs at Embry-Riddle while participating in numerous cultural activities abroad. Foreign language classes are often an essential part of ERAU programs, 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 Career Services Director, and, when applicable, with the co-op/internship faculty advisor in their degree program. For undergraduates, one (1) upper-level open elective credit hour is awarded for every 100 clock hours of work completed, up to a maximum of six (6) credits in one semester. For graduate students, one (1) credit hour is awarded for each 200 clock hours of work completed, up to a maximum of three (3) credit hours from the semester. Additional information is available from Career Services and on the Career Services website (<http://prescott.erau.edu/csmpud-services/career/index.html>). A co-op/internship fee, based on the cost of one (1) credit hour in a student's degree program, is charged each semester.

## ROTC

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.

## Air Force

The Air Force Reserve Officer Training Corps (Air Force ROTC) is a leadership and 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 commission as 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 classes. 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.

## Three-Year Program

While Air Force ROTC is designed to be completed over four school years, it is possible for in-coming sophomores to enter the program with the intention of completing it in three. Under this program, a student will take both the freshman and sophomore classes in the first year and then continue with the junior and senior years on the same track as his or her 4-year counterparts. Not until the start of the junior year does a student incur an obligation to join the Air Force, unless the student accepts an Air Force scholarship sooner. Candidates for the three-year program must be approved in advance by the detachment commander.

## 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 for qualified students on a competitive basis, 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 \$250-\$400 per month (see Financial Information). High school students interested in a scholarship should apply as soon as possible in the six-month application period (mid-May 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 and sophomores can earn three-year 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

In addition to the Air Force's scholarship aid, Embry-Riddle also offers University funded financial incentives to new high school Air Force ROTC Tuition Scholarship winners. University incentives are offered at the discretion of the campus Financial Aid Office, not Air Force ROTC. University incentives include any University funded scholarships, grants, and awards. University funded incentives, in

combination with funding from Air Force ROTC and other sources, cannot exceed the cost of education. Air Force ROTC Tuition Scholarship winners should contact the Financial Aid Office for more information regarding financial incentives funded by the University. 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

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 can earn 18 hours of academic credit for completing four years of Army ROTC. Those who do so may be eligible for a Defense Studies minor. 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.

## 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 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 Joint Base Lewis McChord, 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, physical fitness and SAT/ACT scores, the better their chance of being selected as a scholarship recipient.

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
- In addition to the Army's scholarship aid, Embry-Riddle also offers University funded financial incentives to new high school Army ROTC Tuition Scholarship winners. Army Green to Gold Scholarship winners may be eligible for these incentives as well. University incentives are offered at the discretion of the campus Financial Aid Office, not Army ROTC. University funding includes any University funded scholarships, grants, and awards. University funding, in combination with funding from Army ROTC and other sources, cannot exceed the cost of education. Army ROTC Tuition Scholarship winners should contact the Financial Aid Office for more information regarding financial incentives funded by the University.

## Admission to the Basic Course:

Admission requirements are:

- Enrollment in a baccalaureate or master's 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
- Agree, whether scholarship or non-scholarship, to be contracted to complete the Advanced Course requirements and serve on active duty, reserve, or National Guard duty as a commissioned officer
- Maintain at least a 2.00 overall academic CGPA and a 3.00 ROTC CGPA
- 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 a 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  
<http://prescott.erau.edu/rotc/army-rotc>

## Physical Training

All contracted cadets are required to attend physical training three days per week as part of the course grade. Physical training is normally conducted on Monday, Wednesday, and Friday from 6-7 a.m.

## Marine Corps

For freshmen, sophomores, and juniors, the Marine Corps offers the Platoon Leaders Course (PLC). Freshmen and sophomores attend two six-week summer training sessions over two years, and juniors attend one ten-week training session. Both the six-week and the ten-week sessions are located at Quantico, Va. During the training sessions, candidates can earn from \$2,885 to \$4,810, depending on which training session is attended. In addition, eligible candidates may apply for two financial assistance programs, the Marine Corps Financial Assistance Program (MCFAP) and the Marine Corps College Tuition

Assistance Program (MCTAP). Call or visit the Web site (<http://officer.marines.com/>) to receive more information.

To be eligible for the program, the student must be a U.S. citizen (either native-born or naturalized), between the ages of 18-28 (exceptions are considered), with full-time enrollment in a minimum of 12 academic credits per semester, have minimum GPA of 2.0, and 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 an 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 over 20 military occupational specialties not directly related to piloting aircraft.

Openings are available for men and women with any major. Contact the Officer Selection Officer at (480) 894-0439 OR (602) 432-1204 (CELL).

# Degrees and 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 general education and academic specialization, the two components complementing each other. Detailed information about specific degree programs is listed by College and information on Minor courses of study follows in the subsequent section.

The following degree programs are currently offered at the Prescott Campus.

## Degrees

### Bachelors

- B.S. in Aeronautical Science (p. 74)
- B.S. in Aeronautics (p. 80)
- B.S. in Aerospace Engineering (p. 96)
- B.S. in Air Traffic Management (p. 82)
- B.S. in Applied Meteorology (p. 84)
- B.S. in Astronomy (p. 54)
- B.S. in Aviation Business Administration (p. 56)
- B.S. in Aviation Environmental Science (p. 59)
- B.S. in Computer Engineering (p. 99)
- B.S. in Cyber Intelligence and Security (p. 61)
- B.S. in Electrical Engineering (p. 101)
- B.S. in Global Security and Intelligence Studies (p. 63)
- B.S. in Interdisciplinary Studies (p. 69)
- B.S. in Mechanical Engineering (p. 103)
- B.S. in Safety Science (p. 86)
- B.S. in Software Engineering (p. 107)
- B.S. in Space Physics (p. 71)

### Masters

- M.S. in Safety Science (p. 90)

### Combined Program

- B.S./M.S. in Safety Science (p. 88)

### Certificate Program

- Aircraft Dispatcher (p. 93)

## Undergraduate Requirements

### Basic Skills Requirement

Embry-Riddle recognizes the importance of communication and quantitative skills in all areas of aerospace. Successful pilots, engineers, physicists, field agents, 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 basic mathematics skills, students must enroll in a quantitative skills course (e.g. MA 106) designed to help them prepare for 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 an approved English proficiency test (e.g. TOEFL or IELTS). 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 ability, the general education program enables students, regardless of their degree program, to understand the significance of acquiring a broad range of knowledge.

Throughout the general education program, students gain and enhance competence in written and oral communication. They practice reasoning and critical thinking skills and demonstrate computer proficiency. As students engage in this course of study, they familiarize themselves with and investigate ideas and methodologies from several disciplines including 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. Three hours may be satisfied by placement, examination, or course completion. The other three hours must be completed by taking a course that has 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.

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

## Social Sciences and Economics

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, government, economics, psychology, or sociology.

\* 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.

## University General Education Competencies

While taking General Education required courses, students develop a basic set of General Education skills (i.e., competencies, listed below) based on course learning outcomes. This skills set will be instrumental to student success in upper level courses within their degree program; in these courses students will practice application of this skill set, eventually demonstrating mastery before graduation. As a result, students will graduate with a set of General Education competencies that will provide the basis for success in life and on the job. The following skills are the competencies that all University students will develop, practice, and master in preparation for graduate school or the workplace.

### Critical Thinking

The student will apply knowledge at the synthesis level to define and solve problems within professional and personal environments.

### Quantitative Reasoning

The student will demonstrate the use of digitally-enabled technology (including concepts, techniques and tools of computing), mathematics proficiency and analysis techniques to interpret data for the purpose of drawing valid conclusions and solving associated problems.

### Information Literacy

The student will conduct meaningful research, including gathering information from primary and secondary traditional or electronic sources and incorporating and documenting source material in his or her writing.

### Communication

The student will communicate concepts in written, digital and verbal forms to present technical and non-technical information.

### Scientific Literacy

The student will be able to analyze scientific evidence as it relates to the physical world and its interrelationship with human values and interests.

### Cultural Literacy

The student will be able to analyze historical events, cultural artifacts, and philosophical concepts.

## Graduate Requirements

### Master of Science in Safety Science

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 MSSS 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.

## Doctor of Philosophy (Ph.D.) in Aviation

The demand for aviation professionals with the skills to conduct research and solve problems continues to grow in response to the increasing complexity and evolution of the aviation field. The Ph.D. in Aviation program is designed to address that need by allowing students to pursue doctoral studies in aviation in a diverse, intellectually versatile and multi-disciplinary environment. It is the first Ph.D. in aviation in the U.S.

Courses are offered online for greater accessibility to the working professional. Participation in three six-day, on-campus residency seminars is required during the program. This program format provides doctoral degree students an innovative way to achieve their personal, educational, and professional goals.

The Ph.D. in Aviation program is designed to enable students to achieve the following learning objectives: develop mastery of the central theories and concepts in the field of aviation, including foundations, safety management, economics, and regulatory procedures; pose and solve theory-based and research-based problems designed to advance applications in the field of aviation; extend the aviation body of knowledge by conceiving, planning, producing, and communicating original research; develop and demonstrate expertise in instructional processes; and demonstrate leadership, collaboration, and communication necessary for scholarly work in aviation.

Courses are offered during three 15-week terms per year. The program requires completion of four aviation core courses, a four-course sequence in statistics and research methodology, and four specialization or cognate courses. A qualifying exam tests student's mastery of core and cognate subject matter and is conducted at the end of the course work.

Completion and defense of a dissertation is the final phase of the program. The dissertation is a formal academic paper that constitutes the culmination of the doctoral program.

The purpose of the dissertation is to prepare students to be professionals in a discipline, to develop the skills necessary to engage in independent research, and to advance the body of knowledge in aviation. The program requires completion of 90 credit hours of course work, residency seminars, and dissertation courses, including 30 credit hours from the student's master's degree.

Specific information about the program, including admission and course requirements, can be found in the Embry-Riddle Aeronautical University Doctoral Programs Catalog, and at the program website: <http://aviationphd.erau.edu>.



# College of Arts and Sciences

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Dr. Archie Dickey, 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 helping our students develop as scholars, professionals, and citizens.

Cherished pursuits of the College are developing leaders, inculcating moral and ethical integrity, helping to resolve local, regional, national, international, and global issues, and supporting both the uniqueness of the individual and the integration of the individual into the larger community.

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.

## 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, aesthetic apperception, critical thinking, moral and ethical judgment and behavior, and leadership. Our General Education courses provide our students a strong foundation for success, not only in their degree programs but in their careers after graduation.

## U.S. Army 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. Please refer to the Financial Assistance section of the catalog for more information.

## 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. They also 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, international risk and threat assessment through The Eagle Eye report, which is co-produced by faculty and students, and the Eagle Operations Center. 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 that benefits not only their scholarly discipline but also the world at large. Students often work closely with faculty on grants, contracts, and other scholarly pursuits. Our Space Physics faculty and students, particularly, epitomize learning through scholarship and research, demonstrated through endeavors like their involvement with the laser interferometer gravitational wave observatory. Another source of excellence is the FAA-sponsored research undertaken by our Aviation Environmental Science faculty into critical areas of inquiry such as bird-strike investigations. Our 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.

## Degrees

### Bachelors

- B.S. in Astronomy
- B.S. in Aviation Business Administration
- B.S. in Aviation Environmental Science
- B.S. in Cyber Intelligence and Security
- B.S. in Global Security and Intelligence Studies
- B.S. in Interdisciplinary Studies
- B.S. in Space Physics

## B.S. in Astronomy

The Bachelor of Science in Astronomy is a program designed to prepare students for work in space-related and aerospace-related industries, academic and government research laboratories, graduate studies in astronomy and astrophysics, and other careers such as science education. Astronomy is the study of celestial objects such as planets, stars, nebulae, and galaxies, as well as the Universe as a whole. Astronomers apply the fundamental laws of physics to celestial objects to understand the appearance and behavior of those objects. Students will explore objects ranging from the nearby (e.g., the Solar System) to the farthest reaches of the Universe and its origin (e.g., cosmology and the Big Bang).

In addition to classroom learning, students will gain hands-on experience with astronomical equipment, such as telescopes and sophisticated electronic cameras, using the Campus Observatory Complex. Students will learn how to plan, execute, and analyze astronomical observations. In their senior year, students satisfying course and GPA requirements have the option of completing a senior research thesis project in an area of interest that overlaps with the research interests of a supervising faculty member. Opportunities also exist before the senior year for student-faculty research projects. Whether contributing to the fundamental knowledge of astronomical objects, furthering space exploration, or engaging in one of an additional variety of available careers, graduates of this program will be prepared to become leaders in space-related fields.

### 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 Astronomy 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 Astronomy. The list is organized as a “vertical outline” according to the year and semester 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 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.

Students may not pursue both an Astronomy B.S. degree and a Space Physics B.S. degree. However, also note that the degree requirements for the first three semesters of both degree programs can be satisfied with the same courses. Thus, a student who is making appropriate progress in either the Astronomy or Space Physics degree programs can switch to the other program after the third semester with a complete transfer of credit from one program to the other.

## Suggested Program of Study

### Freshman Year

Fall		Hours
	COM Elective *	3
MA 241	Calculus and Analytical Geometry I	4
PS 215	Physics I	3
PS 216	Physics I Laboratory	1
PS 105	General Chemistry I	4
PS 105L	General Chemistry I Laboratory	0
UNIV 101	College Success	1
<b>Hours Subtotal</b>		<b>16.0</b>

### Spring

MA 242	Calculus and Analytical Geometry II	4
PS 204	General Astronomy	3
PS 208	Physics II	3
PS 221	Intermediate Physics Laboratory	2
	SS Lower-Level Elective *	3
<b>Hours Subtotal</b>		<b>15.0</b>

### Sophomore Year

Fall		Hours
	COM Elective *	3
MA 243	Calculus and Analytical Geometry III	4
PS 219	Physics III	3
PS 222	Intermediate Astronomy	3
PS 232	Computational Methods in the Physical Sciences	3
<b>Hours Subtotal</b>		<b>16.0</b>

### Spring

MA 335	Introduction to Linear and Abstract Algebra	3
MA 345	Differential Equations and Matrix Methods	4
PS 271	Techniques of Observational Astronomy	3
PS 303	Modern Physics	3
PS 315	Modern Physics Laboratory	2
<b>Hours Subtotal</b>		<b>15.0</b>

### Junior Year

Fall		Hours
	COM Elective*	3
MA 441	Mathematical Methods for Engineering and Physics I	3
PS 330	Electricity and Magnetism I	3
PS 340	Astrophysics I	3
	Technical elective	3
<b>Hours Subtotal</b>		<b>15.0</b>

### Spring

PS 408	Astrophysics II	3
	HU Lower-Level Course	3
	SS Upper-Level Elective *	3
	Open Elective	3

	Technical Elective	3
	<b>Hours Subtotal</b>	<b>15.0</b>
<b>Senior Year</b>		
<b>Fall</b>		
PS 321	Classical Mechanics I	3
PS 490	Senior Research Thesis, Part I	3
	HU Upper-level Elective	3
	Open Elective	4
	Technical Elective	3
	<b>Hours Subtotal</b>	<b>16.0</b>
<b>Spring</b>		
PS 350	Quantum Mechanics I	3
PS 380	Optics Laboratory	3
PS 491	Senior Research Thesis, Part II	3
	Open Elective	3
	<b>Hours Subtotal</b>	<b>12.0</b>
Hours Total:		120.0

or PS 499	Special Topic in Physical Science	
MA 412	Probability and Statistics	3
MA 443	Complex Variables	3
MA 299	Special Topics in Mathematics	1-4
or MA 399	Special Topics in Mathematics	
or MA 499	Special Topics in Mathematics	
Any other upper-division technical course with approval of the Astronomy Department		

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

#### Communications Electives

COM 122	English Composition	3
COM 219	Speech	3
COM 221	Technical Report Writing	3
COM 222	Business Communication	3
COM 225	Science and Technology Communication	3
or any COM 3XX or COM 4XX course		3

#### Lower-Level Social Science Electives

EC 210	Microeconomics	3
EC 211	Macroeconomics	3
Any Lower-Level SS, RS, or SIS course		3

#### Lower-Level Humanities Electives

Any HU 140 Series Course		3
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#### Upper-Level Humanities Electives

Any Upper-Level HU Course		
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#### Upper-Level Social Science Electives

Any Upper-Level SS Course		
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#### Technical Electives

PS 322	Classical Mechanics II	3
PS 331	Electricity and Magnetism II	3
PS 405	Atomic Nuclear Physics	3
PS 412	Particle Physics and Cosmology	3
PS 413	Particle Physics and Cosmology II	3
PS 420	Remote Sensing	3
PS 422	Space Propulsion	3
PS 451	Quantum Mechanics II	3
PS 299	Special Topics in Physical Science	1-4
or PS 399	Special Topic in Physical Science	

## B.S. in 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, aviation 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 Chicago, Las Vegas, Toronto, Seattle, San Francisco and Hong Kong).

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. 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.

### 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 sophomore 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 3 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 MSL 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 is in 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 concentration in residence or transfer those credits from institutions approved by the Department Chair.

General Education	39
Business Core	48
Area of Concentration	15-16
Open Electives	18-17
<b>Total Hours</b>	<b>120</b>

### General Education

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

### Business Core

BA 102	Introduction to Aviation Business and Industry <sup>†</sup>	3
or AS 120	Principles of Aeronautical Science	
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 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
Total Hours		48

## Areas of Concentration

### Airport Management

BA 408	Airport Management	3
BA 308	Public Administration	3
BA 418	Airport Administration and Finance **	3
BA/EC Business Electives (300-400 level)		6
Total Hours		15

### Finance

BA 334	Investment Analysis	3
BA 342	International Finance	3
BA 434	Corporate Finance II	3
or BA 329	Forensic Accounting and Fraud Examination	3
BA/EC Business Electives (300-400 level)		6
Total Hours		15

### Flight Operations - Fixed Wing

AS 119	Private Pilot Operations	4
AS 221	Instrument Pilot Operations	3
AS 321	Commercial Pilot Operations **	3
FA 119	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
Total Hours		16

### Flight Operations - Helicopter

AS 142	Private Helicopter Operations	3
AS 252	Instrument Helicopter Operations	3
AS 372	Commercial Helicopter Operations **	3
FH 142	Helicopter Pilot Flight Private	1
FH 252	Helicopter Pilot Flight Instrument	1

FH 372	Helicopter Pilot Flight Commercial	1
300-400 Level AS, BA, EC, SF, or WX *		3
Total Hours		15

Students selecting Flight Operations areas of concentration need to begin the coursework as soon as possible. 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.

## Management

The focus is to produce an aviation management generalist. The culminating focus course is BA 436.\*\*

### Courses Available as Designated Electives

Select any five designated electives of which a minimum of two must be aviation focused and a minimum of four must be BA/EC: 15

BA 308	Public Administration	
BA 322	Aviation Insurance ***	
BA 324	Aviation Labor Relations ***	
BA 329	Forensic Accounting and Fraud Examination	
BA 333	Personal Financial Planning	
BA 334	Investment Analysis	
BA 342	International Finance	
BA 408	Airport Management ***	
BA 410	Management of Air Cargo ***	
BA 415	Airline Management ***	
BA 418	Airport Administration and Finance ***	
BA 421	Small Business Management	
BA 425	Trends and Current Problems in Air Transportation ***	
BA 427	Management of Multicultural Workforce	
BA 434	Corporate Finance II	
BA 399/499	Special Topics in Management	
EC 420	Economics of Air Transportation	
EC 399/499	Special Topics in Economics	
AES 403	Wildlife and Airports ***	
AES 406	Environmental Management	
AS 402	Airline Operations ***	
SIS 420	Aviation Security and Technology ***	
Total Hours		15

**Open Electives** 17-18

**Total Degree Requirements** 120

† Requirement may also be fulfilled by Private Pilot License.

\* Must be approved by the Department Chair.



\*\* These classes are considered the concentration capstone for the respective concentration.

\*\*\* These classes are considered aviation focused.

## Suggested Program of Study

### Freshman Year

	Hours
Lower-Level Social Sciences	3
Physical and Life Sciences	3
Any HU 14X	3
IT 109 Introduction to Computers and Applications	3
COM 122 English Composition	3
MA 111 College Mathematics for Aviation I or MA 120 Quantitative Methods I	3
BA 102 Introduction to Aviation Business and Industry † or AS 120 Principles of Aeronautical Science	3
BA 201 Principles of Management	3
EC 210 Microeconomics	3
Open Elective	3
<b>Hours Subtotal</b>	<b>30.0</b>

### Sophomore Year

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 220 Quantitative Methods II or BA 352 Business Quantitative Methods	3
Open Elective	3
<b>Hours Subtotal</b>	<b>30.0</b>

### Junior Year

Upper-Level Humanities -OR- Social Sciences	3
BA 312 Managerial Accounting	3
BA 319 Managerial 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>Hours Subtotal</b>	<b>30.0</b>

### Senior Year

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>Hours Subtotal</b>	<b>30.0</b>
Hours Total:	120.0

**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.**

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 English Composition	3
COM 219 Speech	3
COM 221 Technical Report Writing or COM 222 Business Communication	3

### Computer Science

IT 109 Introduction to Computers and Applications	3
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### Humanities and Social Sciences

Any HU 140 Series Course	3
EC 210 Microeconomics	3
Select one of the following:	3

PSY 101 Introduction to Psychology

SS 110 World History

SS 120 U.S. History

SS 130 History of Aviation in America

SS 204 Introduction to Geography

SS 210 Introduction to Sociology

HU/SS Upper-Level Course 3

### Mathematics

MA 120 Quantitative Methods I or MA 111 College Mathematics for Aviation I	3
MA 222 Business Statistics	3
MA 220 Quantitative Methods II or BA 352 Business Quantitative Methods	3

### Physical and Life Sciences

Select two of the following (of which one course must include a laboratory): 6

Any AES or PS course or

SIS 260 Forensic Science Applications in Security and Intelligence

or WX 201 Survey of Meteorology

## B.S. in Aviation Environmental 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 the precise knowledge and technical skills needed to tackle 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 federal and state air quality specialist, and airports and municipalities' environmental specialist.

### Degree Requirements

The AES program consists of several components: general education, AES core, designated electives, and a co-op experience. The general education element provides the fundamentals in math, social sciences, computers, and communication. The AES core is designed to give the student basic science knowledge and demonstrate the ways in which business, economics, geography, and policy studies integrate with environmental aspects of their future careers. AES students are also required to complete a co-op experience prior to graduation. This experience will link their AES academic work with their professional future. The Bachelor of Science in Aviation Environmental Science (AES) requires successful completion of a minimum of 120 credit hours.

### Aviation Environmental Science Core Courses

AES 111	Plant Biology	4
AES 112	Animal Biology	4
AES 142	Intro to Environmental Science	3
AES 240	Natural History of the Region	3-4
or AES 309	Principles of Ecology	
AES 308	Atmospheric Environmental Studies	3
AES 330	Environmental Consulting	3
AES 403	Wildlife and Airports	3
AES 406	Environmental Management	3
AES 490	Senior Seminar	3
AS 120	Principles of Aeronautical Science	3
BA 201	Principles of Management	3
BA 308	Public Administration	3
BA 390	Business Law	3
BA 408	Airport Management	3
EC 210	Microeconomics	3
or EC 211	Macroeconomics	
PS 108	Contemporary Chemistry	3

SS 204	Introduction to Geography	3
CEAES 396	Coop Ed Avia Environmental Sci	3
Total Hours		56-57

### Designated Electives

Select six of the following:		18
AES 306	Pollution Prevention	
AES 312	Plant Identification	
AES 313	Riparian Ecology	
BA 311	Marketing	
BA 335	International Business	
BA 410	Management of Air Cargo	
BA 421	Small Business Management	
WX 201	Survey of Meteorology	
WX 261	Applied Climatology	
Total Hours		18

### Suggested Program of Study

#### Freshman Year

	Hours	
AES 111	Plant Biology	4
AES 112	Animal Biology	4
AES 142	Intro to Environmental Science	3
COM 122	English Composition	3
COM 219	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>Hours Subtotal</b>		<b>29.0</b>

#### Sophomore Year

AES 240	Natural History of the Region	3-4
or AES 309	Principles of Ecology	
AS 120	Principles of Aeronautical Science	3
BA 201	Principles of Management	3
COM 221	Technical Report Writing	3
or COM 222	Business Communication	
PS 108	Contemporary Chemistry	3
SS 204	Introduction to Geography	3
	Lower-Level SS	3
	Upper-Level HU/SS	3
	Designated Electives	6
<b>Hours Subtotal</b>		<b>30.0-31.0</b>

#### Junior Year

AES 308	Atmospheric Environmental Studies	3
AES 330	Environmental Consulting	3
AES 403	Wildlife and Airports	3
BA 308	Public Administration	3
BA 390	Business Law	3
EC 210	Microeconomics	3

or EC 211	Macroeconomics	
	Upper-Level HU/SS	3
	Designated Electives	3
	Open Electives	6
	<b>Hours Subtotal</b>	<b>30.0</b>
<b>Senior Year</b>		
AES 406	Environmental Management	3
AES 490	Senior Seminar	3
BA 408	Airport Management	3
	Designated Electives	9
	Open Electives	9-10
	<b>Hours Subtotal</b>	<b>27.0-28.0</b>
<b>Summer Session</b>		
CEAES 396	Coop Ed Avia Environmental Sci	3
	<b>Hours Subtotal</b>	<b>3.0</b>
<hr/>		
	Hours Total:	120

**Communication Theory and Skills**

COM 122	English Composition	3
COM 219	Speech	3
COM 221	Technical Report Writing	3
or COM 222	Business Communication	

**Humanities**

Lower-Level

HU 14X

Upper-Level

HU 300-400

**Social Sciences**

Lower-Level

SS 100-200

Upper-Level

SS 300-400

**Computer Science**

IT 109	Introduction to Computers and Applications	3
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**Mathematics**

MA 120	Quantitative Methods I	3
MA 222	Business Statistics	3

## B.S. in Cyber Intelligence and Security

The Cyber Intelligence and Security (CI) degree program, offered by the Department of Global Security and Intelligence Studies, is designed to provide graduates with the knowledge and skills essential for entry into cyber security, cyber analytics, and security operations and management careers.

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 internet/ business environment. Dedicated faculty advisors assist CI students in evaluating the many opportunities available to them in this program. Emphasis is placed on effective communications, quantitative skills, global awareness, social responsibility, ethical and legal grounding, information technology, critical thinking skills, teamwork, computer and network functional skills, broad cyber industry familiarity, and a commitment to lifelong learning.

Course requirements include a core computer science foundation with lecture and labs, 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, unmanned aviation, global security and intelligence, and culture and language.

### Degree Requirements

The Bachelor of Science degree in Cyber Intelligence and Security (CI) requires successful completion of a minimum of 120 credit hours, and is normally completed in eight semesters. Students choose one of three options as a part of their senior capstone - either a project, a thesis, or internship/co-op program. Some courses may require prerequisite subject knowledge or particular class standing. Course descriptions should be reviewed prior to registration to ensure proper placement.

The Embry-Riddle Aeronautical University – Prescott Bachelor of Science degree program in Cyber Intelligence and Security is in candidacy for accreditation as a Center of Excellence by the NSA. Embry Riddle is a member of the Cyber Patriot program and the CyberWatch Network.

In order to be awarded a CI degree, a student is required to complete a minimum of 80% of the core in residence or transfer those credits from institutions approved by the Program Director.

### General Education

COM 122	English Composition	3
COM 219	Speech	3
COM 221	Technical Report Writing	3
EGR 115	Introduction to Computing for Engineers	3
MA 120	Quantitative Methods I	3
MA 220	Quantitative Methods II	3
EC 210	Microeconomics	3

PS 113	Introductory Physics I	3
PS 114	Introductory Physics II	4
HU14X	lower level	3
	Lower level SS/PSY Course	3
	Upper level HU/SS course	3
<b>Total Hours</b>		<b>37</b>

### Cyber Core

BA 201	Principles of Management	3
BA 210	Financial Accounting	3
BA 312	Managerial Accounting	3
BA 320	Business Information Systems	3
BA 420	Management of Production and Operations	3
CS 125	Computer Science I	4
CS 222	Introduction to Discrete Structures	3
CS 225	Computer Science II	4
CS 213	Introduction to Computer Networks	3
CS 317	Files and Database Systems	3
CS 305	Database Systems and Data Mining	3
CS 420	Operating Systems	3
MA 222	Business Statistics	3
MA 320	Decision Mathematics	3
<b>Total Hours</b>		<b>44</b>

### Intelligence & Security Concentration

CI 119	Introduction to Cyber Security	3
CI 310	Intelligence, Surveillance and Reconnaissance	3
CI 311	Securing Computer Networks	3
CI 450	Computer Forensics II	3
CS 303	Network Security	3
CS 432	Information and Computer Security	3
SIS 210	Security Fundamentals	3
SIS 315	Studies in Global Intelligence I	3
SIS 323	Intelligence and Technology	3
<b>Total Hours</b>		<b>27</b>

### Senior Capstone

<b>Choose one of the following:</b>		<b>3</b>
CI 490	Cyber Capstone Project	
CI 475	Cyber Senior Thesis	
CECI 396/496 Cooperative Education		
SIS 470	Senior Cooperative Internship	
<b>Total Hours</b>		<b>3</b>

### Electives

Upper Level HU course	3
Upper level SS/PSY course	3

Upper level SIS course	3
Total Hours	9

## Suggested Program of Study

This suggested sequencing is appropriate for most CI students. However, those seeking to supplement with a minor should consult their advisor.

### Freshman Year

Fall		Hours
UNIV 101	College Success *	1
EGR 115	Introduction to Computing for Engineers	3
CI 119	Introduction to Cyber Security	3
COM 122	English Composition	3
MA 120	Quantitative Methods I	3
EC 210	Microeconomics	3
<b>Hours Subtotal</b>		<b>16.0</b>
Spring		
CS 125	Computer Science I	4
BA 201	Principles of Management	3
	HU 14X lower level	3
MA 220	Quantitative Methods II	3
PS 113	Introductory Physics I	3
<b>Hours Subtotal</b>		<b>16.0</b>

### Sophomore Year

Fall		
CS 222	Introduction to Discrete Structures	3
CS 225	Computer Science II	4
SIS 210	Security Fundamentals	3
PS 114	Introductory Physics II	4
<b>Hours Subtotal</b>		<b>14.0</b>
Spring		
CS 213	Introduction to Computer Networks	3
SIS 315	Studies in Global Intelligence I	3
CI 310	Intelligence, Surveillance and Reconnaissance	3
COM 221	Technical Report Writing	3
BA 210	Financial Accounting	3
<b>Hours Subtotal</b>		<b>15.0</b>

### Junior Year

Fall		
	Lower level SS course	3
CS 317	Files and Database Systems	3
COM 219	Speech	3
MA 222	Business Statistics	3
CS 303	Network Security	3
<b>Hours Subtotal</b>		<b>15.0</b>
Spring		
CI 311	Securing Computer Networks	3
BA 312	Managerial Accounting	3
MA 320	Decision Mathematics	3
SIS 323	Intelligence and Technology	3

CS 305	Database Systems and Data Mining	3
<b>Hours Subtotal</b>		<b>15.0</b>

### Senior Year

Fall		
	Elective	3
	Elective	3
CS 420	Operating Systems	3
CI 450	Computer Forensics II	3
BA 320	Business Information Systems	3
<b>Hours Subtotal</b>		<b>15.0</b>
Spring		
	Capstone	3
BA 420	Management of Production and Operations	3
CS 432	Information and Computer Security	3
	Elective	3
	Upper level HU/SS course	3
<b>Hours Subtotal</b>		<b>15.0</b>
Hours Total:		120

## Footnotes

- \* UNIV 101 meets open elective or credit in excess of degree requirement.



## B.S. in Global Security and Intelligence Studies

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, psychological dimensions of military and terrorist threats, cyber-security, environmental security issues, and human cultures. The program will explore the implications of these multiple factors to 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 in obtaining positions and performing

1. with federal government intelligence, security, law enforcement and emergency management agencies
2. with the Department of Defense and the armed services
3. with security, competitive intelligence and information protection departments in the private sector especially those involved in aviation and transportation security
4. with state, county and local homeland security, law enforcement and emergency management organizations,
5. as students in graduate schools focusing on intelligence and national security, international relations, regional studies,
6. as students in law schools
7. as staffers for political leaders and legislative representatives specializing in national intelligence and security issues.

### 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 computer operations and applications.

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, forensic science, the law, economics, psychology, government and foreign policy, and the history of intelligence.

The GSIS core and the designated electives are designed to demonstrate the ways in which societies and cultures, economies, systems of thought, military developments, and environmental concerns are shaping the international system.

In the senior year, the GSIS major will select one of four areas of concentration: Pre-Law and Government, Intelligence, Criminal Justice and Security, or Security and Intelligence. Each area of concentration contains at least five courses, allowing the student to gain a deeper understanding in a more specialized field. The fourth option for the area of concentration, Security and Intelligence, is to choose a total of five courses from both the Intelligence and Criminal Justice and Security areas of concentration, two from one and three from the other.

GSIS students are required to complete a senior project prior to graduation. The options include a senior thesis (SIS 475), a senior internship including a research paper (SIS 470), or a semester-long capstone course including a simulated intelligence and security scenario using the GSIS operations center (SIS 415). The senior internship is designed to provide the students with practical experience and increase their employment opportunities. The capstone scenario will enable the student to demonstrate his or her knowledge and understanding gained in the GSIS Program in a simulated crisis situation in a real-world environment. 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.

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.

The Bachelor of Science in Global Security and Intelligence Studies (GSIS) requires successful completion of a minimum of 122 credit hours.

### Three Degree Tracks

The GSIS degree program provides the student with three curricular tracks: the Standard track, the Security Operations Management track and the Chinese track.

Students who take the Standard track are required to demonstrate oral and reading competency in a language other than English, or by taking 12 credits of college-level foreign language courses in one language.

The Security Operations and Management track is geared towards those interested in a career in security and protection; either in private industry or with a governmental security and intelligence agency. Course requirements for this track include 12 hours of

foreign language, general education courses, GSIS core classes and 33 credits in specialty courses.

Students who take the Chinese track will take the same subject area courses and the same number of credits as those in the Standard or Security Operations Management tracks. The overall difference is that, in the Chinese track, students will take 45 credits in courses that will be entirely in Chinese or have a significant Chinese component with supplementary reading and writing assignments in English, rather than the 12 credits in a foreign language required by the other two tracks. The Chinese track is not open to native speakers of Chinese. The 45 credits include the 12 required foreign language credits for the Standard track, the 9 credits in the Chinese Minor, and 24 additional credits which will be offered by teaching content courses in Mandarin Chinese with supplementary reading and writing assignments in English. Study abroad in the summer of the sophomore year is required for Chinese track students.

## Standard Track

General Education	38
Standard Track Core Courses	36
Foreign Language	12
Designated Electives	9
Area of Concentration	15
Open Electives	9
Senior Project	3
<b>Total Hours</b>	<b>122</b>

## General Education

AES 1XX	Biology with laboratory	4
COM 122	English Composition	3
COM 219	Speech	3
COM 223	Intelligence Writing	3
HU 14X	Humanities & Arts	3
CI 119	Introduction to Cyber Security	3
MA 120	Quantitative Methods I	3
or MA 140	College Algebra	
MA 222	Business Statistics	3
PSY 101	Introduction to Psychology	3
SIS 260	Forensic Science Applications in Security and Intelligence	4
SS 110	World History	3
Upper Level HU/RS/SS elective)		3
<b>Total Hours</b>		<b>38</b>

## Standard Track Core Courses

BA 201	Principles of Management	3
EC 210	Microeconomics	3
or EC 211	Macroeconomics	
PSY 313	Personality and Profiling	3
or PSY 306	Deceptions	
SIS 100	Introduction to Global Security	3
SS 120	U.S. History	3
SIS 200	Introduction to the U.S. Legal System	3

College of Arts and Sciences 09/20/13

or SS 290	History of Modern Europe	
SIS 210	Security Fundamentals	3
SS 204	Introduction to Geography	3
SIS 315	Studies in Global Intelligence I	3
SS 320	Government of the U.S.	3
SS 327	International Relations	3
SS 340	U.S. Foreign Policy	3
<b>Total Hours</b>		<b>36</b>

## Foreign Language Requirement

A minimum of twelve credits of foreign language are required for degree completion. All courses must be in the same language.\*

Foreign Language *	12
<b>Total Hours</b>	<b>12</b>

## Designated Electives

Students must complete a minimum of 9 credit hours by selecting from upper-level SIS, SS, RS or HU courses or from the courses specified below with approval of their faculty advisor or the GSIS program chair:

Select a minimum of three of the following:	9	
AS 220	Unmanned Aircraft Systems	
BA 329	Forensic Accounting and Fraud Examination	
EC 210	Microeconomics	
EC 211	Macroeconomics	
SS 260	Cultural Anthropology	
<b>Total Hours</b>		<b>9</b>

## Areas of Concentration (AOC)

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.

### Intelligence

Select five of the following:	15	
SIS 317	Political Change, Revolution, and War	
SIS 323	Intelligence and Technology	
SIS 328	Intelligence Analysis, Writing, and Briefing	
SIS 335	Counter-Intelligence	
SIS 400	International Security and Globalization	
SIS 405	Environment and Security	
SIS 418	Islam: Origins, History, and Role in the Modern World	
Upper level SIS course as approved by Program Chair		
<b>Total Hours</b>		<b>15</b>

### Criminal Justice and Security

Select five of the following:	15	
SIS 312	Global Crime and International Justice Systems	

SIS 414	Government and Corporate Security Management	
SIS 420	Aviation Security and Technology	
SIS 422	Homeland Security and Technology	
SIS 425	Information Protection and Computer Security	
SIS 430	Emergency Management and Contingency Planning	
Upper level SIS course as approved by Program Chair		
Total Hours		15

## Pre-Law and Government

BA 390	Business Law	3
SS 410	International Human Rights	3
SIS 312	Global Crime and International Justice Systems	3
SIS 416	Middle Eastern Comparative Law	3
SIS 421	History and Philosophy of Law/Jurisprudence	3
Total Hours		15

## Security and Intelligence

Choose 5 Courses from the Intelligence and Criminal Justice and Security AOCs		15
Total Hours		15

## Senior Project

Students must complete one of the following as their senior project:		3
SIS 415	Studies in Global Intelligence II	
SIS 470	Senior Cooperative Internship	
SIS 475	Senior Thesis	
Total Hours		3

**Standard Track Total Credits** 122

## Suggested Program of Study Standard Track

### Freshman Year

	Hours
AES 1XX Biology with laboratory	4
COM 122 English Composition	3
COM 219 Speech	3
HU 14X Lower-Level Humanities	3
MA 120 Quantitative Methods I or MA 140 College Algebra	3
PSY 101 Introduction to Psychology	3
SIS 100 Introduction to Global Security	3
SS 110 World History	3
CI 119 Introduction to Cyber Security	3
Open elective	3
<b>Hours Subtotal</b>	<b>31.0</b>

### Sophomore Year

BA 201	Principles of Management	3
COM 223	Intelligence Writing	3
	Foreign Language I & II	6
MA 222	Business Statistics	3
SIS 200	Introduction to the U.S. Legal System	3
or SS 290	History of Modern Europe	
SIS 210	Security Fundamentals	3
SIS 260	Forensic Science Applications in Security and Intelligence	4
SS 120	U.S. History	3
SS 204	Introduction to Geography	3
<b>Hours Subtotal</b>		<b>31.0</b>

### Junior Year

EC 210	Microeconomics	3
or EC 211	Macroeconomics	
	Foreign Language III & IV	6
SIS 315	Studies in Global Intelligence I	3
SS 320	Government of the U.S.	3
SS 327	International Relations	3
	AOC courses	6
	Designated Electives	3
	Open elective	3
<b>Hours Subtotal</b>		<b>30.0</b>

### Senior Year

PSY 313	Personality and Profiling	3
or PSY 306	Deceptions	
SIS 415	Studies in Global Intelligence II	3
or SIS 470	Senior Cooperative Internship	
or SIS 475	Senior Thesis	
SS 340	U.S. Foreign Policy	3
	AOC courses	9
	Designated Electives	6
	Open Electives	3
	Upper level HU/RS/SS electives	3
<b>Hours Subtotal</b>		<b>30.0</b>
<b>Hours Total:</b>		<b>122.0</b>

## Security Operations Management Track

General Education	38
Security Operations Core Courses	36
Foreign Language	12
Security Operations Mgmt Specialty Courses	33
Senior Project	3
<b>Total Hours</b>	<b>122</b>

## General Education

AES 1XX	Biology with laboratory	4
COM 122	English Composition	3
COM 219	Speech	3

COM 223	Intelligence Writing	3
HU 14X	Humanities & Arts	3
CI 119	Introduction to Cyber Security	3
MA 120	Quantitative Methods I	3
or MA 140	College Algebra	
MA 222	Business Statistics	3
PSY 101	Introduction to Psychology	3
SIS 260	Forensic Science Applications in Security and Intelligence	4
SS 110	World History	3
Upper Level HU/RS/SS elective)		3
Total Hours		38

## Security Operations Management Track Core Courses

BA 201	Principles of Management	3
EC 210	Microeconomics	3
or EC 211	Macroeconomics	
SIS 100	Introduction to Global Security	3
SS 120	U.S. History	3
SIS 200	Introduction to the U.S. Legal System	3
or SS 290	History of Modern Europe	
SIS 210	Security Fundamentals	3
SIS 315	Studies in Global Intelligence I	3
SS 204	Introduction to Geography	3
SS 320	Government of the U.S.	3
PSY 313	Personality and Profiling	3
or PSY 306	Deceptions	
SS 327	International Relations	3
SS 340	U.S. Foreign Policy	3
Total Hours		36

## Foreign Language Requirement

A minimum of twelve credits of foreign language are required for degree completion. All courses must be in the same language.\*

Foreign Language *	12
Total Hours	12

## Security Operations Specialty Courses

BA 308	Public Administration	3
or SIS Upper Level		
BA 309	Government Acquisitions and Contracting	3
BA 329	Forensic Accounting and Fraud Examination	3
or SIS Upper Level		
CS 213	Introduction to Computer Networks	3
CS 304	Introduction to Computer Forensics	3
SIS 335	Counter-Intelligence	3
SIS 340	Security Investigations and Interview	3
SIS 414	Government and Corporate Security Management	3

SIS 422	Homeland Security and Technology	3
SIS 425	Information Protection and Computer Security	3
SIS 426	Physical Security and Facility Design	3
Total Hours		33

## Senior Project

Students must complete one of the following as their senior project:		3
SIS 440	Security Operations Management Practicum	
SIS 470	Senior Cooperative Internship **	
Total Hours		3

**Security Operations Management Track Total Credits 122**

## Suggested Program of Study Security Operations Management Track

### Freshman Year

	Hours	
AES 1XX Biology with laboratory	4	
COM 122	English Composition	3
HU 14X Lower-Level Humanities	3	
CI 119	Introduction to Cyber Security	3
MA 120	Quantitative Methods I	3
or MA 140	College Algebra	
PSY 101	Introduction to Psychology	3
SIS 100	Introduction to Global Security	3
SIS 260	Forensic Science Applications in Security and Intelligence	4
SS 110	World History	3
<b>Hours Subtotal</b>		<b>29.0</b>

### Sophomore Year

BA 201	Principles of Management	3
EC 210	Microeconomics	3
or EC 211	Macroeconomics	
COM 219	Speech	3
COM 223	Intelligence Writing	3
Foreign Language I & II	6	
MA 222	Business Statistics	3
SIS 210	Security Fundamentals	3
SIS 200	Introduction to the U.S. Legal System	3
or SS 290	History of Modern Europe	
SS 120	U.S. History	3
SS 204	Introduction to Geography	3
<b>Hours Subtotal</b>		<b>33.0</b>

### Junior Year

BA 308	Public Administration	3
or SIS Upper Level		
CS 213	Introduction to Computer Networks	3
Foreign Language (III & IV)	6	

PSY 313	Personality and Profiling	3
or PSY 306	Deceptions	
SIS 315	Studies in Global Intelligence I	3
SS 327	International Relations	3
SS 320	Government of the U.S.	3
SS 340	U.S. Foreign Policy	3
	Upper Level HU/RS/SS Elective	3
	<b>Hours Subtotal</b>	<b>30.0</b>
<b>Senior Year</b>		
BA 309	Government Acquisitions and Contracting	3
BA 329	Forensic Accounting and Fraud Examination	3
	or SIS Upper Level	
CS 304	Introduction to Computer Forensics	3
SIS 335	Counter-Intelligence	3
SIS 340	Security Investigations and Interview	3
SIS 414	Government and Corporate Security Management	3
SIS 422	Homeland Security and Technology	3
SIS 425	Information Protection and Computer Security	3
SIS 426	Physical Security and Facility Design	3
SIS 440	Security Operations Management Practicum **	3
or SIS 470	Senior Cooperative Internship	
	<b>Hours Subtotal</b>	<b>30.0</b>
	Hours Total:	122.0

## Chinese Track

General Education	38
Chinese Core Courses	36
Foreign Language Requirement (See below) Chinese	27
Specialty Courses	
Area of Concentration	15
Designated Elective - CI 119	3
Senior Project	3
<b>Total Hours</b>	<b>122</b>

## General Education

AES 1XX	Biology with laboratory	4
COM 122	English Composition	3
COM 223	Intelligence Writing	3
LCH 206	Contemporary Chinese Literature	3
LCH 208	Speech in Chinese	3
LCH 209	Computer Communication and Applications in Chinese	3
LCH 306	Asian Literature	3
LCH 400	Eastern and Western Civilization	3
MA 120	Quantitative Methods I	3
or MA 140	College Algebra	
MA 222	Business Statistics	3
PSY 101	Introduction to Psychology	3

SIS 260	Forensic Science Applications in Security and Intelligence	4
<b>Total Hours</b>		<b>38</b>

## Chinese Track Core Courses

BA 201	Principles of Management	3
EC 210	Microeconomics	3
or EC 211	Macroeconomics	
LCH 207	Introduction to Geography	3
SIS 100	Introduction to Global Security	3
SS 120	U.S. History	3
SIS 200	Introduction to the U.S. Legal System	3
or SS 290	History of Modern Europe	
SIS 210	Security Fundamentals	3
SIS 315	Studies in Global Intelligence I	3
SS 320	Government of the U.S.	3
PSY 313	Personality and Profiling	3
or PSY 306	Deceptions	
SS 327	International Relations	3
SS 340	U.S. Foreign Policy	3
<b>Total Hours</b>		<b>36</b>

## Foreign Language Requirement

Students must complete a minimum of 45 credits of course work in Chinese. These course are scattered throughout the General Education, Core and Specialty course sections.

## Chinese Track Specialty Courses

LCH 103	Chinese I and II	6
LCH 203	Chinese III and IV	6
LCH 205	Modern Chinese Films	3
LCH 303	Intermediate Chinese I and II	6
LCH 402	Cross-Cultural Communications	3
LCH 4XX	Senior Review	3
<b>Total Hours</b>		<b>27</b>

## Area of Concentration (AOC)

Students must select one Area of Concentration from the AOC choices listed above in the GSIS Standard Track. The options are Intelligence, Criminal Justice and Security, Pre-Law and Government or Security and Intelligence.

Area of Concentration	15
<b>Total Hours</b>	<b>15</b>

## Designated Elective

CI 119	Introduction to Cyber Security	3
<b>Total Hours</b>		<b>3</b>

## Senior Project

Students must complete one of the following:	3	
SIS 475	Senior Thesis	
SIS 470	Senior Cooperative Internship **	



SIS 415	Studies in Global Intelligence II
<hr/>	
Total Hours	3
<b>Chinese Track Total Credits</b>	<b>122</b>

## Suggested Program of Study

Students in the Chinese Track must meet with their advisor each semester to discuss their study plan and are required to complete a study abroad session the summer after their sophomore year

## General GSIS Program Notes

- \* Non Chinese track GSIS students may meet the foreign language requirement in several ways:
  - Complete 12 credit hours of one foreign language at ERAU
  - Transfer 12 credit hours of one foreign language from another accredited institution of higher education.
  - Transfer less than 12 credit hours of one foreign language from another accredited institution of higher education and complete the remaining credit hours in the same language at ERAU with the language instructor's approval.
  - Take an approved national foreign language examination such as those offered by Brigham Young Foreign Language Achievement Testing Service (FLATS) Examination ,DOD Defense Language Proficiency Tests or AP Advanced Placement Tests and apply for Advanced Standing.
  - Take a Course Equivalency Examination receive credit for one or all of the equivalent language courses with the language instructor's and the appropriate department chairperson's approval.

Students should contact Dr. Leeann Chen, the GSIS Program Language Coordinator, with any questions they may have.

- \*\* Senior Cooperative Internship must be with a federal, state, or local law enforcement or intelligence organizations or a corporate security organization and must be approved by the Program Chair.

# B.S. in Interdisciplinary Studies

## Program Plan of Study and Requirements

The Interdisciplinary Studies program consists of a set of core requirements and three minors, allowing students to essentially design their own degree programs. 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. 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, thus preparing students to meaningfully and usefully connect their three minors. The program 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 degree culminates in a senior capstone requirement, which most often takes the form of a co-op experience.

Students meet regularly with the interdisciplinary studies program chair or faculty advisors to develop and revise their individual plan for degree completion. This plan involves evaluating their career objectives and selecting three appropriate minors.

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Check the course descriptions 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, including a minimum of 40 credit hours of upper-division courses (300-400 level).

General Education	36
Core Requirements	30-33
Minors and Open Electives	51-54
<b>Total Credit Hours</b>	<b>120</b>

## General Education

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 Hours</b>	<b>36</b>

## Core Requirements

### Cross Discipline Core

BA 201	Principles of Management	3
PSY 101	Introduction to Psychology **	3
MA 222	Business Statistics **	3
Select one of the following:		3
AS 120	Principles of Aeronautical Science	
IS 100	Interdisciplinary Studies - Issues in Facing the Future	
SS 130	History of Aviation in America	
FAA	Private Pilot Certificate	
<b>Total Hours</b>		<b>12</b>

### Enhanced General Education

Select six credits from the following:		6
Any HU 14X series		
SS 204	Introduction to Geography	
SS 210	Introduction to Sociology	
SIS 100	Introduction to Global Security	
LAR	Arabic I & II	
LCH	Chinese I & II	
LSP	Spanish I & II	
Summer Study Abroad		
Select one of the following:		3
HU 330	Values and Ethics	
HU 341	World Philosophy **	
HU 345	Comparative Religions **	
<b>Total Hours</b>		<b>9</b>

### International Focus

Select two of the following:		6
BA 335	International Business	
HU 335	Technology and Modern Civilization	
SIS 312	Global Crime and International Justice Systems	
SIS 315	Studies in Global Intelligence I	
SIS 317	Political Change, Revolution, and War	
SIS 320	Global History, Politics, and Culture	
SIS 400	International Security and Globalization	
SIS 415	Studies in Global Intelligence II	
SS 327	International Relations	
SS 333	U.S. - Asian Relations	
SS 340	U.S. Foreign Policy	
<b>Total Hours</b>		<b>6</b>

### Capstone Experience

IS 399	Special Topics in Interdisciplinary Studies (OR Cooperative Education)	3-6
<b>Total Hours</b>		<b>3-6</b>

<b>Total Credits</b>	30-33
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## Minors and Open Electives

Students must select three minor fields of study which range in credits from 15 to 21. Open Electives will complete any remaining credits after the selection of minors.

<b>Minors and Open Electives</b>	51-54
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\* 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 required if not taken for general education credit.

### Communication Theory and Skills

COM 122	English Composition	3
COM 219	Speech	3
COM 221	Technical Report Writing	3
COM 222	Business Communication	3
COM 223	Intelligence Writing	3
COM 260	Introduction to Media	3
COM 351	Journalism	3
COM 410	Advanced Professional Writing	3
COM 411	Web Design Workshop	3
COM 420	Advanced Technical Communication I	1
HU 319	Advanced Speech	3
HU 355	Creative Writing	3
HU 363	Communication and Society	3
HU 399	Special Topics in Humanities	6
HU 499	Special Topics in Humanities	6

### Humanities

Lower-Level

Any HU 14X course

Upper-Level

HU 300-400 level

### Social Sciences

Lower-Level

EC 100-200 level

SS/PSY 100-200 level

Upper-Level

SS/PSY 300-400 level

## B.S. 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-related 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 satisfying course and GPA requirements have the option of completing a senior thesis project in an area of interest that overlaps with the research interests of a supervising faculty member. Current faculty interests include: astrophysics, particle physics and cosmology, gravitational waves, general relativity, and exotic propulsion.

### 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 description section 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.

### Suggested Program of Study

#### Freshman Year

	Hours
COM Elective *	3
MA 241 Calculus and Analytical Geometry I	4
MA 242 Calculus and Analytical Geometry II	4
PS 105 General Chemistry I	4
PS 204 General 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>Hours Subtotal</b>		<b>31.0</b>
<b>Sophomore Year</b>		
	COM Elective *	3
	HU Lower-Level Elective *	3
MA 243	Calculus and Analytical Geometry III	4
MA 335	Introduction to Linear and Abstract Algebra	3
MA 345	Differential Equations and Matrix Methods	4
PS 219	Physics III	3
PS 222	Intermediate Astronomy	3
PS 232	Computational Methods in the Physical Sciences	3
PS 303	Modern Physics	3
PS 315	Modern Physics Laboratory	2
<b>Hours Subtotal</b>		<b>31.0</b>
<b>Junior Year</b>		
	COM Elective *	3
MA 435	Linear and Abstract Algebra II	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 350	Quantum Mechanics I	3
PS 380	Optics Laboratory	3
	Open Electives	3
	Technical Elective	3
<b>Hours Subtotal</b>		<b>30.0</b>
<b>Senior Year</b>		
PS 405	Atomic Nuclear Physics	3
PS 430	Thermodynamics and Statistical Mechanics	3
PS 490	Senior Research Thesis, Part I ***	3
PS 491	Senior Research Thesis, Part II ***	3
	Technical Electives	6
	HU Upper-Level Elective	3
	SS Upper-Level Elective	3
	Open Electives	4
<b>Hours Subtotal</b>		<b>28.0</b>
Hours Total:		120.0

\* 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.

\*\* Open elective or in excess of degree requirement.

\*\*\* In their senior year, eligible students will choose a thesis project in association with a supervising faculty member. Students who are not eligible to take PS 490 and PS 491 will instead take 6 credits of technical electives selected from the list below. Eligibility for taking PS 490 is described in the prerequisites for the course in the course description section of the catalog.

#### Communications Electives

COM 122	English Composition	3
COM 219	Speech	3
COM 221	Technical Report Writing	3
COM 222	Business Communication	3
COM 225	Science and Technology Communication	3
or any COM 3XX or COM 4XX course		

#### Lower-Level Social Sciences Electives

EC 210	Microeconomics	3
EC 211	Macroeconomics	3
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	3
PS 331	Electricity and Magnetism II	3
PS 375	Planetary Science	3
PS 408	Astrophysics II	3
PS 412	Particle Physics and Cosmology	3
PS 413	Particle Physics and Cosmology II	3
PS 420	Remote Sensing	3
PS 422	Space Propulsion	3
PS 451	Quantum Mechanics II	3
PS 299	Special Topics in Physical Science	1-4
or PS 399 Special Topic in Physical Science		
or PS 499 Special Topic in Physical Science		
MA 412	Probability and Statistics	3
MA 443	Complex Variables	3
MA 299	Special Topics in Mathematics	1-4
or MA 399 Special Topics in Mathematics		
or MA 499 Special Topics in Mathematics		

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



# College of Aviation

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Dr. Gary Northam, 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, Applied Meteorology, Aeronautics, Air Traffic Management, Safety Science, and a Masters Degree in Safety Science.

The Aeronautical Science Program 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 Commercial, Instrument-Rated pilot, make up the core of the Aeronautical Science degree. Professional-level aeronautical science and flight courses prepare the graduate for a career as a professional civil or military pilot.

The 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.

The B.S. in Applied Meteorology prepares students for careers in meteorology, including weather forecasting, research, the military, and aviation, including dispatching. The program is housed in a well-equipped, modern facility. The program 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 B.S. in Safety Science provides the student with skills and knowledge for a career in Aviation Safety or Occupational Safety and Health. The program delivers an effective foundation in safety that prepares the student for any industrial setting and allows each student to select an Aviation Safety or Occupational Safety and Health area of concentration (AOC). 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.

Students enrolled in the Flight program fly a mix of aircraft, many with advanced avionics, and several state-of-the-art Flight Training devices. 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.

Air Traffic Control – Collegiate Training Initiative (AT-CTI): The Federal Aviation Administration (FAA) approved AT-CTI program at the Prescott campus includes the following degree programs: BS in Aeronautical Science, BS in Aeronautics, and BS in Applied Meteorology. By current FAA mandate, only students enrolled in one of these degree programs is eligible for inclusion in the AT-CTI program. Students who declare and enroll in one of these three majors may request enrollment in the Air Traffic Control minor area of concentration and may then become eligible for the AT-CTI program by satisfactorily completing the required courses.

The current recommended path to becoming an air traffic control specialist with the FAA is to earn the Bachelor of Science degree in Air Traffic Management.

## Degrees

### Bachelors

B.S. in Aeronautical Science  
 B.S. in Aeronautics  
 B.S. in Air Traffic Management  
 B.S. in Applied Meteorology  
 B.S. in Safety Science

### Masters

M.S. in Safety Science

### Combined Program

B.S./M.S. in Safety Science

### Certificate

Aircraft Dispatcher Certification

## B.S. in Aeronautical Science (Professional Pilot)

The Aeronautical Science degree program blends flight training with rigorous academic study in a unique manner that provides a strong foundation for a career as a leader in the aviation industry, including airlines, corporate and commercial aviation, or the military. This approach to aviation education gives the student an added value over traditional flight training programs by focusing on the skills and knowledge required by today's industry. The curriculum provides skills in mathematics, physics, communications, and aeronautics, including FAA certification. 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.

Aeronautical Science degree requires the completion of a capstone course. This course is to be taken as a last semester senior year degree requirement for graduation.

### Degree Requirements

The Bachelor of Science degree in Aeronautical Science may be attained in eight semesters. To earn the degree, successful completion of a minimum of 120 credit hours is required. The purpose of the Aeronautical Science degree program is to prepare the graduate for a productive career as a professional pilot and responsible citizenship in support of aviation and aerospace industries. Upon completion of the curriculum, the student will possess an FAA Commercial Pilot Certificate with instrument rating. 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.

### Course List

General Education	40
Select one of the following:	50
Aeronautical Science Core - Fixed Wing	
Aeronautical Science Core - Helicopter	
Flight Core Courses	4
Select one of the following:	26
Fixed Wing Specialty Courses	

### Helicopter Specialty Courses

Total Hours	120
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### General Education

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 113 Introductory Physics I	3
PS 114 Introductory Physics II	4
Total Hours	40

### Aeronautical Science Core Courses - Fixed Wing

AS 119 Private Pilot Operations	4
AS 221 Instrument Pilot Operations	3
AS 246 Basic 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 Aircraft Systems and Components	3
AS 357 Flight Physiology	3
AS 387 Crew Resource Management	3
AS 408 Flight Safety	3
AS 420 Flight Technique Analysis	3
AS 480 Applied Aviation Research Methods	3
UNIV 101 College Success	1
WX 201 Survey of Meteorology	3
WX 301 Aviation Weather	3

Total Hours	50
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### Aeronautical Science Core Courses - Helicopter

AS 142 Private Helicopter Operations	3
AS 246 Basic Navigation	3
AS 252 Instrument Helicopter Operations	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 372 Commercial Helicopter Operations	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	4
UNIV 101	College Success	1
WX 201	Survey of Meteorology	3
WX 301	Aviation Weather	3
Total Hours		50

## Flight Core Courses

### Fixed Wing Professional Pilot 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
Total Hours		4

### Fixed Wing Flight Education Pilot Track

AS 421	Flight Instructor Ground Course	4
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
FA 421	Flight Instructor Rating	1
FA 460	Multi-Engine Flight Instructor Rating	2
Total Hours		11

### Helicopter Professional Pilot Track

FH 142	Helicopter Pilot Flight Private	1
FH 252	Helicopter Pilot Flight Instrument	1
FH 372	Helicopter Pilot Flight Commercial	1
FH 442	Helicopter Pilot Flight Instructor	1
Total Hours		4

### Airline Pilot Specialty

AS 254	Aviation Legislation	3
or AS 405	Aviation Law	
AS 380	Pilot Career Planning and Interviewing Techniques	1
AS 402	Airline Operations	3
or AS 410	Airline Dispatch Operations	
AS 411	Jet Transport Systems	3
AS 435	Electronic Flight Management Systems	3
FA 420	Airline Flight Crew Techniques and Procedures	2
Electives		4-11
Total Hours		19-26

### Commercial Pilot Specialty

AS 254	Aviation Legislation	3
or AS 405	Aviation Law	

AS 380	Pilot Career Planning and Interviewing Techniques	1
BA/SIS	300/400 level Elective	3
Minor		9-18
Electives		0-10
Total Hours		19-26

### Military Pilot Specialty

AS 435	Electronic Flight Management Systems	3
ROTC		16-18
Electives		0-7
Total Hours		19-28

### Helicopter Pilot Specialty

AS 254	Aviation Legislation	3
or AS 405	Aviation Law	
AS 378	Environmental Helicopter Operations	3
AS 380	Pilot Career Planning and Interviewing Techniques	1
AS 412	Corporate and Business Aviation	3
AS 428	Advanced Helicopter Systems and Functions	3
BA/SF/WX	300-400 Level Electives	6
Open Electives		7
Total Hours		26

**Total Degree Credits** 120-122

### Elective Flight Courses (Fixed Wing)

FA 122	Private Multi Flight with Laboratory	1
FA 215	Upset Training	1
FA 370	Advanced Multi-Engine Instrument Flight	1
FA 421	Flight Instructor Rating	1
FA 460	Multi-Engine Flight Instructor Rating	2

### 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

	Hours
Communication Theory and Skills *	3
Computer Science Elective *	3
Lower-Level Humanities *	3
Lower-Level Social Sciences *	3
AS 119 Private Pilot Operations	4

AS 246	Basic 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 113	Introductory Physics I	3
UNIV 101	College Success	1
<b>Hours Subtotal</b>		<b>30.0</b>

**Sophomore Year**

	Communication Theory and Skills *	3
AS 221	Instrument Pilot Operations	3
AS 309	Aerodynamics	3
AS 310	Aircraft Performance	3
AS 311	Aircraft Engines - Turbine	3
AS 321	Commercial Pilot Operations	3
AS 356	Aircraft Systems and Components	3
FA 221	Instrument Single Flight	1
PS 114	Introductory Physics II	4
WX 201	Survey of Meteorology	3
WX 301	Aviation Weather	3
<b>Hours Subtotal</b>		<b>32.0</b>

**Junior Year**

	Communication Theory and Skills *	3
	Lower-Level Social Sciences *	3
	Electives	6
AS 254	Aviation Legislation	3
or AS 405	Aviation Law	
AS 350	Domestic and International Navigation	3
AS 357	Flight Physiology	3
AS 380	Pilot Career Planning and Interviewing Techniques	1
AS 387	Crew Resource Management	3
BA 201	Principles of Management	3
FA 321	Commercial Single Flight	1
FA 323	Commercial Multi Add On	1
<b>Hours Subtotal</b>		<b>30.0</b>

**Senior Year**

	Upper-Level HU/SS Elective *	3
AS 402	Airline Operations	3
or AS 410	Airline Dispatch Operations	
AS 408	Flight Safety	3
AS 411	Jet Transport Systems	3
AS 420	Flight Technique Analysis	3
AS 435	Electronic Flight Management Systems	3
AS 480	Applied Aviation Research Methods	3
FA 420	Airline Flight Crew Techniques and Procedures	2
	Electives	5
<b>Hours Subtotal</b>		<b>28.0</b>
Hours Total:		120.0

**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**

		<b>Hours</b>
	Communication Theory and Skills *	3
	Computer Science Elective *	3
	Lower-Level Humanities *	3
	Lower-Level Social Sciences *	3
AS 119	Private Pilot Operations	4
AS 246	Basic 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 113	Introductory Physics I	3
UNIV 101	College Success	1
<b>Hours Subtotal</b>		<b>30.0</b>

**Sophomore Year**

	Communication Theory and Skills *	3
AS 221	Instrument Pilot Operations	3
AS 309	Aerodynamics	3
AS 310	Aircraft Performance	3
AS 311	Aircraft Engines - Turbine	3
AS 321	Commercial Pilot Operations	3
AS 356	Aircraft Systems and Components	3
FA 221	Instrument Single Flight	1
PS 114	Introductory Physics II	4
WX 201	Survey of Meteorology	3
WX 301	Aviation Weather	3
<b>Hours Subtotal</b>		<b>32.0</b>

**Junior Year**

	Communication Theory and Skills *	3
	Lower-Level Social Sciences *	3
	Minor	6
AS 254	Aviation Legislation	3
or AS 405	Aviation Law	
AS 350	Domestic and International Navigation	3
AS 357	Flight Physiology	3
AS 380	Pilot Career Planning and Interviewing Techniques	1
AS 387	Crew Resource Management	3
BA 201	Principles of Management	3
FA 321	Commercial Single Flight	1

FA 323	Commercial Multi Add On	1
<b>Hours Subtotal</b>		<b>30.0</b>
<b>Senior Year</b>		
	Upper-Level HU/SS Elective *	3
AS 408	Flight Safety	3
AS 420	Flight Technique Analysis	3
AS 480	Applied Aviation Research Methods	3
	BA/SIS 300/400 Level	3
	Minor	9
	Electives	4
<b>Hours Subtotal</b>		<b>28.0</b>
Hours Total:		120.0

## 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

	Hours	
	Communication Theory and Skills *	3
	Lower-Level Humanities *	3
AS 119	Private Pilot Operations	4
AS 246	Basic 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 113	Introductory Physics I	3
PSY 101	Introduction to Psychology	3
UNIV 101	College Success	1
	ROTC	2
<b>Hours Subtotal</b>		<b>29.0</b>

### Sophomore Year

	Communication Theory and Skills *	3
AS 221	Instrument Pilot Operations	3
AS 309	Aerodynamics	3
AS 311	Aircraft Engines - Turbine	3
AS 321	Commercial Pilot Operations	3
AS 356	Aircraft Systems and Components	3
BA 201	Principles of Management	3
PS 114	Introductory Physics II	4
FA 221	Instrument Single Flight	1
	ROTC	2-4
<b>Hours Subtotal</b>		<b>28.0-30.0</b>

### Junior Year

	Communication Theory and Skills *	3
	Computer Science Elective *	3

AS 310	Aircraft Performance	3
AS 350	Domestic and International Navigation	3
AS 357	Flight Physiology	3
AS 387	Crew Resource Management	3
FA 321	Commercial Single Flight	1
FA 323	Commercial Multi Add On	1
WX 201	Survey of Meteorology	3
WX 301	Aviation Weather	3
	ROTC	6
<b>Hours Subtotal</b>		<b>32.0</b>

### Senior Year

	Lower-Level SS *	3
	Upper-Level HU/SS Elective *	3
AS 408	Flight Safety	3
AS 420	Flight Technique Analysis	3
AS 435	Electronic Flight Management Systems	3
AS 480	Applied Aviation Research Methods	3
	Elective	5-7
	ROTC	6
<b>Hours Subtotal</b>		<b>29.0-31.0</b>
Hours Total:		120

## Helicopter Pilot Specialty

The Helicopter Pilot Specialty program has been developed to provide the aeronautical knowledge necessary for a student to acquire the 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. All helicopter flight activities must be completed with the approved University provider.

### Freshman Year

	Hours	
	Communication Theory and Skills *	3
	Computer Science Elective *	3
	Lower-Level Humanities *	3
AS 142	Private Helicopter Operations	3
AS 246	Basic Navigation	3
AS 252	Instrument Helicopter Operations	3
FH 142	Helicopter Pilot Flight Private	1
FH 252	Helicopter Pilot Flight Instrument	1
MA 111	College Mathematics for Aviation I	3
MA 112	College Mathematics for Aviation II	3
PS 113	Introductory Physics I	3
UNIV 101	College Success	1
<b>Hours Subtotal</b>		<b>30.0</b>

### Sophomore Year

	Communication Theory and Skills *	3
AS 309	Aerodynamics	3
AS 310	Aircraft Performance	3



AS 311	Aircraft Engines - Turbine	3
AS 356	Aircraft Systems and Components	3
AS 372	Commercial Helicopter Operations	3
AS 442	Flight Instructor Helicopter Operations	4
FH 372	Helicopter Pilot Flight Commercial	1
PS 114	Introductory Physics II	4
WX 201	Survey of Meteorology	3
WX 301	Aviation Weather	3
<b>Hours Subtotal</b>		<b>33.0</b>
<b>Junior Year</b>		
	Communication Theory and Skills *	3
	Lower-Level Social Sciences *	6
BA 201	Principles of Management	3
AS 254	Aviation Legislation	3
or AS 405	Aviation Law	
AS 357	Flight Physiology	3
AS 378	Environmental Helicopter Operations	3
AS 380	Pilot Career Planning and Interviewing Techniques	1
AS 387	Crew Resource Management	3
AS 388	Helicopter Flight Planning	3
FH 442	Helicopter Pilot Flight Instructor	1
<b>Hours Subtotal</b>		<b>29.0</b>
<b>Senior Year</b>		
	Upper-Level HU/SS Elective *	3
	Upper-Level BA/SF/WX Elective	6
AS 408	Flight Safety	3
AS 412	Corporate and Business Aviation	3
AS 428	Advanced Helicopter Systems and Functions	3
AS 438	Advanced Helicopter Operations	3
	Open Electives	7
<b>Hours Subtotal</b>		<b>28.0</b>
Hours Total:		120.0

## 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	English Composition	3
COM 219	Speech	3
COM 221	Technical Report Writing	3
or COM 222	Business Communication	

### Computer Science

IT 109	Introduction to Computers and Applications	3
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or CS 118 Fundamentals of Computer Programming

### Humanities

Lower-Level

Any HU 14X series

Upper-Level

HU 3XX/4XX

### Social Sciences

Lower-Level

PSY 101 Introduction to Psychology

EC 210 Microeconomics

or EC 211 Macroeconomics

SS 110 World History

SS 120 U.S. History

SS 130 History of Aviation in America

SS 204 Introduction to Geography

SS 210 Introduction to Sociology

Military Pilot Specialty must take PSY 101 and SS 110, SS 120, or SS 130

Upper-Level

SS 3XX/4XX 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 certified flight instructor airplane and instrument, and/or they may enroll in the Airline Flight Crew Simulation course.

After matriculating, all remaining FA courses required for the Aeronautical Science degree must be completed at Embry-Riddle or at another AABI-accredited college/university. Students who have begun training on an FAA certificate course prior to enrolling at Embry-Riddle may obtain written permission to complete that ONE course outside Embry-Riddle.

Courses for fixed wing and dispatch 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 Admissions section of this catalog.

## B.S. in Aeronautics

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. Forty credit hours 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), or Applied Meteorology (aviation-related).

### 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 complete courses in the same aviation specialty for which they were granted Aviation Area of Concentration credit would be duplicating coverage of the same subject matter. Credit for completion of such courses will not be applied to degree requirements.

### 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.

## Degree Requirements

The Bachelor of Science degree in Aeronautics requires successful completion of a minimum of 120 credit hours (typically 8 semesters). A minimum of 40 credit hours must be upper-level. The curriculum to be followed by each student will vary depending on any AOC prior learning or transfer credits granted.

### Aviation Area of Concentration

Students must complete 40 credits of advanced standing and/or non-duplicating credit from AMS/AMT/ AS/AT/CEA/ FA/FH/HS/SF/SIM/SP/WX courses. 40

AS 119	Private Pilot Operations	
or AS 120	Principles of Aeronautical Science	
or AS 142	Private Helicopter Operations	
AS 254	Aviation Legislation	
AS 405	Aviation Law	
AS 472	Operational Applications in Aeronautical Science	
or AS 480	Applied Aviation Research Methods	

### General Education

COM	Communication Theory and Skills *	9
CS/IT	Computer Science Elective	3
HU	Lower-Level Humanities Elective	3
SS	Lower-Level Social Sciences Elective (PSY 101 and/or Lower-Level SS)	6
HU/SS	Upper-Level HU or SS Elective	3
MA 140	College Algebra (or higher-level math)	3
Select one of the following:		3
MA 112	College Mathematics for Aviation II	
MA 222	Business Statistics	
MA	Upper-Level Mathematics	
PS	Physical and Life Sciences Elective (One course must include a laboratory)	7
UNIV 101	College Success	1

### Program Support

BA 201	Principles of Management	3
or BA 210	Financial Accounting	
EC 210	Microeconomics	3
or EC 211	Macroeconomics	

### Professional Development Electives

Complete 21 credits of upper-division (300-400) courses in AMS/AS/AT/BA/EC/IT/SF/SIS/WX. 21

### Open Electives

Electives 15

Total Hours 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	English Composition	3
COM 219	Speech	3
COM 221	Technical Report Writing	3
or COM 222	Business Communication	

#### **Humanities**

Lower Level

Any HU 14X series

#### **Social Sciences**

Lower-Level

100-200 level

Upper-Level

300-400 level

PSY 350 Social Psychology

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 40 credits of upper-level courses.

Students need to ascertain Mathematics and Physical Sciences pre/corequisites that are required for other courses. For example, PS 113/PS 114 and MA 112 are required for many upper-division AS and WX courses.

## B.S in Air Traffic Management

The Air Traffic Management (ATM) program is a degree designed for students whose goal is to become an air traffic controller or seek employment in a related industry. In addition to ATM courses, the curriculum provides skills in mathematics, physics, communications, safety, meteorology, and aeronautics. The academic courses are designed to provide exposure to procedures and operations consistent with those found in Federal Aviation Administration (FAA) air traffic control facilities.

Note: The University cannot guarantee selection or employment as an air traffic controller for students completing the Air Traffic Control - Collegiate Training Initiative (AT-CTI) program because selection of FAA air traffic controllers for admittance to the FAA Air Traffic Control Academy and a follow-on assignment as an air traffic controller is done strictly at the discretion of the FAA and based upon their staffing.

### Degree Requirements

The Bachelor of Science degree in Air Traffic Management requires successful completion of a minimum of 120 semester hours, normally completed in eight semesters. A minimum of 40 semester hours must be upper-level. Students are required to complete MA 111 and MA 112.

Students must select and complete one minor field of study, as approved by the Aeronautical Science Department. Total credits within the minor will vary depending on which minor is chosen. Students typically select a minor that will enhance their aviation career. See Minor Courses of Study in this catalog.

A minimum of 7 semesters is required to complete the Air Traffic Management degree program.

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

### Suggested Program of Study

#### Freshman Year

	Hours
Communication Theory and Skills	3
HU 14x Humanities	3
Physical Science Elective	3
AS 120 Principles of Aeronautical Science	3-4
or AS 119 Private Pilot Operations	
AT 200 Air Traffic Management I	3
IT 109 Introduction to Computers and Applications	3
MA 111 College Mathematics for Aviation I	3
MA 112 College Mathematics for Aviation II	3
PSY 101 Introduction to Psychology	3
UNIV 101 College Success	1
Lower/Upper-Level BA/COM/HU/MA/PS/SS Elective	3
<b>Hours Subtotal</b>	<b>31.0-32.0</b>

#### Sophomore Year

College of Aviation 09/20/13

	Communication Theory and Skills	3
	Lower-Level Humanities	3
	Physical Science Elective with Laboratory	4
AT 302	Air Traffic Management II	3
AT 305	Air Traffic Management III	3
BA 201	Principles of Management	3
EC 210	Microeconomics	3
or EC 211	Macroeconomics	
SF 201	Introduction to Health, Occupational, and Transportation Safety	3
or SF 210	Introduction to Aerospace Safety	
WX 201	Survey of Meteorology	3
	Minor Elective	3
	<b>Hours Subtotal</b>	<b>31.0</b>
<b>Junior Year</b>		
	Communication Theory and Skills	3
AT 315	Air Traffic Management - VFR Tower	3
AT 401	Air Traffic Management IV	3
BA 319	Managerial Organizational Behavior	3
SF 320	Human Factors in Aviation Safety	3
or AS 387	Crew Resource Management	
WX 301	Aviation Weather	3
	Upper-Level HU/SS Elective	3
	Upper-Level Open Elective	3
	Minor Elective	6
	<b>Hours Subtotal</b>	<b>30.0</b>
<b>Senior Year</b>		
AT 405	Air Traffic Management V	3
AT 406	Air Traffic Management VI	3
SF 462	Health, Safety, and Aviation Law	3
	Minor	6
	Upper-Level Open Elective	3
	Open Electives **	9-10
	<b>Hours Subtotal</b>	<b>27.0-28.0</b>
	Hours Total:	120

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

#### Communication Theory and Skills

COM 122	English Composition	3
COM 219	Speech	3
COM 221	Technical Report Writing	3
or COM 222	Business Communication	

#### Humanities or Social Sciences

Lower-Level	Any 100-200 level	
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## Upper-Level

Any 300-400 level

**Physical Science**

PS 101	Basic Chemistry	3
PS 102	Explorations in Physics	3
PS 113	Introductory Physics I	3
PS 114	Introductory Physics II	4
PS 105	General Chemistry I	4
PS 107	Elements of Biological Science	3
PS 140	Chemistry for Engineers	4

\*\* Open Elective credits required will be calculated, based upon selection of the minor, to complete the minimum of 120 credits requirement for the degree. A student MUST ALSO complete a minimum of 40 credit hours of upper-level courses. Open elective courses can count toward this total.

Students enrolled in the Army, or Air Force ROTC programs may substitute MSL or AF courses for open elective courses.

Air traffic controllers are required to possess a current FAA 2nd Class or higher medical certificate to receive and exercise the privileges of their FAA Air Traffic Controller certificates. Students should verify their eligibility status for this level medical certificate with an FAA designated medical examiner prior to enrolling in this degree program. The medical certificate is not required for ATM courses or degree enrollment.

Prospective air traffic controllers must be able to complete their university education and have entered the FAA Air Traffic Control Academy prior to reaching their 31st birthday.

FAA air traffic controllers must be U.S. citizens.

## B.S. in Applied Meteorology

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. Both 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 in+ 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.

In addition, most meteorology (WX) classes are offered only **once per year**. Please check with your advisor and the latest flow charts for current semester course offerings.

There are two areas of concentration. Most students will be in the Research Concentration. The Meteorology for Aviation Operations Concentration will train students for jobs as flight dispatchers. This concentration requires several additional classes, most of which can be filled using open elective slots. The concentration must be declared at the time of enrollment or during the first semester.

The courses necessary to earn the degree are listed below.

Note: Many meteorology courses are only offered once per academic year.

## Areas of Concentration (AOC)

### Research AOC

### Suggested Program of Study

#### Freshman Year

		Hours
	EC/SS Lower-Level Economics -OR- Social Sciences	3
COM 122	English Composition	3
COM 219	Speech	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 for Engineers I	3
UNIV 101	College Success *	(1)
WX 252	Introduction to Meteorology	3
WX 353	Thermodynamics of the Atmosphere **	3
	<b>Hours Subtotal</b>	<b>29.0</b>

#### Sophomore Year

CS 125	Computer Science I	3-4
	or EGR 115 Introduction to Computing for Engineers	
MA 243	Calculus and Analytical Geometry III	4
PS 105	General Chemistry I	4
PS 105L	General Chemistry I Laboratory	0
PS 160	Physics for Engineers II	3
PS 216	Physics I Laboratory	1
WX 220	Data Analysis and Visualization **	3
WX 261	Applied Climatology	3
WX 354	Dynamics of the Atmosphere **	3
WX 363	Thunderstorms	3
WX 365	Satellite and Radar Weather Interpretation **	3
	<b>Hours Subtotal</b>	<b>30.0-31.0</b>

#### Junior Year

##### Fall

COM 221	Technical Report Writing	3
MA 345	Differential Equations and Matrix Methods	4
MA 412	Probability and Statistics	3
	or MA 404 Statistics and Research Methods	
WX 270	Weather Information Systems	3
WX 420	Advanced Atmospheric Thermodynamics	3
	<b>Hours Subtotal</b>	<b>16.0</b>

##### Spring

	EC/SS Lower-Level Economics -OR- Social Sciences	3
MA 441	Mathematical Methods for Engineering and Physics I	3
WX 355	Weather Analysis	5

WX 390	Atmospheric Physics	3
<b>Hours Subtotal</b>		<b>14.0</b>
<b>Summer</b>		
	CEAAS Co-op/Internship -OR- Fall/ Spring Open Electives	6
<b>Hours Subtotal</b>		<b>6.0</b>
<b>Senior Year</b>		
<b>Fall</b>		
WX 427	Forecasting Techniques	3
WX 490	Advanced Dynamic Meteorology I	3
<b>Hours Subtotal</b>		<b>6.0</b>
<b>Spring</b>		
	HU/SS Upper-Level Humanities -OR- Social Sciences	3
WX 457	Weather Operations Seminar	3
WX 491	Advanced Dynamic Meteorology II	3
	Open electives	9-16
<b>Hours Subtotal</b>		<b>18.0-25.0</b>
Hours Total:		120

## Meteorology for Aviation Operations AOC

### Suggested Program of Study

#### Freshman Year

		Hours
AS 119	Private Pilot Operations	4
COM 122	English Composition	3
	EC/SS Lower-Level Economics -OR- Social Sciences	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 for Engineers I	3
UNIV 101	College Success *	(1)
WX 252	Introduction to Meteorology **	3
WX 353	Thermodynamics of the Atmosphere **	3
WX 301	Aviation Weather	3
<b>Hours Subtotal</b>		<b>33.0</b>

#### Sophomore Year

AS 221	Instrument Pilot Operations	3
AT 200	Air Traffic Management I	3
CS 125	Computer Science I	3-4
	or EGR 115 Introduction to Computing for Engineers	
MA 243	Calculus and Analytical Geometry III	4
PS 105	General Chemistry I	4
PS 105L	General Chemistry I Laboratory	0
PS 160	Physics for Engineers II	3
PS 216	Physics I Laboratory	1
WX 220	Data Analysis and Visualization **	3

WX 261	Applied Climatology	3
WX 354	Dynamics of the Atmosphere	3
WX 363	Thunderstorms	3
<b>Hours Subtotal</b>		<b>33.0-34.0</b>

#### Junior Year

##### Fall

AS 309	Aerodynamics	3
COM 221	Technical Report Writing	3
MA 345	Differential Equations and Matrix Methods	4
WX 270	Weather Information Systems	3
WX 420	Advanced Atmospheric Thermodynamics	3
<b>Hours Subtotal</b>		<b>16.0</b>

##### Spring

AS 310	Aircraft Performance	3
COM 219	Speech	3
MA 222	Business Statistics	3
	or MA 412 Probability and Statistics	3
WX 355	Weather Analysis	5
WX 390	Atmospheric Physics	3
<b>Hours Subtotal</b>		<b>17.0</b>

#### Senior Year

##### Fall

AS 350	Domestic and International Navigation	3
	EC/SS Lower-Level Economics OR Social Sciences	3
WX 365	Satellite and Radar Weather Interpretation	3
WX 427	Forecasting Techniques	3
WX 490	Advanced Dynamic Meteorology I	3
<b>Hours Subtotal</b>		<b>15.0</b>

##### Spring

AS 410	Airline Dispatch Operations	3
	HU/SS Upper-Level Humanities OR Social Sciences	3
WX 457	Weather Operations Seminar	3
WX 491	Advanced Dynamic Meteorology II	3
<b>Hours Subtotal</b>		<b>12.0</b>
Hours Total:		126.0-127.0

\* UNIV 101 meets open elective or credit in excess of degree requirement

\*\* Courses only offered one semester per academic year. Please check course schedule or department.

## B.S. in Safety Science

The Bachelor of Science degree in Safety Science provides the student with skills and knowledge for a career in Aviation Safety or Occupational Safety and Health and is normally completed in eight semesters. The program delivers an effective foundation in safety that prepares the student for any industrial setting and allows each student to select an Aviation Safety or Occupational Safety and Health area of concentration (AOC).

In the Aviation Safety AOC, for those students who are planning to enter the aviation accident investigation industry, it is highly recommended that the student obtain his/her private pilot's license. ERAU offers flight training for these students (flight fees apply). Those students taking flight training in preparation for their private pilot's license will take AS 119 (the ground school course in conjunction with flight training). Students not getting their pilot's license will take AS 120.

The Department of Safety Science is located in the Robertson Aviation Safety Center where classrooms, laboratories, and faculty offices are convenient for daily interaction with other students and faculty. The Department of Safety Science provides a unique opportunity on the Prescott campus for students to interact with graduate students since it is the only department offering a Master's degree.

The Bachelor of Science degree in Safety Science is designed to provide the student the following expertise:

- Familiarity with the fundamentals of the ancillary disciplines that are essential to the practice of safety: aviation safety, occupational safety, industrial hygiene, ergonomics/human factors, and quantitative methods
- Ability to understand research processes, techniques and procedures and to draw appropriate conclusions from the analysis of both quantitative and qualitative data
- Knowledge of the basic approaches to accident investigation
- Understanding of the breadth of application of the discipline of safety science, including ground and occupational safety as well as product safety, aviation safety, flight safety, and air crash investigation
- Use appropriate tools for the analysis of safety data to draw inferences about cause, effect, and prevention

### Degree Requirements

The successful completion of the Bachelor of Science in Safety Science requires a minimum of 120-121 credit hours, depending upon the Area of Concentration (AOC) chosen. Students will complete a general education core of 24 credit hours and a math and science core of 27 credit hours. Each Safety Science major will complete a safety core of 27 credit hours. The student can choose either Aviation Safety or Occupational Safety and Health as an AOC. Each of these areas of concentration will require 24-28 credit hours. One minor must be completed to meet the degree requirements.

## Areas of Concentration (AOC)

### Aviation Safety AOC

### Suggested Program of Study

#### Freshman Year

		<b>Hours</b>
UNIV 101	College Success *	(1)
AS 119	Private Pilot Operations	3-4
or AS 120	Principles of Aeronautical Science	
COM 122	English Composition	3
	HU 14X Humanities	3
MA 111	College Mathematics for Aviation I	3
MA 112	College Mathematics for Aviation II	3
	AES 1xx Biology Concepts	4
PS 113	Introductory Physics I	3
SF 210	Introduction to Aerospace Safety	3
WX 201	Survey of Meteorology	3
	<b>Hours Subtotal</b>	<b>28.0-29.0</b>

#### Sophomore Year

	CS/IT Computer Science Elective	3
	Upper Level HU/SS Elective	3
COM 219	Speech	3
COM 221	Technical Report Writing	3
or COM 222	Business Communication	
EC 210	Microeconomics	3
or EC 211	Macroeconomics	
MA 222	Business Statistics	3
PS 105	General Chemistry I	4
PS 114	Introductory Physics II (and Lab)	4
PSY 101	Introduction to Psychology	3
BA 201	Principles of Management	3
	<b>Hours Subtotal</b>	<b>32.0</b>

#### Junior Year

SF 315	Environmental Compliance and Safety	3
SF 320	Human Factors in Aviation Safety	3
SF 325	Human Factors and Ergonomics I	3
SF 330	Aircraft Accident Investigation	3
SF 335	Mechanical and Structural Factors in Aviation Safety	3
SF 345	Safety Program Management	3
SF 355	Industrial Hygiene and Toxicology	3
	Courses for Minor	9
	<b>Hours Subtotal</b>	<b>30.0</b>

#### Senior Year

AS 309	Aerodynamics	3
AS 356	Aircraft Systems and Components	3
AS 405	Aviation Law	3
SF 326	System Safety	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 475	Senior Project	3
	Courses for Minor	6
	<b>Hours Subtotal</b>	<b>30.0</b>
	Hours Total:	120.0-121.0

## Occupational Safety and Health Area of Concentration AOC

### Suggested Program of Study

#### Freshman Year

		Hours
UNIV 101	College Success *	(1)
COM 122	English Composition	3
	CS/IT Computer Science Elective	3
	HU 14X Lower Level Humanities	3
MA 111	College Mathematics for Aviation I	3
MA 112	College Mathematics for Aviation II	3
AS 120	Principles of Aeronautical Science	3
	AES 1xx Biology Concepts	4
PS 113	Introductory Physics I	3
SF 210	Introduction to Aerospace Safety	3
WX 201	Survey of Meteorology	3
	<b>Hours Subtotal</b>	<b>31.0</b>

#### Sophomore Year

COM 219	Speech	3
COM 221	Technical Report Writing	3
	or COM 222 Business Communication	
EC 210	Microeconomics	3
	or EC 211 Macroeconomics	
MA 222	Business Statistics	3
PS 105	General Chemistry I	4
PS 114	Introductory Physics II (and Lab)	4
PSY 101	Introduction to Psychology	3
SF 205	Principles of Accident Investigation	3
	Courses for Minor or Elective	3
	<b>Hours Subtotal</b>	<b>29.0</b>

#### Junior Year

SF 315	Environmental Compliance and Safety	3
SF 325	Human Factors and Ergonomics I	3
SF 345	Safety Program Management	3
SF 355	Industrial Hygiene and Toxicology	3
SF 420	Analysis of Observational Data	3
SF 425	Human Factors and Ergonomics II	3
	Courses for Minor	12
	<b>Hours Subtotal</b>	<b>30.0</b>

#### Senior Year

BA 420	Management of Production and Operations	3
	Upper Level HU/SS Elective	3

SF 326	System Safety	3
SF 350	Aircraft Crash and Emergency Management	3
SF 405	Applications in Industrial Hygiene	3
SF 410	Design of Engineering Hazard Controls	3
SF 440	Design of Engineering Hazard Controls II	3
AS 405	Aviation Law	3
SF 475	Senior Project	3
	Courses for Minor	3
	<b>Hours Subtotal</b>	<b>30.0</b>
	Hours Total:	120.0

Notes: Open elective credits required will be calculated, based upon selection of the minor, to complete the minimum of 120 credits requirement for the degree. A student must also complete a minimum of 40 credit hours of upper-level courses. Open elective courses can count toward this total.

\* UNIV 101 meets open elective or credit in excess of degree requirement.



## B.S./M.S. in Safety Science

This is a five-year combined program that allows very well-qualified students to complete both a Bachelor of Science and a Master of Science in Safety Science. The five-year program offers upper-level undergraduates in the major the chance to begin their graduate work while completing their bachelor's degree program. This program is available only at the Prescott Campus through the Department of Safety Science.

In the Aviation Safety AOC, for those students who are planning to enter the aviation accident investigation industry, it is highly recommended that the student obtain his/her private pilot's license. ERAU offers flight training for these students (flight fees apply). Those students taking flight training in preparation for their private pilot's license will take AS 119, (the ground school course in conjunction with flight training). Students not getting their pilot's license will take AS 120.

The objective of this five-year program is to produce safety professionals with the following skill set:

- Familiarity with the fundamentals of the ancillary disciplines that are essential to the practice of safety: aviation safety, occupational safety, industrial hygiene, ergonomics/human factors, and quantitative methods
- Ability to understand research processes, techniques and procedures and to draw appropriate conclusions from the analysis of both quantitative and qualitative data
- Knowledge of the basic approaches to accident investigation
- An understanding of the breadth of application of the discipline of safety science, including ground and occupational safety as well as product safety, aviation safety, flight safety, and air crash investigation
- Ability to use appropriate tools for the analysis of safety data to draw inferences about cause, effect, and prevention.

## Degree Requirements

Students enrolled in this program must meet the following requirements:

- Maintain a cumulative GPA of 3.0 throughout the academic program
- Maintain a cumulative GPA of 3.0 for all graduate courses
- Complete a total of 150 credits hours, including an Area of Concentration (AOC). There will be 120 credit hours required for the completion of the BSSS and 30 additional credit hours of graduate requirements for completion of the MSSS. A minor is required for the Occupational Safety and Health Area of Concentration (AOC).

## Application Process

Applications may be submitted to the Chair of the Department of Safety Science for the five-year BS/MS in Safety Science program after the completion of a minimum of 45 credits with a CGPA of 3.00. A well-defined process will be used to determine whether a student is fully qualified for admission into the program. Criteria for making this judgment will include academic record, work experience, professional activities, publications, recommendations, written statements, and interviews, as appropriate. Applications will be reviewed and the student notified of their acceptance into

*College of Aviation 09/20/13*

the program after successful completion of 60 credit hours with a CGPA of 3.00.

## Aviation Safety AOC

### Five Year Program of Study

#### Year One

		<b>Hours</b>
AS 119	Private Pilot Operations	3-4
or AS 120	Principles of Aeronautical Science	
COM 122	English Composition	3
	HU 14x Humanities	3
MA 111	College Mathematics for Aviation I	3
MA 112	College Mathematics for Aviation II	3
	AES 1xx Biology Concepts	4
PS 113	Introductory Physics I	3
SF 210	Introduction to Aerospace Safety	3
WX 201	Survey of Meteorology	3
<b>Hours Subtotal</b>		<b>28.0-29.0</b>

#### Year Two

	CS/IT Computer Science Elective	3
COM 219	Speech	3
COM 221	Technical Report Writing	3
or COM 222	Business Communication	
EC 210	Microeconomics	3
or EC 211	Macroeconomics	
MA 222	Business Statistics	3
PS 105	General Chemistry I	4
PS 114	Introductory Physics II (and Lab)	4
PSY 101	Introduction to Psychology	3
BA 201	Principles of Management	3
<b>Hours Subtotal</b>		<b>29.0</b>

#### Year Three

SF 315	Environmental Compliance and Safety	3
SF 320	Human Factors in Aviation Safety	3
SF 325	Human Factors and Ergonomics I	3
SF 330	Aircraft Accident Investigation	3
SF 335	Mechanical and Structural Factors in Aviation Safety	3
SF 345	Safety Program Management	3
SF 355	Industrial Hygiene and Toxicology	3
SF 375	Propulsion Plant Investigation	3
	Open Electives	11-12
<b>Hours Subtotal</b>		<b>35.0-36.0</b>

#### Year Four

AS 309	Aerodynamics	3
AS 356	Aircraft Systems and Components	3
AS 405	Aviation Law	3
SF 326	System Safety	3
SF 350	Aircraft Crash and Emergency Management	3
SF 435	Aircraft Crash Survival Analysis and Design	3

	Upper Level HU/SS Elective	3
MSF 603	Occupational Safety	3
MSF 613	Aviation Safety	3
	<b>Hours Subtotal</b>	<b>27.0</b>
<b>Year Five</b>		
MSF 580	Ind Hygiene & Envrnmntl Prtctn	3
MSF 600	Quantitative Methods	3
MSF 601	Ergonomics	3
MSF 602	Human Factors	3
MSF 612	Research Methods	3
MSF 690	Graduate Research Project	3
	Graduate Level Electives	12
	<b>Hours Subtotal</b>	<b>30.0</b>
Hours Total:		150

## Occupational Safety and Health Area of Concentration AOC

### Five Year Program of Study

#### Year One

		Hours
AS 120	Principles of Aeronautical Science	3
COM 122	English Composition	3
	CS/IT Computer Science Elective	3
	HU 14x Humanities	3
MA 111	College Mathematics for Aviation I	3
MA 112	College Mathematics for Aviation II	3
	AES 1xx Biology Concepts	4
PS 113	Introductory Physics I	3
SF 210	Introduction to Aerospace Safety	3
WX 201	Survey of Meteorology	3
	<b>Hours Subtotal</b>	<b>31.0</b>

#### Year Two

COM 219	Speech	3
COM 221	Technical Report Writing	3
	or COM 222 Business Communication	
EC 210	Microeconomics	3
	or EC 211 Macroeconomics	
MA 222	Business Statistics	3
PS 105	General Chemistry I	4
PS 114	Introductory Physics II (and Lab)	4
PSY 101	Introduction to Psychology	3
SF 205	Principles of Accident Investigation	3
	Courses for Minor	3
	<b>Hours Subtotal</b>	<b>29.0</b>

#### Year Three

SF 315	Environmental Compliance and Safety	3
SF 325	Human Factors and Ergonomics I	3
SF 345	Safety Program Management	3
SF 355	Industrial Hygiene and Toxicology	3
SF 420	Analysis of Observational Data	3

SF 425	Human Factors and Ergonomics II	3
	Courses for Minor	12
	<b>Hours Subtotal</b>	<b>30.0</b>

#### Year Four

AS 405	Aviation Law	3
BA 420	Management of Production and Operations	3
SF 326	System Safety	3
SF 350	Aircraft Crash and Emergency Management	3
SF 405	Applications in Industrial Hygiene	3
SF 410	Design of Engineering Hazard Controls	3
SF 440	Design of Engineering Hazard Controls II	3
	Upper Level HU/SS Elective	3
MSF 603	Occupational Safety	3
MSF 613	Aviation Safety	3
	<b>Hours Subtotal</b>	<b>30.0</b>

#### Year Five

MSF 580	Ind Hygiene & Envrnmntl Prtctn	3
MSF 600	Quantitative Methods	3
MSF 601	Ergonomics	3
MSF 602	Human Factors	3
MSF 612	Research Methods	3
MSF 690	Graduate Research Project	3
	Graduate Level Electives	12
	<b>Hours Subtotal</b>	<b>30.0</b>
Hours Total:		150.0

Notes: Undergraduate open elective credits required will be calculated, based upon selection of the minor, to complete the minimum of 120 credits requirement for the degree. A student must also complete a minimum of 40 credit hours of upper-level courses. Open elective courses can count toward this total.

\* UNIV 101 meets open elective or credit in excess of degree requirement.

## M.S. in Safety Science

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 and aviation safety. The degree program produces 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 below. 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 (including algebra and trigonometry), the physical and natural sciences, computer applications, behavioral science, and statistics. Students who lack prerequisite knowledge in 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

MSF 580	Ind Hygiene & Envrnmntl Prtctn	3
MSF 601	Ergonomics	3
MSF 602	Human Factors *	3
MSF 603	Occupational Safety	3
MSF 613	Aviation Safety	3
Total Hours		15

\* Prerequisite MSF 600

#### Safety Science Research Core

MSF 600	Quantitative Methods	3
MSF 612	Research Methods	3
Select one of the following options:		3-6

##### Option I

MSF 700	Thesis *
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##### Option II

MSF 690	Graduate Research Project *	
Total Hours		9-12

\* Prerequisite MSF 600 and MSF 612

### Electives

Select three to four of the following:		9-12
MSA 602	The Air Transportation System	
MSA 613	Airport Operations Safety	
MSF 530	Arcrft Accident Investigation	
MSF 605	Industrial Hygiene Measurement **	
MSF 606	Cntrl Mthds Occpntl Sfty Hlth	
MSF 607	Epidemiology *	
MSF 609	System Safety *	
MSF 610	Industrial Security	
MSF 611	Case Studies in Safety *	
MSF 614	Safety Ethics	
MSF 630	Aircraft Accident Analysis	
MSF 635	Adv Aircraft Survivability ***	
MSF 655	Airline & Ops Safety Mgmt	
MSF 675	Aviation Maintenance Safety	
MSF 680	Integrated Safety Ops Capstone	
MSF 685	Aviation Security	
MSF 686	Emergency Preparedness	
MSF 696	Internship in Safety Science	
MSF 699	Spec Topics in Safety Science	
Total Hours		9-12

\* Prerequisite MSF 600

\*\* Prerequisite MSF 580

\*\*\* Prerequisite MSF 530

### Graduate Assistantships

Graduate assistantships are academic appointments that are normally reserved for qualified graduate students. Graduate assistants may be involved in research activities under the direction of a faculty member or may assist with administrative duties. 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 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

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 outline of the methods to be used, and a preliminary list of sources. 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. **HUMAN SUBJECTS:** 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:** Writing the GRP or thesis should not be started until the student's committee has given approval. The process of writing should begin no later than the beginning of the semester of anticipated graduation.

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. The student should begin this process as early as possible. Despite when the student begins this process, the committee cannot guarantee that the process will be finished, so students should make plans accordingly. The student will be allowed to finish when and only when the committee has been satisfied and the committee has approved and signed the “approval” sheet after the GRP presentation. Also note that summers are allocated for the purpose of completing 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 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 department. 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 semester the department establishes and posts the deadlines for committee organization, proposal submission, completion of the first three chapters of the GRP/thesis, the defense confirmation, delivery of the GRP/thesis to the committee, and the final defense.



## Aircraft Dispatcher Certification

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.

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
Total Hours		21

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

**This program is offered within the academic programs at ERAU 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 Dispatch Program Manager in the Aeronautical Science Department.**

# College of Engineering

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Dr. Ronald A. Madler, Dean

The College of Engineering offers five complementary programs, with an emphasis on the aerospace industry. Aerospace, Computer, Electrical, Mechanical and Software 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 solving the complex engineering development problems of our society and industry.

Aerospace Engineering concentrates its efforts on aircraft and spacecraft systems including structures, aerodynamics, flight mechanics, performance and control.

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, robotics and energy with an emphasis on jet aircraft engines, autonomous vehicles such as Unmanned Aerial Vehicles (UAVs) and Planetary Rovers and renewable energy sources such as solar and wind.

Software Engineering focuses on the design of security and safety-critical software needed to operate any complex system.

The philosophy of our college is to give students a broad background, enabling them to pursue careers in many technical areas, but we choose to use aerospace as our vehicle to demonstrate the exciting, creative, and technical aspects of these engineering disciplines.

With this in mind, our mission is to provide undergraduate education founded on a rigorous, applied treatment of engineering fundamentals coupled with modern engineering tools.

We are dedicated to providing excellence in aviation and space education, based in aerospace, computer, electrical, mechanical and software 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 alumni to prepare them for a productive and rewarding career. These objectives for alumni are to: demonstrate achievements in their chosen profession, contribute to the development of the profession, engage in

professional growth, and contribute to the welfare of society through service.

Along with these objectives we have established outcomes we expect from our students as they progress through graduation. Those outcomes are listed below:

1. an ability to apply knowledge of mathematics, science, and engineering
2. an ability to design and conduct experiments, as well as to analyze and interpret data
3. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
4. an ability to function on multidisciplinary teams
5. an ability to identify, formulate, and solve engineering problems
6. an understanding of professional and ethical responsibility
7. an ability to communicate effectively
8. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
9. a recognition of the need for, and an ability to engage in life-long learning
10. a knowledge of contemporary issues
11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The Aerospace Engineering, Computer Engineering, Electrical Engineering and Mechanical Engineering programs are accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

It is the goal of the College of Engineering that incoming freshmen be able to complete their baccalaureate studies in four years. Depending on preparation and the time committed to classes, students may be able to graduate more quickly than that or it may take them longer. The nominal four-year program assumes that students arrive here having mastered trigonometry, two years of algebra, and one year of high school physics. Because communication skills are vital to all modern engineering disciplines, entering students should have a strong background in English composition.

Students exploring engineering who have not selected a specific degree program may, during their first semester, enroll in courses that are common to all the engineering disciplines. This enables a student interested in engineering to explore the content of all the engineering programs during their first semester prior to declaring a major at the beginning of their second semester. The first semester courses apply toward any engineering degree.

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.

## **Degrees**

### **Bachelors**

- B.S. in Aerospace Engineering
- B.S. in Computer Engineering
- B.S. in Electrical Engineering
- B.S. in Mechanical Engineering
- B.S. in Software Engineering

## B.S. in Aerospace Engineering

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 measure our accomplishment of this goal are engineers who:

- Demonstrate achievements in their chosen profession
- Contribute to the development of the profession
- Engage in professional growth
- Contribute to the welfare of society through service

The Aerospace Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

### Degree Requirements

The Bachelor of Science in Aerospace Engineering program requires successful completion of a minimum of 129 credit hours. The program may be completed in eight semesters assuming appropriate background and full-time enrollment. A minimum cumulative grade point average of 2.00 is needed for all required AE, EGR, EP, ES, and ME 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. Students should be aware that they must complete MA 241, MA 242, PS 150 with a C or better prior to taking ES 201; complete PS 160 and ES 201 with a C or better prior to taking all other ES courses; and complete EGR 115 with a C or better prior to taking all AE and ME courses.

### Suggested Program of Study

#### Freshman Year

	Hours
Lower-Level Humanities -OR- Social Sciences *	3
CEC 220 Digital Circuit Design	3
CEC 222 Digital Circuit Design Laboratory	1
COM 122 English Composition	3

College of Engineering 09/20/13

EC 225	Engineering Economics	3
EGR 101	Introduction to Engineering	2
	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 for Engineers I	3
PS 160	Physics for Engineers II	3
UNIV 101	College Success **	(1)
<b>Hours Subtotal</b>		<b>32.0</b>

#### Sophomore Year

COM 221	Technical Report Writing	3
EGR 115	Introduction to Computing for Engineers	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 Analytical Geometry III	4
MA 345	Differential Equations and Matrix Methods	4
PS 250	Physics for Engineers III	3
PS 253	Physics Laboratory for Engineers	1
<b>Hours Subtotal</b>		<b>33.0</b>

#### Junior Year

	Select one of the options below.	33
<b>Hours Subtotal</b>		<b>33.0</b>

#### Senior Year

	Select one of the options below.	31
<b>Hours Subtotal</b>		<b>31.0</b>
Hours Total:		129.0

### Aeronautics Option

#### Junior Year

	Hours	
AE 301	Aerodynamics I	3
AE 302	Aerodynamics II	3
AE 314	Experimental Aerodynamics	1
AE 315	Experimental Aerodynamics Laboratory	1
AE 318	Aerospace Structures I	3
AE 413	Airplane Stability & Control	3
AE 418	Aerospace Structures II	3
AE 430	Control System Analysis and Design	3
ES 305	Thermodynamics	3
ES 320	Engineering Materials Science	2
ES 321	Engineering Materials Science Laboratory	1
EE 335	Electrical Engineering I ***	2
EE 336	Electrical Engineering I Laboratory ***	1
PS 105	General Chemistry I	4
PS 105L	General Chemistry I Laboratory	0
<b>Hours Subtotal</b>		<b>33.0</b>

#### Senior Year

	Upper-Level Humanities *	3
	Upper Level Mathematics *	3
	Technical Electives	6
AE 313	Space Mechanics	3
AE 416	Aerospace Structures and Instrumentation	1
AE 417	Aerospace Structures and Instrumentation Laboratory	1
AE 420	Aircraft Preliminary Design	4
AE 421	Aircraft Detail Design	4
COM 420	Advanced Technical Communication I	1
COM 430	Advanced Technical Communication II	2
ME 309	Airbreathing and Rocket Propulsion	3
	<b>Hours Subtotal</b>	<b>31.0</b>

## Astronautics Option

### Junior Year

		Hours
AE 301	Aerodynamics I	3
AE 313	Space Mechanics	3
AE 318	Aerospace Structures I	3
AE 325	Experimental Space Systems Engineering	1
AE 326	Experimental Space Systems Engineering Lab	1
AE 426	Spacecraft Attitude Dynamics	3
AE 430	Control System Analysis and Design	3
EP 394	Space Systems Engineering	3
ES 305	Thermodynamics	3
ES 320	Engineering Materials Science	2
ES 321	Engineering Materials Science Laboratory	1
EE 335	Electrical Engineering I ***	2
EE 336	Electrical Engineering I Laboratory ***	1
PS 105	General Chemistry I	4
PS 105L	General Chemistry I Laboratory	0
	<b>Hours Subtotal</b>	<b>33.0</b>

### Senior Year

	Upper-Level Humanities *	3
	Upper Level Mathematics *	3
	Technical Electives	6
AE 414	Space Propulsion	3
AE 416	Aerospace Structures and Instrumentation	1
AE 417	Aerospace Structures and Instrumentation Laboratory	1
AE 418	Aerospace Structures II	3
AE 427	Spacecraft Preliminary Design	4
AE 445	Spacecraft Detail Design	4
COM 420	Advanced Technical Communication I	1
COM 430	Advanced Technical Communication II	2
	<b>Hours Subtotal</b>	<b>31.0</b>

## Technical Electives

Three technical elective credits must be upper-level College of Engineering courses not specifically listed in the student's degree requirements. The remaining three credits must be selected from the list below or an upper-level ROTC course may be substituted.

### AE

Upper-level, except AE 399, AE 499 \*\*\*\*  
With prior approval of the Aerospace Engineering Department.

### Cooperative Education Courses

With prior approval of the Aerospace Engineering dept.  
See Career Advisor for more information

### CEC

Upper level, except CEC 399, CEC 499 \*\*\*\*

### CS

CS 325	Programming in ADA
CS 335	Introduction to Computer Graphics
CS 350	Computer Modeling and Simulation
CS 420	Operating Systems

### EE

Upper level, except EE 399, EE 499 \*\*\*\*

### EGR

Upper level

### EP

Upper level, except EP 399, EP 499 \*\*\*\*

### ES

Upper level, except ES 399, ES 499 \*\*\*\*

### MA

MA 348	Numerical Analysis I
MA 412	Probability and Statistics
MA 432	Linear Algebra
MA 441	Mathematical Methods for Engineering and Physics I
MA 442	Mathematical Methods for Engineering and Physics II
MA 443	Complex Variables

### ME

Upper-level, except ME 399, ME 499 \*\*\*\*

### PS

PS 303	Modern Physics
PS 321	Classical Mechanics I
PS 322	Classical Mechanics II
PS 350	Quantum Mechanics I
PS 375	Planetary Science
PS 420	Remote Sensing

### SE

SE 300 Software Engineering Practices

\* See General Education Electives section below

\*\* UNIV 101 is taken in excess of degree requirements or meets open elective credit



\*\*\* EE 223/EE 224 may be substituted for EE 335/EE 336

\*\*\*\* Must be approved by the AE/ME Department chair before taking this course.

## General Education Electives

Embry-Riddle courses in the general education categories of Humanities, Mathematics, 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. Prior approval by the Aerospace Engineering Department chair is required for any substitutions for general education electives.

### Humanities

Lower-Level

Any HU/L course under 300 level

Upper-Level

Select one of the following:

HU 330 Values and Ethics

HU/SS399 Study Abroad only

### Social Sciences

Lower-Level

Any EC/SS/PSY/RS course under 300 level

### Mathematics

Upper-Level

Select one of the following:

MA 412 Probability and Statistics

MA 432 Linear Algebra

MA 441 Mathematical Methods for Engineering and Physics I

MA 443 Complex Variables

or as approved by the AE/ME Department chair

## B.S. in Computer Engineering

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 measure our accomplishment of this goal are engineers who:

- Demonstrate achievements in their chosen profession
- Contribute to the development of the profession
- Engage in professional growth
- Contribute to the welfare of society through service

The Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

### 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 section 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

	Hours
Lower-Level Humanities OR Social Sciences *	3
CEC 220 Digital Circuit Design	3
CEC 222 Digital Circuit Design Laboratory	1
COM 122 English Composition	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 Analytical Geometry I	4
MA 242 Calculus and Analytical Geometry II	4
PS 150 Physics for Engineers I	3
UNIV 101 College Success ***	(1)
<b>Hours Subtotal</b>	<b>32.0</b>

#### Sophomore Year

CEC 320 Microprocessor Systems	3
CEC 322 Microprocessor Systems Laboratory	1
COM 221 Technical Report Writing	3
CS 125 Computer Science I	4
CS 222 Introduction to Discrete Structures	3
EE 223 Linear Circuits Analysis I	3
EE 224 Electrical Engineering Laboratory I	1
MA 243 Calculus and Analytical Geometry III	4
MA 345 Differential Equations and Matrix Methods	4
PS 160 Physics for Engineers II	3
PS 250 Physics for Engineers III	3
PS 253 Physics Laboratory for Engineers	1
<b>Hours Subtotal</b>	<b>33.0</b>

#### Junior Year

Lower-Level Humanities OR Social Sciences	3
CEC 460 Telecommunications Systems	3
CS 420 Operating Systems	3
EC 225 Engineering Economics	3
EE 302 Electronic Devices and Circuits	3
EE 309 Signal and Linear System Analysis	4
MA 412 Probability and Statistics	3
SE 300 Software Engineering Practices	3
Open Elective	3
Technical Elective **	3
<b>Hours Subtotal</b>	<b>31.0</b>

#### Senior Year

Upper-Level Humanities OR Social Sciences *	3
CEC 420 Computer Systems Design I	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>Hours Subtotal</b>	<b>31.0</b>
Hours Total:	127

## Footnotes

- \* Embry-Riddle courses in the General Education categories of Humanities and Social Sciences may be chosen from those listed in the section 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.
- \*\* 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.
- \*\*\* UNIV 101 is taken in excess of degree requirements or meets open elective credit.

## General Education Electives

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

#### Upper-Level

PSY 350 Social Psychology

Or any SS or EC course equal to or above 300 level

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

## B.S in Electrical Engineering

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 measure our accomplishment of this goal are engineers who:

- Demonstrate achievements in their chosen profession
- Contribute to the development of the profession
- Engage in professional growth
- Contribute to the welfare of society through service

The Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

### 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 section 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

	<b>Hours</b>
CEC 220 Digital Circuit Design	3
CEC 222 Digital Circuit Design Laboratory	1
COM 122 English Composition	3
COM 219 Speech	3
EGR 101 Introduction to Engineering	2
EGR 115 Introduction to Computing for Engineers	3
HU/SS Lower-Level Humanities OR Social Sciences *	3
HU 14X Lower-Level Humanities	3
MA 241 Calculus and Analytical Geometry I	4
MA 242 Calculus and Analytical Geometry II	4
PS 150 Physics for Engineers I	3
UNIV 101 College Success ***	(1)
<b>Hours Subtotal</b>	<b>32.0</b>

#### Sophomore Year

CEC 320 Microprocessor Systems	3
CEC 322 Microprocessor Systems Laboratory	1
COM 221 Technical Report Writing	3
CS 125 Computer Science I	4
EE 223 Linear Circuits Analysis I	3
EE 224 Electrical Engineering Laboratory I	1
MA 243 Calculus and Analytical Geometry III	4
MA 345 Differential Equations and Matrix Methods	4
PS 160 Physics for Engineers II	3
PS 250 Physics for Engineers III	3
PS 253 Physics Laboratory for Engineers	1
<b>Hours Subtotal</b>	<b>30.0</b>

#### Junior Year

EE 302 Electronic Devices and Circuits	3
EE 304 Electronic Circuits Laboratory	1
EE 309 Signal and Linear System Analysis	4
EE 340 Electric and Magnetic Fields	3
EE 450 Elements of Power Systems	3
EE 452 Power Systems Laboratory	1
ES 207 Fundamentals of Mechanics	3
ES 312 Energy Transfer Fundamentals	3
ES Core Selection ****	3
MA Math Elective (above 300-level)	3
MA 441 Mathematical Methods for Engineering and Physics I	3
Specified Elective ****	3
<b>Hours Subtotal</b>	<b>33.0</b>

#### Senior Year

EC 225 Engineering 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
<b>Hours Subtotal</b>	<b>32.0-33.0</b>
Hours Total:	127.0-128.0

### ES Core selection (take 3 credits):

AE 416 Aerospace Structures and Instrumentation & AE 417 and Aerospace Structures and Instrumentation Laboratory	2
EGR 200 Computer Aided Conceptual Design of Aerospace Systems	3
EGR 401 Advanced CATIA	1
EP 394 Space Systems Engineering	3
ES 206 Fluid Mechanics	3

ES 306	Fiber Optics	3
ES 315	Space Environment and Effects	3
ES 320 & ES 321	Engineering Materials Science and Engineering Materials Science Laboratory	3
ES 322 & ES 323	Aerospace Engineering Failure and Aerospace Engineering Failure Laboratory	3
ES 412	Structural Dynamics	3
ES 413	Engineering Fundamental Review	1
ES 299	Special Topics in Engineering Science	3
ES 399	Special Topics in Engineering Science	3
ES 499	Special Topics in Engineering Science	3

## Footnotes

- \* 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.
- \*\* Technical electives are selected from a list provided by the department chair
- \*\*\* UNIV 101 is taken in excess of degree requirements
- \*\*\*\* Specified elective is any AE, AF, CE, CS, EE, ES, MA, MSL, PS course above 300 level, or as approved by department chair and not otherwise taken for the EE degree. Only one three-credit specified elective may come from AF or MSL.
- \*\*\*\*\* Select 3 credits from the list of ES core selection above.

## General Education Electives

### Humanities

#### Lower-Level

Any HU/L course under 300 level

#### Upper-Level

Any HU/L course equal to or above 300 level

### Social Sciences

#### Lower-Level

Any SS/EC/PSY/RS course under 300 level

#### Upper-Level

PSY 350 Social Psychology

Or any SS or EC course equal to or above 300 level

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



## B.S. in Mechanical Engineering

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 three primary options of robotics, propulsion and energy.

The freshman year in Mechanical Engineering is common to the Aerospace Engineering degree program. The second year in Mechanical Engineering builds fundamental skills in math and physics while introducing students to Engineering Mechanics and the Thermal Sciences. During the second semester of their sophomore year, Mechanical Engineering students in Embry-Riddle's program in Prescott will start taking courses aligned within the focus areas of robotics, propulsion or energy. The robotics option emphasizes the design and analysis of autonomous vehicles that include uninhabited aerial vehicles (UAVs), autonomous space vehicles, and planetary rovers. The propulsion option emphasizes 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. The energy option emphasizes the design of renewable energy systems. During the senior year, students will gain additional depth in their options 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 have the opportunity to choose between five capstone sequences as a culminating event focused on teams, integration, and synthesis of four years of education. Mechanical engineers can choose capstones sequences that include:

- Robotics sequence centered on UAVs and rovers
- Astronautics sequence centered on spacecraft
- Aeronautics sequence centered on aircraft
- Propulsion sequence centered on jet aircraft engines.
- Energy sequence centered on alternative energy systems

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 measure our accomplishment of this goal are engineers who:

- Demonstrate achievements in their chosen profession
- Contribute to the development of the profession
- Engage in professional growth
- Contribute to the welfare of society through service

The Mechanical Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

## Degree Requirements

The Bachelor of Science in Mechanical 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, ES, and ME courses, excluding technical electives. The courses necessary to earn this degree are listed below.

Students should be aware that they must complete MA 241, MA 242, PS 150 with a C or better prior to taking ES201; complete PS 160 and ES 201 with a C or better prior to taking all other ES courses; and complete EGR 115 with a C or better prior to taking all AE and ME courses.

## Suggested Program of Study

### Freshman Year

		Hours
CEC 220	Digital Circuit Design	3
CEC 222	Digital Circuit Design Laboratory	1
COM 122	English Composition	3
EC 225	Engineering Economics	3
EGR 101	Introduction to Engineering	2
	HU/SS Lower-Level Humanities OR Social Sciences *	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 for Engineers I	3
PS 160	Physics for Engineers II	3
UNIV 101	College Success **	(1)
<b>Hours Subtotal</b>		<b>32.0</b>

### Sophomore Year

COM 221	Technical Report Writing	3
EGR 115	Introduction to Computing for Engineers	3
EGR 200	Computer Aided Conceptual Design of Aerospace Systems	3
ES 201	Statics	3
ES 202	Solid Mechanics	3
MA 243	Calculus and Analytical Geometry III	4
MA 345	Differential Equations and Matrix Methods	4
PS 250	Physics for Engineers III	3
PS 253	Physics Laboratory for Engineers	1
	Select one of the options below.	6-7
<b>Hours Subtotal</b>		<b>33.0-34.0</b>

### Junior Year

	Select one of the options below.	32-34
<b>Hours Subtotal</b>		<b>32.0-34.0</b>

### Senior Year

	Select one of the options below.	29-32
<b>Hours Subtotal</b>		<b>29.0-32.0</b>
Hours Total:		129

## Propulsion Option

### Sophomore Year

		Hours
ES 206	Fluid Mechanics	3
ES 305	Thermodynamics	3
<b>Hours Subtotal</b>		<b>6.0</b>

### Junior Year

AE 430	Control System Analysis and Design	3
EE 335	Electrical Engineering I ***	2
EE 336	Electrical Engineering I Laboratory ***	1
ES 204	Dynamics	3
ES 320	Engineering Materials Science	2
ES 321	Engineering Materials Science Laboratory	1
ES 403	Heat Transfer	3
ME 309	Airbreathing and Rocket Propulsion	3
ME 404	Mechatronics	3
ME 404L	Mechatronics Laboratory	1
ME 417	Advanced Propulsion	3
PS 105	General Chemistry I	4
PS 105L	General Chemistry I Laboratory	0
	Technical Elective	3
<b>Hours Subtotal</b>		<b>32.0</b>

### Senior Year

	Upper-level Humanities OR Social Sciences *	3
AE 416	Aerospace Structures and Instrumentation	1
AE 417	Aerospace Structures and Instrumentation Laboratory	1
COM 420	Advanced Technical Communication I	1
COM 430	Advanced Technical Communication II	2
MA 412	Probability and Statistics	3
ME 304	Introduction to Machine Design	3
ME 305	Machine Design Laboratory	1
ME 400	Vibration and Acoustics	3
ME 403	Thermal Power Systems	3
	Technical Electives	3
	Preliminary Design	4
	Detail Design	4
<b>Hours Subtotal</b>		<b>32.0</b>

## Robotics Option

### Sophomore Year

		Hours
ES 204	Dynamics	3
EE 223	Linear Circuits Analysis I	3
EE 224	Electrical Engineering Laboratory I	1
<b>Hours Subtotal</b>		<b>7.0</b>

### Junior Year

	Upper-level Humanities OR Social Sciences *	3
AE 430	Control System Analysis and Design	3

College of Engineering 09/20/13

ES 206	Fluid Mechanics	3
ES 305	Thermodynamics	3
MA 412	Probability and Statistics	3
ME 302	Introduction to Robotics I	3
ME 304	Introduction to Machine Design	3
ME 305	Machine Design Laboratory	1
ME 404	Mechatronics	3
ME 404L	Mechatronics Laboratory	1
ME 406	Robotics II	3
ME 406L	Robotics II Laboratory	1
PS 105	General Chemistry I	4
PS 105L	General Chemistry I Laboratory	0
<b>Hours Subtotal</b>		<b>34.0</b>

### Senior Year

COM 420	Advanced Technical Communication I	1
COM 430	Advanced Technical Communication II	2
ES 320	Engineering Materials Science	2
ES 321	Engineering Materials Science Laboratory	1
ES 403	Heat Transfer	3
ME 400	Vibration and Acoustics	3
ME 403	Thermal Power Systems	3
	Technical Electives	6
	Preliminary Design	4
	Detail Design	4
<b>Hours Subtotal</b>		<b>29.0</b>

## Energy Option

### Sophomore Year

		Hours
ES 206	Fluid Mechanics	3
ES 305	Thermodynamics	3
<b>Hours Subtotal</b>		<b>6.0</b>

### Junior Year

AE 430	Control System Analysis and Design	3
EE 335	Electrical Engineering I ***	2
EE 336	Electrical Engineering I Laboratory ***	1
ES 204	Dynamics	3
ES 320	Engineering Materials Science	2
ES 321	Engineering Materials Science Laboratory	1
ES 403	Heat Transfer	3
ME 312	Alternative Energy	3
ME 403	Thermal Power Systems	3
ME 404	Mechatronics	3
ME 404L	Mechatronics Laboratory	1
ME 432	Advanced Alternative Energy	3
PS 105	General Chemistry I	4
PS 105L	General Chemistry I Laboratory	0
<b>Hours Subtotal</b>		<b>32.0</b>

### Senior Year

	Upper-level Humanities OR Social Sciences *	3
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AE 416	Aerospace Structures and Instrumentation	1
AE 417	Aerospace Structures and Instrumentation Laboratory	1
COM 420	Advanced Technical Communication I	1
COM 430	Advanced Technical Communication II	2
MA 412	Probability and Statistics	3
ME 304	Introduction to Machine Design	3
ME 305	Machine Design Laboratory	1
ME 400	Vibration and Acoustics	3
	Technical Electives	6
	Preliminary Design	4
	Detail Design	4
	<b>Hours Subtotal</b>	<b>32.0</b>

## Capstone Design Sequence, Preliminary and Detail Design

ME students have five possible sequences for their capstone sequence:

### Aeronautics

Students taking the Aircraft capstone sequence are required to take:

AE 420	Aircraft Preliminary Design	4
AE 421	Aircraft Detail Design	4

### Astronautics

Students taking the Spacecraft capstone sequence are required to take:

AE 427	Spacecraft Preliminary Design	4
AE 445	Spacecraft Detail Design	4

### Energy

Students taking the Energy capstone sequence are required to take:

ME 435	Energy Engineering Preliminary Design	4
ME 440	Energy Engineering Detail Design	4

### Propulsion

Students taking the Propulsion capstone sequence are required to take:

ME 429	Propulsion System Preliminary Design	4
ME 431	Propulsion System Detail Design	4

### Robotics

Students taking the Robotics capstone sequence are required to take:

ME 407	Preliminary Design of Robotic Systems with Laboratory	4
ME 420	Detail Design of Robotic Systems with Laboratory	4

## Technical Electives

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 below or an upper-level ROTC course may be substituted.

### AE

Upper-level, except AE 399, AE 499 \*\*\*\*

### Cooperative Education courses

With prior approval of the Aerospace Engineering dept.  
See Career Advisor for more information

### CEC

Upper level, except CEC 399, CEC 499 \*\*\*\*

### CS

CS 325	Programming in ADA
CS 335	Introduction to Computer Graphics
CS 350	Computer Modeling and Simulation
CS 420	Operating Systems

### EE

Upper level, except EE 399, EE 499 \*\*\*\*

### EGR

Upper level

### EP

Upper level, except EP 399, EP 499 \*\*\*\*

### ES

Upper level, except ES 399, ES 499 \*\*\*\*

### MA

MA 348	Numerical Analysis I
MA 432	Linear Algebra
MA 441	Mathematical Methods for Engineering and Physics I
MA 442	Mathematical Methods for Engineering and Physics II
MA 443	Complex Variables

### ME

Upper-level, except ME 399, ME 499 \*\*\*\*

### PS

PS 303	Modern Physics
PS 321	Classical Mechanics I
PS 322	Classical Mechanics II
PS 350	Quantum Mechanics I
PS 375	Planetary Science
PS 420	Remote Sensing

### SE

SE 300 Software Engineering Practices

## Footnotes

\* See General Education Electives section below

\*\* UNIV 101 is taken in excess of degree requirements or meets open elective credit

\*\*\* EE 223/EE 224 may be substituted for EE 335/EE 336

\*\*\*\* Must be approved by the Aerospace Engineering Department before taking this course.

## General Education Electives

Embry-riddle courses in the general education categories of Humanities, Mathematics, and Social Sciences may be chosen as specified below, assuming prerequisite and corequisite 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.

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

### Humanities

Lower-Level

Any HU/L course under 300 level

Upper-Level

Select one of the following:

HU 330 Values and Ethics

HU/SS399 Study Abroad only

### Social Sciences

Lower-Level

Any EC/SS/PSY/RS course under 300 level

## B.S. in Software Engineering

The Bachelor of Science degree in Software Engineering is designed to prepare students for an entry-level software engineering position in industry that supports the design and implementation of software systems with the focus on real-time, embedded, and safety critical applications. Such systems are critical in aviation, space, medicine, and other disciplines that rely on high-quality, dependable software. The objectives of the Software Engineering program are that our graduates:

- Demonstrate achievements in their chosen profession
- Contribute to the development of the profession
- Engage in professional growth
- Contribute to the welfare of society through service

The curriculum is designed to facilitate accomplishment of these objectives by program graduates. It provides a broad education, including fundamental knowledge about computer software and hardware. It also allows graduates to work in a team environment and to recognize the value of collaborative effort. The program lays a foundation for lifelong learning, professional growth, and ethical and responsible behavior in society.

### Cyber-Security Focus

The degree features an optional focus on cyber-security. Students who select this focus will be prepared to support government and industry's need for people skilled in software development as well as in cyber-security.

For the cyber-security focus, the junior year replaces a technical elective with CS 425 Net-Centric Computing (3), and the senior year replaces two technical electives with CS 303 Network Security (3) and CI 450 Computer Forensics and one open elective with CS 432 Information & Computer Security (3).

### Degree Requirements

The Bachelor of Science degree can be earned in eight semesters assuming appropriate background and full-time enrollment. Successful completion of a minimum of 128 credit hours is required. Students entering this program should have demonstrated a competence in mathematics and science (preferably physics). They should be prepared to enter Calculus I, having demonstrated proficiency in algebra and trigonometry. Students can prepare for this program by taking MA 140, College Algebra, and MA 142, Trigonometry, prior to taking MA 241. For those students who have not taken physics in high school, it is recommended that PS 113, Technical Physics I, be taken prior to PS 150. The Software Engineering program is designed to prepare students to work as part of a team on the development of software systems. Software engineering concepts, methods, and techniques are integrated through the curriculum. The curriculum includes courses in general education, math and science, and computing. The latter is divided into computing fundamentals, advanced concepts, applied computing, and software engineering. In addition, a student can acquire a minor or a concentration in a domain area of interest.

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Check the course description section 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.

## Suggested Program of Study

### Freshman Year

		Hours
	Lower-Level Humanities -OR- Social Sciences *	3
CEC 220	Digital Circuit Design	3
CEC 222	Digital Circuit Design Laboratory	1
COM 122	English Composition	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 Analytical Geometry I	4
MA 242	Calculus and Analytical Geometry II	4
PS 150	Physics for Engineers I	3
	UNIV 101 College Success ***	(1)
<b>Hours Subtotal</b>		<b>32.0</b>

### Sophomore Year

CEC 320	Microprocessor Systems	3
CEC 322	Microprocessor Systems Laboratory	1
COM 221	Technical Report Writing	3
CS 125	Computer Science I	4
CS 222	Introduction to Discrete Structures	3
CS 225	Computer Science II	4
MA 243	Calculus and Analytical Geometry III	4
MA 345	Differential Equations and Matrix Methods	4
PS 160	Physics for Engineers II	3
PS 250	Physics for Engineers III	3
PS 253	Physics Laboratory for Engineers	1
<b>Hours Subtotal</b>		<b>33.0</b>

### Junior Year

CEC 470	Computer Architecture	3
CS 315	Data Structures and Analysis of Algorithms	3
CS 317	Files and Database Systems	3
CS 332	Organization of Programming Languages	3
CS 420	Operating Systems	3
MA 412	Probability and Statistics	3
SE 300	Software Engineering Practices	3
SE 310	Analysis and Design of Software Systems	3
SE 320	Software Construction	3
SE 420	Software Quality Assurance	3
	Technical Elective **	3
<b>Hours Subtotal</b>		<b>33.0</b>

### Senior Year

CEC 450	Real-Time Systems	3
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SE 410	Software Modeling	3
SE 450	Software Team Project I	3
SE 451	Software Team Project II	3
HU 330	Values and Ethics	3
EC 225	Engineering Economics	3
	Open Elective	6
	Technical Elective **	6
<b>Hours Subtotal</b>		<b>30.0</b>
Hours Total:		128.0

## Footnotes

- \* 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 Software Engineering vertical outline.
- \*\* Technical electives include any AE, CE, CS, EE, ES, MA, or PS course
- \*\*\* UNIV 101 is taken in excess of degree requirements or meets open elective credit.

## General Education Electives

### Humanities

#### Lower-Level

Any course in the HU/L series under 300 level

### Social Sciences

#### Lower Level

Any EC/SIS/SS/PSY/RS course under 300 level

# Minor Courses of Study

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 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. Designed to include a minimum number of required courses, minors provide students, whenever possible, with flexibility in fulfilling program requirements.

- A minor must be in a discipline outside the student's major field of study.
- A minor consists of a minimum of 15 semester hours of related courses, of which at least six hours must be completed in residence at Embry-Riddle. A minor must have at least six credits hours in the discipline from courses that are not specifically required in the student's degree program. 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 submitting 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 the standard minors described in this catalog, students may earn an interdisciplinary minor by completing required courses approved by the Department Chair and the Dean of the college offering the minor. No substitutions are allowed in the interdisciplinary minor. A new form must be submitted with the appropriate signatures to make changes. Please see your academic advisor or the Records Office for more information.

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

- Aeronautical Studies (p. 110)
- Aerospace Engineering (p. 110)
- Air Traffic Control (p. 110)
- Applied Meteorology (p. 111)
- Arabic and Middle Eastern Studies (p. 111)
- Asian Studies (p. 111)
- Aviation Safety (p. 111)

- Business Administration (p. 112)
- Computer Science (p. 112)
- Computer Security (p. 112)
- Electrical Engineering (p. 112)
- Engineering Science (p. 112)
- Environmental Studies (p. 113)
- Flight (p. 113)
- Helicopter Flight (p. 113)
- Helicopter Operations & Safety (p. 114)
- Humanities (p. 114)
- Mandarin Chinese (p. 114)
- Mathematics (p. 115)
- Mechanical Engineering (p. 115)
- Psychology (p. 115)
- Robotics (p. 115)
- Security and Intelligence Studies (p. 116)
- Systems Engineering (p. 109)
- Technical Intelligence (p. 116)
- Unmanned Aircraft Systems (p. 116)

## Systems Engineering

**This minor will provide knowledge in basic Systems Engineering. It is open to all students in the College of Engineering on the Prescott Campus. Six (6) credits not specifically required in the student's degree program must be taken to qualify for a minor.**

MA 412	Probability and Statistics	3
SYS 301	Introduction to Systems Engineering	3
SYS 304	Trade Studies, Risk and Decision Analysis	3
SYS 415	Systems Engineering Practices: Specialty Engineering	3
Elective from list below		3
Total Hours		15

### \*Electives - Choose one

AE 350	Project Engineering	3
AE 430	Control System Analysis and Design	3
BA 201	Principles of Management	3
CS 350	Computer Modeling and Simulation	3
EE 401	Control Systems Analysis and Design	3
EP 394	Space Systems Engineering	3
ME 306	Robotic Mechanisms	3
SYS 303	Optimization in Systems Engineering	3
SYS 310	Systems Architecture, Modeling and Simulation	3

\* The following courses taught at Daytona campus can also be used as electives: CEC 300, CIV 222, CIV 311, CIV 340, EE/ME 311, HF 312, HF 315, HF 325.  
Prior approval is required by the AE/ME Department chair for any other substitutions.

## Aeronautical Studies

This minor gives students 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:

Select six of the following:	18
AS 254 Aviation Legislation	
AS 309 Aerodynamics	
AS 310 Aircraft Performance	
AS 311 Aircraft Engines - Turbine	
AS 350 Domestic and International Navigation	
AS 356 Aircraft Systems and Components	
AS 357 Flight Physiology	
AS 387 Crew Resource Management	
AS 402 Airline Operations	
AS 405 Aviation Law	
AS 408 Flight Safety	
AS 410 Airline Dispatch Operations	
AS 411 Jet Transport Systems	
AS 412 Corporate and Business Aviation	
AS 420 Flight Technique Analysis	
<b>Total Hours</b>	<b>18</b>

Note: This minor is not open to students pursuing a degree in Aeronautical Science.

## Aerospace Engineering

This minor will provide knowledge in basic Aerospace Engineering. Students earn this minor by completing a total of 17 credit hours as follows:

AE 301 Aerodynamics I	3
AE 313 Space Mechanics	3
AE 318 Aerospace Structures I	3
Specified Electives	8
<b>Total Hours</b>	<b>17</b>

### Specified electives

AE 302 Aerodynamics II *	3
AE 314 Experimental Aerodynamics *	1
AE 315 Experimental Aerodynamics Laboratory *	1
AE 413 Airplane Stability & Control *	3
ME 309 Airbreathing and Rocket Propulsion *	3

Minor Courses of Study 09/20/13

AE 325 Experimental Space Systems Engineering **	1
AE 326 Experimental Space Systems Engineering Lab **	1
AE 414 Space Propulsion **	3
AE 426 Spacecraft Attitude Dynamics **	3
EP 394 Space Systems Engineering **	3
AE 416 Aerospace Structures and Instrumentation and Aerospace Structures and Instrumentation Laboratory	2
AE 418 Aerospace Structures II	3
EGR 401 Advanced CATIA	1
ES 413 Engineering Fundamental Review	1

\* These courses are recommended for students interested in Aeronautics.

\*\* These courses are recommended for students interested in Astronautics.

Note: This minor is not open to students pursuing a degree in Aerospace Engineering.

## 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.

The FAA has stipulated that only students enrolled in certain aviation degree programs are eligible for entry into the Air Traffic Control (ATC) Collegiate Training Initiative (CTI) program. Although students from any degree program may declare and earn a minor in ATC, eligibility for the CTI program is more restrictive. Approved CTI degree programs include Aeronautics, Aeronautical Science and Applied Meteorology. \*

Students wishing to declare ATC as a minor must receive approval of the Chair of the Aeronautical Science department.

To earn a minor in Air Traffic Control, students must successfully complete the following:

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
Select one of the following:	1-4
AS 119 Private Pilot Operations	
AS 120 Principles of Aeronautical Science	

FAA Private Pilot Certificate	
Total Hours	16-19

\* Although AT 302 is not required for the ATC minor, those students who wish to be eligible for the CTI program must also take AT 302.

Note: This minor is not open to students pursuing a degree in Air Traffic Management

## 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.

WX 201	Survey of Meteorology	3
WX 301	Aviation Weather	3
Any 3 additional WX courses		9

Course Recommendations for flight students:

WX 261	Applied Climatology	
WX 363	Thunderstorms	
WX 364	Weather for Aircrews	
WX 365	Satellite and Radar Weather Interpretation	

Total Hours	15
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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.

Note: This minor is not open to students pursuing a degree in Applied Meteorology

## Arabic and Middle Eastern Studies

The Arabic and Middle Eastern Studies Minor introduces the student to the cultures, histories, and languages of Arab countries. A student can earn this minor by successfully completing at least 18 credit hours as follows:

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 and Culture	3
RS 307 or RS 399	Islam and Arabic Culture Special Topics in Regional Studies	3
Total Hours		18

With departmental approval, students may also earn this minor using transfer credits in Arabic language and area studies

provided they fulfill all other minor requirements listed at the beginning of this section.

## 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. A student can earn the minor by successfully completing at least 15 related credit hours as follows:

LCH 101	Mandarin Chinese I	3
LCH 102	Mandarin Chinese II	3
LCH 199 or LCH 201	Special Topics in Lower-Level Chinese Mandarin Chinese III	3
RS 300	Observing Asian Cultures *	3
RS 305	Asian Literature	3
Total Hours		15

\* This course is only offered every other year.

With departmental approval, students may also earn this minor using transfer credits in Asian language, or Asian studies courses or study abroad provided they take 6 upper level credits at ERAU and fulfill all other minor requirements listed at the beginning of this section.

Note: This minor is not open to students pursuing a degree in Global Securities and Intelligence Studies, Chinese Track.

## Aviation Safety

Students may earn a minor in Aviation Safety by successfully completing the core along with 9 credit hours selected from the elective list below.

<b>Core</b>		
SF 210 or SF 201	Introduction to Aerospace Safety * Introduction to Health, Occupational, and Transportation Safety	3
SF 320	Human Factors in Aviation Safety	3
Select three of the following:		9
SF 330	Aircraft Accident Investigation	
SF 335	Mechanical and Structural Factors in Aviation Safety	
SF 341	Safety and Security of Airport Ground Operations	
SF 345	Safety Program Management	
SF 350	Aircraft Crash and Emergency Management	
SF 375	Propulsion Plant Investigation	
SF 435	Aircraft Crash Survival Analysis and Design	
SF 445	System Safety in Aviation	
SF 399 or SF 499	Special Topics in Safety Special Topics in Safety	
Total Hours		15

\*Note: Students in the Aeronautical Science degree program pursuing the Safety minor who complete SF 210/SF 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.

Note: This minor is not open to students pursuing a degree in Safety Science with an Aviation Safety Area of Concentration.

## Business Administration

Students may earn a minor in Business Administration by successfully completing the following.

BA 201	Principles of Management	3
EC 210	Microeconomics	3
or EC 211	Macroeconomics	
BA 210	Financial Accounting	3
BA 311	Marketing	3
Specified Electives		6
Total Hours		18

### Specified Electives\*

BA 308	Public Administration	3
BA 319	Managerial Organizational Behavior	3
BA 320	Business Information Systems	3
BA 322	Aviation Insurance	3
BA 324	Aviation Labor Relations	3
BA 329	Forensic Accounting and Fraud Examination	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 418	Airport Administration and Finance	3
BA 421	Small Business Management	3
EC 225	Engineering Economics	3

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

Note: This minor is not open to students pursuing a degree in Aviation Business Administration.

## Computer Science

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

CS 125	Computer Science I	4
CS 225	Computer Science II	4
SE 300	Software Engineering Practices	3

Upper Level CEC/CS/SE Electives *	6
Total Hours	17

\* Any 300-400 level Computer/Electrical/Software engineering electives or any computer-related course approved by the CE/EE/SE department chair.

## 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.

EGR 115	Introduction to Computing for Engineers	3
CS 225	Computer Science II	4
CS 303	Network Security	3
CS 305	Database Systems and Data Mining	3
CS 420	Operating Systems	3
CS 432	Information and Computer Security	3
Total Hours		19

## Electrical Engineering

This minor will provide knowledge of analog or digital electronics and its application to the fields of aerospace and mechanical engineering.

EE 223	Linear Circuits Analysis I	3
EE 224	Electrical Engineering Laboratory I	1
EE 309	Signal and Linear System Analysis	4
Select one of the following Options:		8

### Digital Option

CS 125	Computer Science I	
CEC 320	Microprocessor Systems	
CEC 322	Microprocessor Systems Laboratory	

### Analog Option

EE 302	Electronic Devices and Circuits	
EE 304	Electronic Circuits Laboratory	
EE 4XX	Elective and Laboratory	

Total Hours	16
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Note: This minor is not open to students pursuing a degree in Electrical Engineering.

## Engineering Science

This minor will provide knowledge in basic fundamentals of Engineering. Students earn this minor by completing a total of 15 credit hours as follows:

ES 201	Statics	3
or ES 207	Fundamentals of Mechanics	
Specified Electives 200 level or above		6
Specified Electives 300 level or above		6
<b>Total Hours</b>		<b>15</b>

Specified electives - please select from list below:

ES 202	Solid Mechanics	3
ES 204	Dynamics	3
ES 206	Fluid Mechanics	3
ES 305	Thermodynamics	3
ES 306	Fiber Optics	3
ES 315	Space Environment and Effects	3
ES 320	Engineering Materials Science	2
ES 321	Engineering Materials Science Laboratory	1
ES 312	Energy Transfer Fundamentals	3
or ES 403	Heat Transfer	
ES 412	Structural Dynamics	3

Note: This minor is not open to students pursuing a degree in Aerospace Engineering or Mechanical Engineering.

## 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.

PS 107	Elements of Biological Science	3
Select one of the following:		3-4
PS 101	Basic Chemistry	
PS 105	General Chemistry I	
PS 108	Contemporary Chemistry	
PS 140	Chemistry for Engineers	
AES 142	Intro to Environmental Science	3
AES 304	Environmental Science	3
or AES 309	Principles of Ecology	
SS 360	Environmental Law	3
or COM 350	Environmental Communication	
<b>Total Hours</b>		<b>15-16</b>

## Flight (Fixed Wing)

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. Students must select one of two tracks

AS 119	Private Pilot Operations	4
AS 221	Instrument Pilot Operations	3
AS 321	Commercial Pilot Operations	3
Select one of the following Tracks:		7-11

### Flight Track \*

FA 119	Private Single Flight
FA 221	Instrument Single Flight
FA 321	Commercial Single Flight
FA 323	Commercial Multi Add On
Upper-Level AS Course	

### Flight Education Track \*

AS 421	Flight Instructor Ground Course
FA 119	Private Single Flight
FA 221	Instrument Single Flight
FA 321	Commercial Single Flight
FA 323	Commercial Multi Add On
FA 421	Flight Instructor Rating
FA 460	Multi-Engine Flight Instructor Rating

**Total Hours** 17-21

\* 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.

Note: This minor is not open to students pursuing a degree in Aeronautical Science with an Airline Pilot, Commercial Pilot or Military Pilot specialty.

## 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. All helicopter flight activities must be completed with the approved University provider.

AS 142	Private Helicopter Operations	3
AS 252	Instrument Helicopter Operations	3
AS 372	Commercial Helicopter Operations	3
FH 142	Helicopter Pilot Flight Private	1
FH 252	Helicopter Pilot Flight Instrument	1
FH 372	Helicopter Pilot Flight Commercial	1
Select one of the following:		3-5

Any upper-level (300/400) AS, SF, or WX course (3)



AS 442 & FH 442	Flight Instructor Helicopter Operations and Helicopter Pilot Flight Instructor	
Total Hours		15-17

Note: This minor is not open to students pursuing a degree in Aeronautical Science with a Helicopter Pilot specialty.

## 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 is only open to students also pursuing a Helicopter Flight Minor. Students declaring this minor must be FAA licensed helicopter pilots. A minor in Helicopter Operations and Safety can be earned by successfully completing all of the following:

AS 378	Environmental Helicopter Operations	3
AS 388	Helicopter Flight Planning	3
AS 428	Advanced Helicopter Systems and Functions	3
AS 438	Advanced Helicopter Operations	3
SF 210	Introduction to Aerospace Safety	3
SF 345	Safety Program Management	3
Total Hours		18

## 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-HU 146 series for a subtotal of six credits. Students must also complete one course from each of the categories Narrative, Speculative, and Religion and Fine Arts and one additional course from any category for a subtotal of 12 credits.

<b>Humanities 140 Series</b>		
Any 2 courses from the HU140 series		6
<b>Narrative</b>		
HU 300	World Literature	3
HU 305	Modern Literature	3
HU 310	American Literature	3
HU 325	Exploring Film	3
<b>Speculative</b>		
HU 330	Values and Ethics	3
HU 335	Technology and Modern Civilization	3
HU 341	World Philosophy	3
<b>Religion and Fine Arts</b>		
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 may be included with advance permission of the department chair.

## 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. A student can earn this minor by successfully completing 15 credit hours as follows:

LCH 201	Mandarin Chinese III	3
LCH 202	Mandarin Chinese IV	3
LCH 301	Intermediate Mandarin Chinese I	3
LCH 302	Intermediate Mandarin Chinese II	3
LCH 205 or LCH 399	Modern Chinese Films Special Topics in Chinese Language	3
Total Hours		15

A student may also earn this minor by successfully passing 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 earning 6 credits at the upper level from the list above.

Note: This minor is not open to students pursuing a degree in Global Securities and Intelligence Studies, Chinese Track.

## Mathematics

Students may earn a minor in Mathematics by completing the following:

MA 241	Calculus and Analytical Geometry I	4
MA 242	Calculus and Analytical Geometry II	4
MA 243	Calculus and Analytical Geometry III	4
MA 345	Differential Equations and Matrix Methods	4
MA	Electives (approved by department chair)	5-6
Total Hours		21-22

## Mechanical Engineering

This minor will provide knowledge in basic Mechanical Engineering. Students earn this minor by completing a total of 17 credit hours as follows:

ME 304	Introduction to Machine Design	3
ME 305	Machine Design Laboratory	1
Specified Electives		13
Total Hours		17

Specified electives - please select from list below:

ME 302	Introduction to Robotics I *	3
ME 302L	Introduction to Robotics Laboratory *	1
ME 406	Robotics II *	3
ME 406L	Robotics II Laboratory *	1
MA 412	Probability and Statistics *	3
ME 309	Airbreathing and Rocket Propulsion **	3
ME 417	Advanced Propulsion **	3
ES 403	Heat Transfer ***	3
ME 403	Thermal Power Systems ***	3
ME 312	Alternative Energy ***	3
ME 432	Advanced Alternative Energy ***	3
EGR 401	Advanced CATIA	1
ES 413	Engineering Fundamental Review	1

\* These courses are recommended for students interested in Robotics.

\*\* These courses are recommended for students interested in Propulsion.

\*\*\* These courses are recommended for students interested in Energy.

Note: This minor is not open to students pursuing a degree in Mechanical Engineering.

## Psychology

Students may earn a minor in Psychology by successfully completing the three specified courses and an additional two upper-level psychology courses, totaling 15 credit hours.

PSY 101	Introduction to Psychology	3
PSY 306	Deceptions	3
or PSY 365	Abnormal Psychology	
PSY 313	Personality and Profiling	3
<b>Choose any two additional upper-level PSY courses</b>		6
Total Hours		15

## Robotics

This minor will provide knowledge in basic Robotics. It is open to all students in the College of Engineering, except Mechanical Engineering students in the Robotics track. Six (6) credits not specifically required in the student's degree program must be taken to qualify for a minor. Computer and Electrical Engineering students should be aware that they will be required to take additional prerequisite courses outside of the requirements for their degree program to be qualified to complete this minor.

### Option 1

ES 202	Solid Mechanics	3
or ES 207	Fundamentals of Mechanics	
ES 204	Dynamics	3
ME 302	Introduction to Robotics I	3
ME 406	Robotics II	3
ME 304	Introduction to Machine Design	4
& ME 305	and Machine Design Laboratory	
or		
ME 404	Mechatronics	
& 404L	and Mechatronics Laboratory	
Total Hours		16

### Option 2

ME 311 - Robotic Technologies for Unmanned Systems (only taught at Daytona Campus)	3	
ME 402	Robotic Arms	3
ME 404	Mechatronics	3
ME 407	Preliminary Design of Robotic Systems with Laboratory	4
ME 420	Detail Design of Robotic Systems with Laboratory	4
or ME 437 - Senior Design in Robotics Systems (only taught at Daytona Campus)		
Total Hours		17

## Security and Intelligence Studies

This minor is designed for students who wish to gain a general understanding of security and intelligence concepts and processes, their application, and their vital importance to national security. The student is required to take three core courses that will provide the basic knowledge and understanding of these disciplines. An additional three courses elected from the designated list address how these disciplines are applied in the government sector, the private sector, and in the global environment.

SIS 210	Security Fundamentals	3
SIS 315	Studies in Global Intelligence I	3
SIS 325	History of Terrorism	3
Select three of the following:		9
SIS 323	Intelligence and Technology	
SIS 335	Counter-Intelligence	
SIS 410		
SIS 420	Aviation Security and Technology	
SIS 422	Homeland Security and Technology	
Total Hours		18

Note: This minor is not open to students pursuing a degree in Global Security and Intelligence Studies.

## 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.

<b>Required Courses</b>		
PS 330	Electricity and Magnetism I	3
PS 420	Remote Sensing	3
or PS 490	Senior Research Thesis, Part I	
SIS 315	Studies in Global Intelligence I	3
SIS 323	Intelligence and Technology	3
or SIS 400	International Security and Globalization	
Select three of the following:		8-9
PS 221	Intermediate Physics Laboratory	
PS 331	Electricity and Magnetism II	
SIS 400	International Security and Globalization	
SIS 405	Environment and Security	
SS 327	International Relations	
Total Hours		20-21

## Unmanned Aircraft Systems

The Unmanned Aircraft Systems minor provides the students with an education and training on the various UAS platforms and applications currently employed by federal, state, local and private agencies. This minor will have both classroom and laboratory/simulation classes. This minor is designed for students of all majors wishing to become unmanned aircraft pilots or mission payload operators. Lab fee.

### Required Courses

Select one of the following:		2-4
AS 109	F1t Transition Ground Course	
AS 119	Private Pilot Operations	
AS 120	Principles of Aeronautical Science	
AS 220	Unmanned Aircraft Systems	3
AS 235	Unmanned Aircraft Systems Operation and Cross-Country Data Entry	3
AS 315	Unmanned Aircraft Systems Robotics	3
AS 403	Unmanned Sensing Systems	3
AS 473	UAS Flight Simulation	3
BA 337	Entrepreneurship	3
Total Hours		20-22

Note: Due to International Traffic in Arms Regulations (ITAR) imposed by the United States State Department, this program will only be open to U.S. citizens.

# Undergraduate Courses

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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 or co-requisite 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.

## Cooperative Education Courses

Cooperative education and internship experiences are designed as academically based experiential education. Upon approval from the Department Chair and Career Services Director, students may sign up for co-ops or internships in most subject areas. Students enrolled in a University-approved co-op or internship professional activity and registered for 6 credit hours will be considered full-time, **except** by the Financial Aid office which will consider this to be half-time.

## Aeronautical Science (AS) Courses

### AS 109 Fit Transition Ground Course 2 Hours

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 student entering Embry-Riddle's Commercial Pilot program with a Private Pilot certificate and desiring advanced standing.

### AS 119 Private Pilot Operations 4 Hours

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 Hours

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, students with FAA pilot certificates, or students who have credit for AS 119 or AS 121.

### AS 142 Private Helicopter Operations 3 Hours

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 Rotocraft-Helicopter written knowledge test.

### AS 145 Helicopter Flight Transition Ground Course 2 Hours

A review of elementary commercial pilot flight operations including basic rotorcraft 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 Helicopter certification. This course is specifically designed for students entering Embry-Riddle's Commercial Helicopter Pilot Program with a Private Pilot certificate and desiring advanced standing.

### AS 199 Special Topics in Aeronautical Science 1-6 Hour

Individual independent or directed studies of selected topics in general aviation.

### AS 220 Unmanned Aircraft Systems 3 Hours

This course is a survey of unmanned aircraft systems (UAS), emphasizing the military and commercial history, growth, and application of UASs. The course will include basic acquisition, use, and operation of UASs with an emphasis on operations. Proof of US citizenship is required.

### AS 221 Instrument Pilot Operations 3 Hours

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.

**Prerequisites:** AS 119, or AS 109.

### AS 235 Unmanned Aircraft Systems Operation and Cross-Country Data Entry 3 Hours

This course provides an understanding of the core technologies of unmanned aircraft systems. It will include examinations of the design concepts, powerplants, control systems, and communication technologies utilized in current unmanned aircraft systems and/or likely to be used in the next few years. Particular attention will be given to the technical capabilities, best applications, and operational best practices of cross-country flight planning for today's UASs. Proof of US citizenship is required.

**Prerequisites:** AS 220.

**AS 246 Basic Navigation 3 Hours**

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.

**AS 252 Instrument Helicopter Operations 3 Hours**

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.

**Prerequisites:** AS 142 , or AS 145 , or FH 142 , or FH 145.

**AS 254 Aviation Legislation 3 Hours**

This course examines the evolution of federal civil aviation regulations in the United States. Students will examine the past and present problems prompting regulation of the industry, the resultant safety legislation, airport development, funding, legislation, and international aviation legislation.

**AS 299 Special Topics in Aeronautical Science 1-3 Hour**

Individual independent or directed studies of selected topics in general aviation.

**AS 309 Aerodynamics 3 Hours**

Students are provided with an opportunity to explore incompressible flow airfoil theory, wing theory. Topics center on calculation of stall speed, drag, basic performance criteria, configuration changes, high and low speed conditions, special flight conditions, and an introduction to compressible flow.

**Corequisites:** PS 114.

**AS 310 Aircraft Performance 3 Hours**

Aerodynamic performance of aircraft powered by reciprocating, turboprop, or jet turbine engines. Additional topics address stability and control, weight and balance, and operating data.

**Prerequisites:** AS 309.

**AS 311 Aircraft Engines - Turbine 3 Hours**

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 and representative engines.

**AS 315 Unmanned Aircraft Systems Robotics 3 Hours**

This course prepares students to integrate robotic technology into the hardware and software regimes of unmanned aviation. It will include examinations of control and system programming in the context of specific missions through guided discussions, simulation, and the operation of actual unmanned aircraft robotic systems. Proof of US citizenship is required. Pre-Requisite: Junior Standing

**Prerequisites:** AS 220.

**AS 321 Commercial Pilot Operations 3 Hours**

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.

**Prerequisites:** AS 221.

**AS 350 Domestic and International Navigation 3 Hours**

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 utilized 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 , and AS 221 , or AS 252 , or FA 221 , or FA 222 , or FH 252 **Corequisites:** AS 310.

**AS 356 Aircraft Systems and Components 3 Hours**

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. This course is not available for students who have received credit for the AMS systems course.

**Prerequisites:** PS 103 , or PS 113.

**AS 357 Flight Physiology 3 Hours**

This course explores aero- medical information. Topics include 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. Daytona Beach Pre-Requisite: Sophomore standing

**PC Prerequisites:** AS 109 , or AS 119 , or AS 120 , or AS 142 , or AS 145.

**AS 372 Commercial Helicopter Operations 3 Hours**

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 of 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.

**Prerequisites:** AS 252.



**AS 375 NVG Initial Pilot Ground School 1 Hour**

The purpose of this course is to introduce and educate the pilot/student on Night Vision Goggles (NVG), design considerations, operational applications, and applicable FARs. It also teaches the pilot about NVG limitations, capabilities, and aided night flight procedures. As a supplement to the course, the NIVO Computer Based Training system is used to facilitate emphasis on NVG components, aero medical considerations, terrain interpretation, limitations, and mission planning. This course meets FAA NVG Ground Training requirements of FAR 61.31 (k)(1). Successful completion of the written exam with a score of 85% or greater, is required. A lab fee exists for this course.

**AS 378 Environmental Helicopter Operations 3 Hours**

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.

**Prerequisites:** AS 372.

**AS 380 Pilot Career Planning and Interviewing Techniques 1 Hour**

A course in which students will discuss and develop short-term and long-term job and career goals, conduct career research using various University and Industry resources, prepare a personal job search portfolio, prepare resumes and letters of application, and gain insights and proficiency in interviewing skills so they are better prepared to enter the job market upon graduation. Students will participate in simulated interview scenarios, will be expected to correspond with at least one company, and will be involved in the evaluation of letters, resumes, and interviews. This course will be graded Pass/Fail. Pre-Requisite: Junior standing.

**AS 387 Crew Resource Management 3 Hours**

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 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 psychomotor skills will be addressed as they relate to safe, legal, and efficient flight operations. This course is a capstone course for the AMS degree, flight AOC.

**AS 388 Helicopter Flight Planning 3 Hours**

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.

**Prerequisites:** AS 372.

**AS 399 Special Topics in Aeronautical Science 1-3 Hour**

Individual independent or directed studies of selected topics in general aviation.

**AS 402 Airline Operations 3 Hours**

A study of the scope and function of a major air carrier's organizational structure and the specific relationships of the operations department with those of marketing, maintenance, and safety are discussed. A study of corporate issues including the industry in general, market structure, certification, FAR Part 121 regulations, economic issues, mergers, corporate culture, and international topics will be included. From an operational perspective, topics include flight operations employment policies, domiciles, operating specifications, types of services provided, training, passenger considerations, decision making, communications, and pertinent FARs.

**AS 403 Unmanned Sensing Systems 3 Hours**

This is the capstone course of the Unmanned Aviation minor, aimed at giving students direct experience with the planning and effective conduct of complex missions involving the proper use of the complex sensing systems on unmanned aircraft. Through guided discussion and team effort, students will address complex mission assignments by determining the proper sensing system to use, assessing alternate courses of action, selecting and/or designing appropriate unmanned aircraft equipped with the sensing system appropriate to the mission, and by performing other tasks as required to achieve mission success. Proof of US citizenship is required.

**Prerequisites:** AS 220 , and PS 114.

**AS 405 Aviation Law 3 Hours**

This course will introduce the advanced student to the U.S. Constitution as well as to federal, state, and local statutes. The student will become familiar with case law and common law and develop an understanding of the chronological development of these laws and their application to aviation. The student will be introduced to civil law, including tort, product liability, contract, sales, secured credit, property, environmental, and labor laws. Criminal statutory law and government, airman, and operator rights and liabilities will also be studied, as well as international laws and conferences. Pre-Requisite: Junior Standing.



**AS 408 Flight Safety 3 Hours**

This capstone course is designed to assist the student in developing an attitude and philosophy for accident prevention and an awareness of major flight security issues. The course includes ideal and practical personal and organizational safety and security procedures and goals; safety philosophies; aircraft accident reports; human factors; principles of accident investigation, accident prevention programs, and accident statistics; current events; NTSB special studies; and the nature of accident/error chains. Pre-Requisite: Aeronautical Science Senior standing.

**AS 410 Airline Dispatch Operations 3 Hours**

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 , and AS 310 , and AS 350 **Corequisites:** AT 200 , and AS 221.

**AS 411 Jet Transport Systems 3 Hours**

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.

**Prerequisites:** AS 356.

**AS 412 Corporate and Business Aviation 3 Hours**

This course is designed to provide the student with an understanding of the operation of a corporate flight department, value of management mobility, aircraft and equipment evaluation, maintenance, flight operations, administration, and fiscal considerations.

**AS 420 Flight Technique Analysis 3 Hours**

Application of aerodynamic principles to the development of optimal pilot techniques and procedures. Uniform procedures applicable to all airplanes and special procedures for large, high-performance, and transport aircraft are analyzed, including principles of flight deck resource management.

**AS 421 Flight Instructor Ground Course 4 Hours**

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.

**Prerequisites:** FA 321 , or FA 326.

**AS 428 Advanced Helicopter Systems and Functions 3 Hours**

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.

**Prerequisites:** AS 252 , and AS 311.

**AS 435 Electronic Flight Management Systems 3 Hours**

This course teaches the theory and principles governing flight with autopilot and flight management systems. Students will apply theory and principles by demonstrating good decisions and thought processes in autopilot and FMS/PC simulators.

**Prerequisites:** AS 350.

**AS 438 Advanced Helicopter Operations 3 Hours**

During this course, the student will obtain the foundation for advanced and specialized commercial helicopter operations. The student will be introduced to specific areas of flight operations such as Long Lines, EMS, Electronic News Gathering, Corporate, OffShore, and Federal and Municipal Law Enforcement. Emphasis will be placed on developing a safe and competent pilot who is adequately prepared for flight operations in these areas, and can assume the duties of any managerial position. The student will receive training in standard operating, safety and training procedures, aircraft selection, operating and capital budgets, aircraft purchasing and leasing agreements, and an understanding maintenance requirements to include maintenance tracking, spare parts inventory, and record keeping. By the end of the course, the student will have sufficient knowledge to understand the concepts necessary for employment in the commercial helicopter industry

**Prerequisites:** AS 372.

**AS 442 Flight Instructor Helicopter Operations 4 Hours**

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.

**Prerequisites:** AS 372 , or FH 372.

**AS 472 Operational Applications in Aeronautical Science 3 Hours**

This capstone course is designed to be a culminating experience for students in the Aeronautical Science degree program. This course focuses on the professional aspects of a career pilot, industry expectations of those entering the profession, and insights into the real-world application of aeronautical decision-making, crew resource management, threat and error management, and airline operations. Life-long learning skills are promoted through the use of team exercises that require students to explore the regulatory and ethical requirements of professional pilots. Must be taken during last two semesters before graduation

**Prerequisites:** AS 350 , and AS 387.

**AS 473 UAS Flight Simulation 3 Hours**

This course will include instruction, through lectures and instructional laboratory, of Unmanned Aircraft Systems ground control stations, pilot stations, and sensor operator stations. The course will include the organization of a typical unmanned aircraft ground control station. Using an unmanned aircraft simulator, the instructional lab will include education in the proper use of flight controls, sensor controls, and the human factors interface between personnel, and man/machine. Proof of US citizenship is required.

**Prerequisites:** AS 235.

**AS 480 Applied Aviation Research Methods 3 Hours**

The Capstone course is the culminating experience for Aeronautical Science and Aeronautics degree students. This course will provide the opportunity to explore an issue of personal or professional interest or university necessity and to address that issue through study and applied research under the direction of a faculty member. The Capstone project should demonstrate the ability to apply knowledge and skills to real-world issues and problems. In addition, the project should reflect ethical principles and responsible research. The project chosen should make a contribution to the collective body of knowledge - in the work place, the community or in the academic arena.

**AS 499 Special Topics in Aeronautical Science 1-3 Hour**

Individual independent or directed studies of selected topics in general aviation.

## Aerospace Engineering (AE)

A grade of C or better is required in MA 241, MA 242, and either PS 150 and PS 160 or PS 215, PS 216, and PS 208 for entry into all AE courses. A passing grade in all prerequisite courses or department consent is required for entry into all AE courses.

### Courses

**AE 299 Special Topic in Aerospace Engineering 1-6 Hour**

Individual independent or directed studies of selected topics in aerospace engineering.

**AE 301 Aerodynamics I 3 Hours**

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 , and MA 243 **Corequisites:** ES 305.

**AE 302 Aerodynamics II 3 Hours**

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 , and ES 305.

**AE 313 Space Mechanics 3 Hours**

This course presents a vector-based solution of the two-body problem and the solution for the position and time problem (Kepler's equations). These are used to analyze orbits, satellite launch, ground tracks, orbit transfer, interplanetary trajectories, and interception and rendezvous. Using three-dimensional vector dynamics, the motion and stability of rigid and semi-rigid spacecraft are studied as are the means for controlling spacecraft orientation.

**Prerequisites:** ES 204 , and MA 345.

**AE 314 Experimental Aerodynamics 1 Hour**

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.

**Prerequisites:** COM 221 **Corequisites:** AE 302.

**AE 315 Experimental Aerodynamics Laboratory 1 Hour**

This laboratory consists of a sequence of experiments that demonstrate basic aerodynamic theory while developing skills in the use of classic and modern experiment apparatus, the practice of good experimental technique, and the writing of experimental reports. Specific experiments depend on apparatus availability and instructor preference.

**Prerequisites:** COM 221 **Corequisites:** AE 302.

**AE 318 Aerospace Structures I 3 Hours**

Methods of stress analysis of statically determinate lightweight structural systems. Applications include space structures and semimonocoque structures. Inertia force and load factor computation. Topics in applied elasticity. Three-dimensional beam bending. Shear flow. Materials considerations. Finite element modeling and computer-aided analysis.

**Prerequisites:** ES 202.

**AE 325 Experimental Space Systems Engineering 1 Hour**

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.

**Prerequisites:** PS 250 **Corequisites:** EP394.

**AE 326 Experimental Space Systems Engineering Lab 1 Hour**

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.

**Prerequisites:** PS 253 **Corequisites:** EP 394.

**AE 350 Project Engineering 3 Hours**

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. Pre-Requirement: Junior standing.

**AE 399 Special Topic in Aerospace Engineering 1-6 Hour**

Individual independent or directed studies of selected topics in aerospace engineering.

**AE 401 Advanced Aerodynamics I 3 Hours**

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 , and MA 441.

**AE 409 Aircraft Composite Structures 3 Hours**

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 , and ES 320.

**AE 411 Advanced Experimental Aerodynamics 3 Hours**

This course is a technical elective and consists of a series of advanced experiments using the wind tunnel. Model design and construction, testing procedure, control surface testing, propeller testing, use of wind tunnel data, scale effects, complete model testing. Includes introduction to supersonic testing.

**Prerequisites:** AE 314.

**AE 413 Airplane Stability & Control 3 Hours**

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:** ES 204 , and MA 345 **Corequisites:** AE 302.

**AE 414 Space Propulsion 3 Hours**

This course provides the student with an introduction to the basic principles of liquid and solid propulsion systems. Flight performance parameters are presented for single and multistage vehicles. The thermo-chemistry of the combustion process will also be discussed. Performance enhancements of nuclear rockets and electric propulsion will be covered.

**Prerequisites:** AE 301 , and ES 305.

**AE 416 Aerospace Structures and Instrumentation 1 Hour**

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 designs are utilized.

**Prerequisites:** AE 318 , or ME 304 , and COM 221 , and EE 335  
**Corequisites:** AE 417.

**AE 417 Aerospace Structures and Instrumentation Laboratory 1 Hour**

Principles of modern aerospace vehicles 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.

**Prerequisites:** COM 221 , and EE 335 , and AE 318 , or ME 304.

**AE 418 Aerospace Structures II 3 Hours**

Continuation of AE 318. Methods of computer-aided deflection and stress analysis of redundant lightweight structural systems by means of virtual work principles and their energy counterparts. Introduction to finite element theory. Buckling considerations. Applications include space structures and semimonocoque structures.

**Prerequisites:** AE 318.

**AE 420 Aircraft Preliminary Design 4 Hours**

Airplane conceptual design principles are developed to meet modern aerodynamic, propulsion, structural and performance specifications. A complete airplane is designed, resulting in a design package consisting of specifications, aerodynamic calculations, inboard profile drawing, weight and balance, general arrangement drawing, aerodynamic drag analysis and complete performance report.

**Prerequisites:** AE 314 , and AE 413 , and EGR 200

**Corequisites:** COM 420.

**AE 421 Aircraft Detail Design 4 Hours**

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. The design of an aircraft is carried from the general layout to the design of its detail parts and the design of necessary tools.

**Prerequisites:** AE 404 , or AE 418 , and AE 420.

**AE 426 Spacecraft Attitude Dynamics 3 Hours**

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.

**Prerequisites:** AE 313.

**AE 427 Spacecraft Preliminary Design 4 Hours**

Spacecraft preliminary design principles are developed to meet mission objectives. A complete spacecraft is designed, resulting in a design package consisting of specifications; calculations; CAD drawings; weight and various subsystem budgets; and a series of trade studies, reviews, and design reports.

**Prerequisites:** AE 313 , and EGR 200 , and EP 394

**Corequisites:** AE 426 , and COM 420.

**AE 430 Control System Analysis and Design 3 Hours**

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:** ES 204 , and MA 345.

**AE 433 Aerodynamics of the Helicopter 3 Hours**

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 , and MA 441.

**AE 436 Introduction to Optimization 3 Hours**

This course will cover mathematical optimization methods, problem formulation, and optimality criteria, linear programming methods for optimality problems, numerical methods for unconstrained and constrained problems, sequential linear programming, genetic algorithms, and hybrid optimal control.

**Prerequisites:** EGR 115 , and MA 345.

**AE 445 Spacecraft Detail Design 4 Hours**

Principles of spacecraft detail and subsystem design, analysis, modeling, manufacture, and test are covered and incorporated into projects to give actual experience in detail design and integration of spacecraft subsystems and systems. Integration of multiple subsystems into a single functional model is a key component to the course.

**Prerequisites:** AE 318 , and AE 426 , and AE 427 **Corequisites:** AE 430.

**AE 499 Special Topic in Aerospace Engineering 1-6 Hour**

Individual independent or directed studies of selected topics in aerospace engineering.

## Air Force Aerospace Studies (AF)

### Courses

**AF 101 U.S. Military Forces GMC 1 Hour**

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, and Air Force officer career opportunities. Leadership Laboratory is mandatory for Air Force ROTC cadets and complements this course by providing cadets with followership experiences.

**Corequisites:** AF 101L.

**AF 101L Leadership Laboratory 0 Hours**

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.

**Corequisites:** AF 101.

**AF 102 U.S. Military Forces GMC 1 Hour**

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.

**Corequisites:** AF 102L.

**AF 102L Leadership Laboratory 0 Hours**

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.

**Corequisites:** AF 102.

**AF 199 Special Topics in AFROTC 1-3 Hour**

Individual independent or directed studies of selected topics in Air Force aerospace studies.

**AF 201 The Evolution of USAF Air and Space Power (General Military Course) 1 Hour**

The AF 201 course is designed to examine the aspects of air and space power through a historical perspective. Using this perspective, the course covers a time period from the first balloons and dirigibles to the air and space applications employed at the beginning of the Cold War. Historical examples are studied to extrapolate the fundamentals of air power, including the tenets of air and space power, principles of war, and Air Force competencies, functions, and doctrine. In addition, the students will continue to discuss the importance of the Air Force core values through the use of operational examples and historical Air Force leaders, and will continue to develop their communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

**Corequisites:** AF 201L.

**AF 201L Leadership Laboratory 0 Hours**

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.

**Corequisites:** AF 201.

**AF 202 The Evolution of USAF Air and Space Power (General Military Course) 1 Hour**

Continuation of AF 201. This course continues to explore Air Force history, beginning with the Vietnam era and culminating with the modern air and space applications employed during Operations Iraqi and Enduring Freedom. A weekly Leadership Laboratory is mandatory.

**Corequisites:** AF 202L.

**AF 202L Leadership Laboratory 0 Hours**

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 299 Special Topics in AFROTC 1-3 Hour**

Individual independent or directed studies of selected topics in Air Force aerospace studies.

**AF 301 Air Force Leadership Studies (Professional Officer Course) 3 Hours**

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.

**Corequisites:** AF 301L.

**AF 301L Leadership Laboratory 0 Hours**

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.

**Corequisites:** AF 301.



**AF 302 Air Force Leadership Studies (Professional Officer Course) 3 Hours**

Continuation of AF 301. A weekly Leadership Laboratory is mandatory.

**Corequisites:** AF 302L.

**AF 302L Leadership Laboratory 0 Hours**

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.

**Corequisites:** AF 302.

**AF 399 Special Topics in AFROTC 1-3 Hour**

Individual independent or directed studies of selected topics in Air Force aerospace studies.

**AF 401 Preparation for Active Duty (Professional Officer Course) 3 Hours**

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.

**Corequisites:** AF 401L.

**AF 401L Leadership Laboratory 0 Hours**

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.

**Corequisites:** AF 401.

**AF 402 Preparation for Active Duty (Professional Officer Course) 3 Hours**

Continuation of AF 401. A weekly Leadership Laboratory is mandatory.

**Corequisites:** AF 402L.

**AF 402L Leadership Laboratory 0 Hours**

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.

**Corequisites:** AF 402.

**AF 403L Leadership Laboratory 0 Hours**

Mandatory. Provides advanced leadership experiences in officer-type activities. Includes a mandatory physical fitness program.

**AF 404L Leadership Lab 0 Hours**

Mandatory. Provides advanced leadership experiences in officer-type activities. Includes a mandatory physical fitness program.

**AF 499 Special Topics in AFROTC 1-3 Hour**

Individual independent or directed studies of selected topics in Air Force aerospace studies.

## Courses

**AT 199 Special Topics in Air Traffic Control 1-3 Hour**

Individual independent or directed studies of selected topics in air traffic management.

**AT 200 Air Traffic Management I 3 Hours**

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; pilots' environment; and future air traffic control systems. The course also provides essential information that is useful for pilots and other aviation professionals.

**Prerequisites:** AS 109 , or AS 119 , or AS 120 , or AS 142 , or AS 145.

**AT 299 Special Topics in Air Traffic Control 1-3 Hour**

Individual independent or directed studies of selected topics in air traffic management.

**AT 302 Air Traffic Management II 3 Hours**

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 Hours**

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 (ATC) 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.

**Prerequisites:** AT 200 , and AT 302.

## Air Traffic Management (AT)

An additional lab fee is associated with each of the following courses: AT 305, AT 315, AT 401, AT 405, AT 406.

**AT 315 Air Traffic Management - VFR Tower 3 Hours**

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 intra-facility coordination; federal aviation regulations; notification and handling of emergency aircraft; flight progress strip marking; aircraft recognition and characteristics; limited weather observations; airport lighting systems; wake turbulence and its effects on arriving/departing aircraft; VFR and IFR ATC procedures; runway incursions; using ATIS; reporting RVR/RCR; determining prevailing visibility using visual reference; NOTAMs; and criteria for runway selection. The course also provides essential information that is useful for pilots and other aviation professionals

**Prerequisites:** AT 302.

**AT 399 Special Topics in Air Traffic Control 1-3 Hour**

Individual independent or directed studies of selected topics in air traffic management.

**AT 401 Air Traffic Management IV 3 Hours**

This course integrates the knowledge of air traffic control gained in previous air traffic control courses with an opportunity to actually "work" air traffic control operating positions. Using a realistic air traffic control simulation, students issue instructions to aircraft, make hand-offs, coordinate with other controllers, solve aircraft confliction problems, and do other controller tasks. The ability to make real-time decisions, determine strategies for controlling aircraft, and work 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 , and AT 305.

**AT 405 Air Traffic Management V 3 Hours**

This course introduces students to the en route radar procedures and minima prescribed in FAAH 7110.65 and builds upon knowledge gained in previous courses, all in a simulated environment. Training includes the vertical, lateral, and longitudinal separation of aircraft in the departure, en route, and arrival phases of flight. Phraseology, strip marking, instrument and visual approaches and the coordination procedures necessary to complete these functions are included in simulated ATC scenarios, along with the associated keyboard commands in an en route environment.

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

**AT 406 Air Traffic Management VI 3 Hours**

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 , and AT 302 , and AT 305 , and AT 401 , and AT 405.

**AT 499 Special Topics in Air Traffic Control 1-3 Hour**

Individual independent or directed studies of selected topics in air traffic management.

## Arabic (LAR)

### Courses

**LAR 101 Arabic I 3 Hours**

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 Hours**

A continuation of LAR 101.

**Prerequisites:** LAR 101.

**LAR 199 Special Topics in Arabic Language 1-3 Hour**

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

**LAR 201 Arabic III 3 Hours**

A continuation of LAR 102.

**Prerequisites:** LAR 102.

**LAR 202 Arabic IV 3 Hours**

A continuation of LAR 201.

**Prerequisites:** LAR 201.

**LAR 299 Special Topics in Arabic Language 1-3 Hour**

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

**LAR 399 Special Topics in Arabic Language 1-6 Hour**

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

**LAR 499 Special Topics in Arabic Language 1-6 Hour**

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



# Aviation Environmental Science (AES)

## Courses

### AES 111 Plant Biology 4 Hours

This course will study the principles and processes associated with the biology of plants, including a survey of fungi, green protists, and plants. Major emphasis on vascular plants, evolutionary origins, and ecological adaptations. One three-hour laboratory session per week.

### AES 112 Animal Biology 4 Hours

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 Intro to Environmental Science 3 Hours

An introductory course that stresses the interrelations of all aspects of the living and the nonliving world. Introduces the student to key concepts and principles that govern how nature works and the application of these concepts and principles to possible solutions to environmental and resource problems.

### AES 199 Special Topics Aviation Environmental Science 1-3 Hour

Individual independent or directed studies of selected topics in aviation environmental science.

### AES 240 Natural History of the Region 4 Hours

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 299 Special Topics Aviation Environmental Science 1-3 Hour

Individual independent or directed studies of selected topics in aviation environmental science.

### AES 304 Environmental Science 3 Hours

A survey course in the environmental problems arising from human use and abuse of the environment. Ecological, economic, sociological, and technologic principles will be applied to the management control of pollution of the atmosphere and water sources of the Earth.

**Prerequisites:** AES 142.

### AES 306 Pollution Prevention 3 Hours

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.

**Corequisites:** PS 105 , or PS 106.

### AES 308 Atmospheric Environmental Studies 3 Hours

Overview of atmospheric environmental topics on local and regional issues as well as global change issues. Introduction to the chemistry of atmospheric pollution. Examination of sources of air pollution especially from the aerospace industries. Includes discussion of monitoring, regulation, and control of air pollution.

**Prerequisites:** AES 142.

### AES 309 Principles of Ecology 3 Hours

This course is designed to provide practical experience in the scientific measurement of environmental parameters. Experience in collecting and identifying plants and animals in the different ecosystems will be developed by field and laboratory work.

**Prerequisites:** AES 142.

### AES 310 Air Quality & Sound Pollution 3 Hours

The examination of the fundamental principles that govern air quality, its pollution, and its management. Also the fundamental principles associated with sound pollution and its management.

**Prerequisites:** AES 142.

### AES 311 Water Quality 3 Hours

The hydrologic cycle, with emphasis on atmospheric, land surface, shallow subsurface, and ground water processes. Examination of physical, chemical, and biological properties of these aquatic systems and the effects of common pollutants. Development of environmental literacy is emphasized.

**Prerequisites:** AES 142.

### AES 312 Plant Identification 3 Hours

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. Pre-Requisite: Junior Standing.

### AES 313 Riparian Ecology 3 Hours

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. Pre-Requisite: Junior Standing.

### AES 330 Environmental Consulting 3 Hours

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. Pre-Requisite: Junior Standing.

### AES 399 Special Topics Aviation Environmental Science 1-3 Hour

Individual independent or directed studies of selected topics in aviation environmental science.

### AES 402 Environmental Quality Lab 1 Hour

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:** AES 306 , or AES 310.

**AES 403 Wildlife and Airports 3 Hours**

An examination of the problems and solutions associated with wildlife and their impact on airport safety. Special emphasis on problems correlated with birds. Pre-Requisite: Junior Standing.

**AES 406 Environmental Management 3 Hours**

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. Pre-Requisite: Junior Standing.

**AES 490 Senior Seminar 3 Hours**

This is a senior capstone course dealing with specific issues associated with the environmental work place both from an airport and municipality point of view. Topics include but are not limited to: storm water issues, noise, fuel spills, NEPA, 404 permitting.

**AES 499 Special Topics Aviation Environmental Science 1-3 Hour**

Individual independent or directed studies of selected topics in aviation environmental science.

## Business Administration (BA)

### Courses

**BA 102 Introduction to Aviation Business and Industry 3 Hours**

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 121 Software Based Bookkeeping 1 Hour**

This course will introduce students to software based bookkeeping. Throughout the course students will learn how to create a new company in the software based program, enter sales information and create invoices, track inventory, work with bank accounts, receive payments and make deposits, enter and pay bills, work with payroll, and analyze financial data with reports.

**BA 201 Principles of Management 3 Hours**

Provides an overview of relevant management principles and practices as applied in contemporary formal and informal organizations. Focuses on management theories, philosophies, and functions.

**BA 210 Financial Accounting 3 Hours**

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 Hours**

This course is a continuation of BA 120. It covers advanced concepts of spreadsheet use, database management systems, presentation graphics and Internet usage that will assist in problem analysis, worksheet management and exchanging spreadsheet data with other programs. It introduces the student to project planning, project scheduling and project tracking using computer software. In addition, the course provides experience in the basics of retrieving graphical and text-based information and also explores webpage design and development to support management activities.

**Prerequisites:** IT 109.

**BA 299 Special Topics in Management 1-4 Hour**

Individual independent or directed studies of selected topics in management.

**BA 308 Public Administration 3 Hours**

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 309 Government Acquisitions and Contracting 3 Hours**

This course will provide an analysis of Government contracting regulations and contract administration/management procedures, with particular emphasis on the Federal Acquisition Regulation (FAR) and the Department of Defense Regulation Supplement (DFARS), and the practical application of the FAR and DFARS in Government and Industry contract administration/management roles.

**BA 311 Marketing 3 Hours**

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

**BA 312 Managerial Accounting 3 Hours**

Emphasizes management's use of cost information in internal decision-making. Decision-making processes include cost analysis, control, allocation, and planning. A variety of accounting techniques applicable to aviation/aerospace companies are presented.

**Prerequisites:** BA 210.

**BA 319 Managerial Organizational Behavior 3 Hours**

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.

**Prerequisites:** BA 201.

**BA 320 Business Information Systems 3 Hours**

A management approach to understanding business information systems. The general characteristics, potential, and limitations of business systems are covered. The major emphasis is on understanding the inputs, processing, and outputs of a variety of business systems; the ways in which business systems are interrelated and the inherent management problems involved in the implementation and control of such systems.

**Prerequisites:** BA 221.

**BA 322 Aviation Insurance 3 Hours**

An introduction to the basic principles of insurance and risk with its special application to the aviation industry. An in-depth review of the aviation insurance industry in the United States including the market and types of aviation insurers. Pre-Requisite: Sophomore Standing.

**BA 324 Aviation Labor Relations 3 Hours**

An investigation of labor-management relations with specific reference to 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, conflict resolution, and contemporary trends affecting union membership.

**BA 325 Social Responsibility and Ethics in Management 3 Hours**

A comprehensive inquiry into the major components of social responsibility including economic, legal, political, ethical, and societal issues involving the interaction of business, government, and society.

**Prerequisites:** BA 201.

**BA 328 Professional Consulting 3 Hours**

This course presents a practical introduction to consulting, where consultants must rely on influence, professional experience and knowledge sharing - rather than managerial control - to impact an organization. Emphasis is given to problem recognition, definition, and solution. Various types of non-mathematical problem solving strategies are explored such as consulting, strategic planning and management, organizational change, conflict resolution, and facilitation. Concepts presented are applicable to all fields, such as aviation, engineering, computer science and environmental studies.

**BA 329 Forensic Accounting and Fraud Examination 3 Hours**

This course will review the role of the fraud examiner/forensic accountant in investigations and audits. Topics covered will include: Criminology, ethics, detection and investigative tools, fraud schemes, and financial litigation and remediating. Students will emerge from the course with an understanding of the role of a forensic accountant and familiarity with their tools and practices.

**BA 332 Corporate Finance I 3 Hours**

The finance function as used by management, including financial analysis and control financial planning; and short, intermediate, and long-term financing, using the theory of cost of capital and leverage in planning financial strategies. Aviation-related businesses are emphasized.

**Prerequisites:** BA 210.

**BA 333 Personal Financial Planning 3 Hours**

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 Hours**

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, and 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; the survey of investment companies; asset allocation; concept of efficient markets; equity and bond portfolio management; portfolio performance evaluation; fiduciary responsibility and ethical conduct in investment profession; and corporate governance. The course is taught from the viewpoint of an individual rather than institutional investor. The course utilizes current economic and capital market information to make practical application of the course materials.

**Prerequisites:** BA 332.

**BA 335 International Business 3 Hours**

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.

**Prerequisites:** BA 201.

**BA 337 Entrepreneurship 3 Hours**

This is an introductory course in career building, organization management, business development and technology commercialization in dynamic, early-stage, public and private sector product-markets - including the emerging Unmanned Aircraft Systems (UAS) and related industries - with emphasis on entrepreneurship; the mentalities and processes of successful disruptive innovation. Prereq: BA 201

**Prerequisites:** BA 201.

**BA 342 International Finance 3 Hours**

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.

**BA 352 Business Quantitative Methods 3 Hours**

Development, implementation, and utilization of business models for managerial decision making. Various techniques for modeling, such as statistical analyses techniques, data analysis, regression and correlation analysis, forecasting, simulation, and optimization models are covered. Developing models needed in decision support systems using Microsoft Excel.

**Prerequisites:** BA 221 , and MA 222.

**BA 390 Business Law 3 Hours**

A survey of the legal aspects of business transactions. Areas covered include contracts, agency, bailment, negotiable instruments, partnerships, corporations, consumer credit, and the governments influence on business law.

**BA 399 Special Topics in Management 1-4 Hour**

Individual independent or directed studies of selected topics in management.

**BA 408 Airport Management 3 Hours**

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 Hours**

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.

**Prerequisites:** BA 201.

**BA 415 Airline Management 3 Hours**

An introduction to the administrative aspects of airline operation and management. Topics include the annual profit plan, uniform system of accounts and reports, demand analysis, scheduling, the theory of pricing, fleet planning, facilities planning, and airline financing.

**Prerequisites:** BA 201.

**BA 418 Airport Administration and Finance 3 Hours**

An advanced study of the organizational, political, and financial administration of public and private civil use airports. Areas of emphasis include public relations management; safety and security issues; employee organizational structures; financial and accounting strategies; revenue and expense sources; economic impacts of airport operations; airport performance measurement standards; and current trends and issues of direct concern to airport administrators.

**Prerequisites:** BA 408.

**BA 420 Management of Production and Operations 3 Hours**

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:** MA 222.

**BA 421 Small Business Management 3 Hours**

An analysis of the theoretical and practical knowledge necessary to be successful in conceiving, initiating, organizing, and operating a small business. Special focus will be placed on small businesses in the aviation field.

**Prerequisites:** BA 201 , and BA 210.

**BA 425 Trends and Current Problems in Air Transportation 3 Hours**

This course assists students in building skills that allow them to identify trends and current problems in air transportation. These trends are related to market growth, airline network structure, competition, schedule change, aircraft size change, pricing, delays and on-time performance, and financial conditions. Students will use available databases to extract data, perform descriptive and statistical analysis, and derive conclusions.

**Prerequisites:** BA 201.

**BA 427 Management of Multicultural Workforce 3 Hours**

An investigation into 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:** BA 201.

**BA 430 International Trade and Regulations 3 Hours**

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:** EC 210.

**BA 434 Corporate Finance II 3 Hours**

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. Aviation and aerospace related businesses are emphasized.

**Prerequisites:** BA 332.

**BA 436 Strategic Management 3 Hours**

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. Pre-Requisite: Graduating Senior Standing.

**BA 499 Special Topics in Management 1-4 Hour**

Individual independent or directed studies of selected topics in management.

## Chinese (LCH)

LCH 206, LCH 207, LCH 208, LCH 306, LCH 307, LCH 308, LCH 400, LCH 402 are taught in the Chinese Language, with testing, papers, and examinations in Chinese. Textbooks will be in English with supplementary material or assignments in Chinese or English required.



## Courses

### LCH 101 Mandarin Chinese I 3 Hours

Introduction to Mandarin Chinese language, including the pronunciation system (pin yin), basic grammar, traditional character writing and reading, speaking simple sentences, as well as cultural contexts inseparable from the language. Open only to those without prior knowledge of Mandarin Chinese or with consent of the instructor.

### LCH 102 Mandarin Chinese II 3 Hours

A continuation of Mandarin Chinese I.

**Prerequisites:** LCH 101.

### LCH 103 Chinese I and II 6 Hours

Introduction to the Mandarin Chinese language, including the pronunciation system (pin yin); basic grammar; simplified or traditional character writing and reading; speaking from single sentences to sentence strings; as well as cultural contexts inseparable from language use. Open only to those without prior knowledge of Mandarin Chinese or with consent of the instructor.

### LCH 199 Special Topics in Lower-Level Chinese 1-6 Hour

Study Abroad course or directed studies of selected topics in the Chinese language.

### LCH 201 Mandarin Chinese III 3 Hours

A continuation of LCH 102 with emphasis on communicative abilities in listening, speaking, reading, and writing.

**Prerequisites:** LCH 102.

### LCH 202 Mandarin Chinese IV 3 Hours

A continuation of LCH 201.

**Prerequisites:** LCH 201.

### LCH 203 Chinese III and IV 6 Hours

A continuation of LCH 103 with emphasis on communicative abilities in listening, speaking, reading, and writing.

**Prerequisites:** LCH 102 , or LCH 103.

### LCH 205 Modern Chinese Films 3 Hours

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.

**Prerequisites:** LCH 302 , or LCH 303.

### LCH 206 Contemporary Chinese Literature 3 Hours

This course selects contemporary Chinese short stories and poems in comparison with classical poetry and oral and performance literature. Class discussions and assignments may be combined with visits to the opera, dances, and theater. Students will gain a unique and in-depth understanding of Chinese culture at both the elite and popular levels. This course emphasizes reading, writing, and appreciation skills in Chinese.

**Prerequisites:** LCH 205 , and LCH 208.

### LCH 207 Introduction to Geography 3 Hours

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.

**Prerequisites:** LCH 205 , and LCH 208.

### LCH 208 Speech in Chinese 3 Hours

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.

**Prerequisites:** COM 122 , and LCH 302 , or LCH 303.

### LCH 209 Computer Communication and Applications in Chinese 3 Hours

LCH 209 uses the Chinese Internet environment, including the Mandarin Chinese language, to seek an in-depth understanding of Internet communications and collaboration between cultures. With a focus on using current emerging computer technologies for collaboration with users from other cultures, this course provides hands-on experience examining different keyboarding systems, search engines, and various web-based technology tools. The course provides training on how to use popular computer applications to obtain, process, share, and evaluate information in English and Chinese. The course also discusses the impact of the Internet on different societies, and the effect of different cultural rules and regulations on Internet communications and collaboration. This course will be taught in Chinese.

Supplementary English materials may be necessary. **Prereq:**LCH 303.

### LCH 299 Special Topics in Lower Level Chinese 1-6 Hour

Study Abroad course or directed studies of selected topics in the Chinese language.

### LCH 301 Intermediate Mandarin Chinese I 3 Hours

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, college curriculum for different degrees, international travel, government bureaus, and handy personal and emergency situations.

**Prerequisites:** LCH 202 , or LCH 203.

### LCH 302 Intermediate Mandarin Chinese II 3 Hours

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.

**Prerequisites:** LCH 301.

### LCH 303 Intermediate Chinese I and II 6 Hours

This course empowers students with the performable ability of sustained appropriate discourse in sentence strings or paragraph chunks in a wide variety of real-life simulations. Discourse should be easily understood by native speakers of Mandarin. Topics may include but are not limited to biographical paragraphs; salaries and taxation; college curriculum for different degrees; international travel; government bureaus; handy personal and emergency situations; being a tour guide; a marriage counselor; an insurance sales person; a security firm manager; an environmental consultant; and a professional in other fields.

**Prerequisites:** LCH 202 , or LCH 203.

**LCH 306 Asian Literature 3 Hours**

A continuation of the study of communication and 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 expertise. For example, an instructor may focus on East Asia rather than South Asia, on prose rather than drama. Pre-Requisite: Sophomore standing.

**LCH 307 Personality and Profiling 3 Hours**

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.

**Prerequisites:** LCH 400.

**LCH 308 History of Terrorism 3 Hours**

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 327 , and LCH 306.

**LCH 399 Special Topics in Chinese Language 1-6 Hour**

Upper-level study abroad course or directed studies of selected topics in Chinese language.

**LCH 400 Eastern and Western Civilization 3 Hours**

Cultural achievements of Eastern and Western civilization from ancient times to the present. Comparisons will be made among different civilizations of the world, and how these civilizations relate to each other. Course may include supplementary reading and writing assignments in English.

**PC Prerequisites:** LCH 308.

**LCH 402 Cross-Cultural Communications 3 Hours**

An examination of the challenges to communicating across the variety of sub-cultures 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 sub-cultural differences will be considered.

**Prerequisites:** LCH 208 , or COM 221 , or COM 222 , or COM 223.

**LCH 499 Special Topics in Chinese Language 1-6 Hour**

Upper-level study abroad course or directed studies of selected topics in Chinese language.

## Communication (COM)

### Courses

**COM 122 English Composition 3 Hours**

This course focuses on the principles of using writing for thinking, as well as a tool for expressing ideas. It addresses the composing process, research and documentation, and rhetorical strategies for various audiences and purposes. Students develop their communicative, evaluative, critical thinking, and research writing abilities. A grade of "C" or higher is required to pass this course.

**COM 199 Special Topics in Communication 1-3 Hour**

Individual independent or directed studies of selected topics in communications.

**COM 219 Speech 3 Hours**

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.

**Prerequisites:** COM 122.

**COM 221 Technical Report Writing 3 Hours**

This course introduces students to the preparation of formal and informal technical reports, abstracts, proposals, instructions, professional correspondence and other forms of technical communication. Major emphasis is placed on the long technical report and the acquisition of advanced writing skills.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**COM 222 Business Communication 3 Hours**

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.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.



**COM 223 Intelligence Writing 3 Hours**

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.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**COM 225 Science and Technology Communication 3 Hours**

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.

**Prerequisites:** COM 221.

**COM 230 Digital Photography 3 Hours**

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. Pre-Requisite: Sophomore Standing.

**COM 260 Introduction to Media 3 Hours**

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.

**Prerequisites:** COM 122.

**COM 299 Special Topics in Communication 1-3 Hour**

Individual independent or directed studies of selected topics in communications.

**COM 320 Mass Communication Law and Ethics 3 Hours**

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 nations 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.

**Prerequisites:** COM 221.

**COM 322 Aviation and Aerospace Communication 3 Hours**

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 aviations economic and social impact on society. Special topics include safety, airport security and congestion, emerging legal issues, and international aviation trends.

**Prerequisites:** COM 221.

**COM 350 Environmental Communication 3 Hours**

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.

**Prerequisites:** COM 221 , or COM 225.

**COM 351 Journalism 3 Hours**

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.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**COM 399 Special Topics in Communication 1-3 Hour**

Individual independent or directed studies of selected topics in communications.

**COM 410 Advanced Professional Writing 3 Hours**

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 COM 221 , and COM 265.

**COM 411 Web Design Workshop 3 Hours**

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 , and COM 222.

**COM 412 Advanced Technical Writing 3 Hours**

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.

**Prerequisites:** COM 221.

**COM 415 Nonverbal Communication 3 Hours**

This course entails the study of communication behaviors and processes not involving the expression of written or spoken words, which contribute information to a message. Special attention is directed to the study of voice qualities; facial expression and body language; space, personal distance, and touch; the use of time and objects; and personal appearance. Study also involves non-verbal communication in applied settings, as well as research strategies for observing, measuring, and understanding non-verbal phenomena.

**Prerequisites:** COM 219 , and COM 221.

**COM 420 Advanced Technical Communication I 1 Hour**

A study of applied technical communication with emphasis on communication standards of the aerospace industry, including participating in meetings, conducting informal briefings, resolving interpersonal conflicts, writing varied technical documents and making formal presentations. Section emphasis varies by instructor.

**Prerequisites:** COM 221 **Corequisites:** AE 420 , or AE 427 , or ME 407 , or ME 429.

**COM 430 Advanced Technical Communication II 2 Hours**

A continuation of Advanced Technical Communication I, this course focuses on informal and formal technical reports and briefings. Major emphasis is placed on public speaking and formal writing skills according to aerospace industry standards. Section emphasis varies by instructor.

**Prerequisites:** COM 420 **Corequisites:** AE 421 , or AE 445 , or ME 420 , or ME 431 , or ME 440.

**COM 499 Special Topics in Communication 1-3 Hour**

Individual independent or directed studies of selected topics in communications.

## Computer Engineering (CEC)

### Courses

**CEC 220 Digital Circuit Design 3 Hours**

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.

**Corequisites:** CEC 222.

**CEC 222 Digital Circuit Design Laboratory 1 Hour**

Laboratory experiments in the measurement and verification of digital circuits. Discrete and integrated logic circuit design analysis and measurements.

**Corequisites:** CEC 220.

**CEC 299 Special Topics in Computer Engineering 1-3 Hour**

Directed studies of selected topics in computer engineering.

**CEC 320 Microprocessor Systems 3 Hours**

Study of digital computer organizations. Introduction to microcomputer systems using a current microprocessor. Assembly language programming techniques for microprocessors will be used to study digital computer operation. Input and output techniques, memory devices, RS 232, and other interfacing techniques will be studied. Hardware and software relationships will also be discussed.

**Prerequisites:** CEC 220 , and CS 125 **Corequisites:** CEC 322.

**CEC 322 Microprocessor Systems Laboratory 1 Hour**

Hands-on experience with a microprocessor is provided through weekly experiments involving hardware and software techniques.

**Corequisites:** CEC 320.

**CEC 399 Special Topics in Computer Engineering 1-3 Hour**

Directed studies of selected topics in computer engineering.

**CEC 420 Computer Systems Design I 3 Hours**

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. Pre-Requisite: Computer Engineering Major and Senior status

**Prerequisites:** CEC 320 , and CEC 322 **Corequisites:** EE 401.

**CEC 421 Computer Systems Design II 3 Hours**

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 , and EE 401.

**CEC 450 Real-Time Systems 3 Hours**

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 , and CEC 320 , and CEC 322 , and CS 420.

**CEC 460 Telecommunications Systems 3 Hours**

Techniques and applications in telecommunications. Types of data communication versus line discipline methodology. Hardware requirements and constraints. Speed versus quality. Security and encoding algorithms.

**Prerequisites:** CEC 320 , and CEC 322.

**CEC 470 Computer Architecture 3 Hours**

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 systems will be discussed. Additional topics in advanced computer architecture and computer systems will be covered.

**Prerequisites:** CEC 320 , and CEC 322.

**CEC 499 Special Topics in Computer Engineering 1-3 Hour**

Directed studies of selected topics in computer engineering.

## Computer Science (CS)

### Courses

**CS 118 Fundamentals of Computer Programming 3 Hours**

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 4 Hours**

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.

**Corequisites:** CS 125L.

**CS 125L Computer Science I Laboratory 0 Hours**

Computer Science I Laboratory

**Corequisites:** CS 125.

**CS 199 Special Topics in Computer Science 1-3 Hour**

Individual independent or directed studies of selected topics in computer science.

**CS 213 Introduction to Computer Networks 3 Hours**

This course will focus on the principles and practice of computer networking, with emphasis on the Internet. The students will learn the structure and components of computer networks, packet switching, layered architectures, TCP/IP, physical layer, error control, window flow control, local area networks (Ethernet, Token Ring, FDDI), network layer, congestion control, quality of service, and multicast.

**Prerequisites:** CS 125.

**CS 222 Introduction to Discrete Structures 3 Hours**

An introduction to the fundamental algebraic, logical, and combinatorial concepts of mathematics that provide a foundation for the study of computer science. Pre-requisite: Experience in programming in a high-level language, pre-Calculus mathematics.

**CS 225 Computer Science II 4 Hours**

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.

**Prerequisites:** CS 125.

**CS 235 Assembly Language Programming 3 Hours**

Introduction to computer architecture; assembler concepts and instruction format; addressing techniques; interrupt processing, especially input/output; segmentation, linkage, and external procedures; programming projects to develop understanding of assembly language concepts.

**Prerequisites:** CS 125 , and CS 220.

**CS 299 Special Topics in Computer Science 1-6 Hour**

Individual independent or directed studies of selected topics in computer science.

**CS 303 Network Security 3 Hours**

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:** CS 225 , and MA 242 , or CS 222.

**CS 304 Introduction to Computer Forensics 3 Hours**

This course will give participants an introduction to the necessary skills to identify an intruders footprints and to properly gather the necessary evidence to prosecute. The basic methodologies and techniques of forensics will be discussed during this course. This course is for individuals and organizations interested in an overview of the knowledge and skills needed to identify, track, and prosecute the cyber-criminal.

**Prerequisites:** CS 125.

**CS 305 Database Systems and Data Mining 3 Hours**

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.

**Prerequisites:** CS 225.

**CS 308 Practicum 3 Hours**

This capstone project course is individualized to each student and uses most facets of their prior instruction.

**CS 315 Data Structures and Analysis of Algorithms 3 Hours**

This course emphasizes the design, implementation, and analysis of algorithms dealing with searching, sorting, graphs, trees, and disk files.

**Prerequisites:** CS 125 , and CS 222.

**CS 317 Files and Database Systems 3 Hours**

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 125.

**CS 325 Programming in ADA 3 Hours**

Advanced systems concepts using the ADA language to implement software engineering, concurrent programming, and structured design techniques.

**Prerequisites:** CS 125.

**CS 332 Organization of Programming Languages 3 Hours**

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 225 , and CS 222.

**CS 335 Introduction to Computer Graphics 3 Hours**

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.

**CS 350 Computer Modeling and Simulation 3 Hours**

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. Junior standing.

**Prerequisites:** MA 412 , or MA 222.

**CS 375 Algorithms 3 Hours**

This course covers strategies, mathematics, implementations, and performance properties of fundamental algorithms employed in computer science.

**Prerequisites:** CS 315 , and MA 242.

**CS 399 Special Topics In Computer Science 1-6 Hour**

Individual independent or directed studies of selected topics in computer science.

**CS 415 Human-Computer Interfaces 3 Hours**

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.

**Prerequisites:** SE 320.

**CS 420 Operating Systems 3 Hours**

Development, structure, and functions of operating systems; demand service models; development of concurrent models. Pre-Requisite: Junior standing

**Prerequisites:** CS 125.

**CS 425 Net-Centric Computing 3 Hours**

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:** CS 317 , and CEC 320.

**CS 432 Information and Computer Security 3 Hours**

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.

**CS 455 Artificial Intelligence 3 Hours**

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-based systems in the aerospace and aviation domain.

**Prerequisites:** CS 222.

**CS 499 Special Topics in Computer Science 1-6 Hour**

Individual independent or directed studies of selected topics in computer science.

## Cyber Intelligence and Security (CI)

### Courses

**CI 119 Introduction to Cyber Security 3 Hours**

This course provides students with a comprehensive overview of cyber security with extensive hands on exercises to demonstrate the concepts. An academic foundation will provide the students with the vocabulary and concepts to understand internet, basic computer concepts, the relationships between data, applications, systems and hosts. Laboratory exercises will allow the students to explore and extend their interactive lectures to discover experientially the concepts that are presented in lecture.

**CI 310 Intelligence, Surveillance and Reconnaissance 3 Hours**

This upper level course provides the physics background for understanding remote sensing using multi frequency sensors such as may be found on aerial, ground, space or sea platforms. Sensors and associated physics will include optical, radio frequencies as well as different tools and platforms available today and in the near future. Open source, web based sources will be used along with GIS platforms such as Google earth, ESRI coupled with satellite, aerial imagery to demonstrate the capabilities available today. A wide range of scenarios will be considered along with current and future technical limitations to resolution, reliability of data, security of data, privacy concerns, attribution and legal issues.

**Prerequisites:** PS 114.



**CI 311 Securing Computer Networks 3 Hours**

This upper level course will build on the understanding of network protocols, encryption techniques to look at methods for protecting networks (wired and wireless) as well as common approaches to defeating security. Firewalls, intrusion detection, access control, local and wide area issues, network monitoring and network management practices will be discussed and demonstrated in lab setting.

**CI 450 Computer Forensics II 3 Hours**

This advanced course offers hands on opportunity to learn and practice current solutions used in computer forensics. Procedures include data and disc image capture, information extraction, file system regeneration, password cracking and more. Common software toolkits will be introduced and utilized in lab setting. Documentation methods, rules of evidence and legal and ethical standards discussed.

**CI 475 Cyber Senior Thesis 3 Hours**

This course is for students who have at least a 3.40 GPA and who plan to attend graduate school. It is a classic thesis research course on a topic that requires an intensive review of the relevant literature or case studies, 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. Note: Students wishing to take this course must apply to the Director of the Cyber Intelligence and Security Program within the last third of the first semester of their senior year.

**CI 490 Cyber Capstone Project 3 Hours**

This course provides students with the opportunity to synthesize the material learned through the degree program and design, develop, participate in and present their concepts in a series of stages from design through final report. Finally, students will plan and participate in a mock cyber "disaster" drill to demonstrate their full understanding of course material - identification of threats, mitigation and defense, operational procedure and implementation, post mortem learning and recommendations for future. Students will have the opportunity to apply their skills and creativity in developing a project that will demonstrate mastery of the coursework in a setting which is typical of a modern company or agency with users, processes, data, network and computer assets. This will be designed by the student team and reviewed by faculty and industry advisory board.

## Economics (EC)

### Courses

**EC 210 Microeconomics 3 Hours**

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 Hours**

An introductory analysis of employment, inflation, recession, GDP economic growth, and international trade with an emphasis on practical policy alternatives. Macroeconomic aviation applications such as the counter-cyclical growth of start-up airlines and consideration of ATC privatization are incorporated.

**EC 225 Engineering Economics 3 Hours**

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.

**Prerequisites:** MA 241.

**EC 299 Special Topics in Economics 1-4 Hour**

Individual independent or directed studies of combinations of selected topics in economics.

**EC 312 Money and Banking 3 Hours**

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.

**Prerequisites:** EC 210.

**EC 315 Managerial Economics 3 Hours**

This course presents an analytical approach to the managers role in understanding pricing, costing, production and forecasting. This course emphasizes the quantitative and qualitative applications of economic principles to business analysis and concentrates on simple quantitative models to explain the firms position in the market and how the manager can react to and control information. Aviation related topics commonly discussed include airport privatization, employee ownership of airlines, forecasting passenger demand, airline production and cost analysis, optimal pricing and production decisions, sensitivity analysis, and capital budgeting.

**Prerequisites:** EC 210.

**EC 316 Environmental Economics and Policy 3 Hours**

This course aims at enabling students to analyze and understand how economic theory is used on environmental issues of particular concern to economic growth and development policies. This course combines theoretical economic study with policy discussions on specific environmental strategies as applied to pollution, water, energy, climate change, and human health issues.

**Prerequisites:** EC 210.

**EC 399 Special Topics in Economics 1-4 Hour**

Individual independent or directed studies of combinations of selected topics in economics.

**EC 420 Economics of Air Transportation 3 Hours**

A study of the economic aspects of airline service with consideration given to the impact of federal aid and regulation, types of aircraft, airport problems, consumer interests, and competitive practices.

**Prerequisites:** EC 210.

**EC 499 Special Topics in Economics 1-6 Hour**

Individual independent or directed studies of combinations of selected topics in economics.



# Electrical Engineering (EE)

## Courses

### EE 223 Linear Circuits Analysis I 3 Hours

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 , and MA 345 , and PS 250.

### EE 224 Electrical Engineering Laboratory I 1 Hour

Problem sessions, electrical instrumentation and measurement, verification of theory presented in EE 223, working knowledge of electronic test equipment.

**Corequisites:** EE 223.

### EE 299 Special Topics in Electrical Engineering 1-6 Hour

Directed studies of selected topics in electrical engineering.

### EE 302 Electronic Devices and Circuits 3 Hours

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.

**Corequisites:** EE 304.

### EE 304 Electronic Circuits Laboratory 1 Hour

Laboratory experiments in the measurement of electronic device characteristics. Design of biasing networks, small signal amplifiers, and switching circuits.

**Corequisites:** EE 302.

### EE 309 Signal and Linear System Analysis 4 Hours

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.

**Prerequisites:** EE 223 , and MA 345.

### EE 335 Electrical Engineering I 2 Hours

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.

**Corequisites:** MA 345 , and PS 250 , and EE 336.

### EE 336 Electrical Engineering I Laboratory 1 Hour

Laboratory experiments and techniques in electrical engineering. The Electrical Engineering Lab EE 336 must be taken during the same semester as EE 335.

**Corequisites:** EE 335.

### EE 340 Electric and Magnetic Fields 3 Hours

This course introduces the study of time-varying electromagnetic fields and the relevant analysis in electrical engineering, electrostatics and magneto-statics. Topics discussed include the 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 , and PS 250.

### EE 399 Special Topics in Electrical Engineering 1-6 Hour

Directed studies of selected topics in electrical engineering.

### EE 401 Control Systems Analysis and Design 3 Hours

Modeling, analysis, and design of analog and digital linear control systems using time and frequency domain techniques. Topics include feedback control system characteristics performance analysis and stability, Z-transforms, and controller design.

**Prerequisites:** EE 303 , or EE 309 **Corequisites:** EE 402.

### EE 402 Control Systems Laboratory 1 Hour

Laboratory experiments involving the principles of operation and design of linear control systems. Experiments to support theory introduced in EE 401.

**Corequisites:** EE 401.

### EE 406 Digital Signal Processing 3 Hours

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 , and CEC 320 **Corequisites:** EE 407.

### EE 407 Digital Signal Processing Laboratory 1 Hour

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.

**Corequisites:** EE 406.

### EE 410 Communication Systems 3 Hours

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 , and EE 340 **Corequisites:** EE 412.

### EE 412 Communication Systems Laboratory 1 Hour

Laboratory experiments involving design and analysis of electronic communication; circuitry and measuring performance characteristics; and limitations of various communication components and systems.

**Corequisites:** EE 410.

**EE 420 Avionics Preliminary Design 3 Hours**

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. Pre-Requisite: Senior Standing

**Prerequisites:** CEC 320 , and CEC 322 , and EE 401 , or AE 430  
**Corequisites:** EE 410 , and EE 450.

**EE 421 Avionics Detail Design 3 Hours**

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 , and EE 410 , and EE 420.

**EE 450 Elements of Power Systems 3 Hours**

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. Pre-Requisite: Senior standing

**Prerequisites:** EE 302 , and EE 401 , or AE 430 **Corequisites:** EE 452.

**EE 452 Power Systems Laboratory 1 Hour**

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.

**Prerequisites:** EE 304.

**EE 460 Advanced Control and System Integration 3 Hours**

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.

**Prerequisites:** EE 401.

**EE 499 Special Topics in Electrical Engineering 1-6 Hour**

Directed studies of selected topics in electrical engineering.

## Engineering (EGR)

### Courses

**EGR 101 Introduction to Engineering 2 Hours**

This course is an introduction to the interdisciplinary aspects of the engineering of aerospace systems. It is a project-based course, demonstrating how the engineering profession is a multi-disciplinary field. 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 Hours**

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.

**EGR 199 Special Topics in Engineering 1-3 Hour**

Individual independent or directed studies of selected topics in engineering.

**EGR 200 Computer Aided Conceptual Design of Aerospace Systems 3 Hours**

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.

**Prerequisites:** EGR 101 , and PS 150.

**EGR 299 Special Topics in Engineering 1-3 Hour**

Individual independent or directed studies of selected topics in engineering.

**EGR 399 Special Topics in Engineering 1-3 Hour**

Individual independent or directed studies of selected topics in engineering.

**EGR 401 Advanced CATIA 1 Hour**

This course explores advanced CATIA options for performing design and analysis of complex parts and assemblies, including knowledgware, simulation, structural analysis, sheet metal design, and automated machining. The methodology for creating complex aircraft and machine component models is also covered. CATIA models are also used to create dynamic simulations using MATLAB Simulink software.

**Prerequisites:** EGR 200.

**EGR 499 Special Topics in Engineering 1-3 Hour**

Individual independent or directed studies of selected topics in engineering.

## Engineering Physics (EP)

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 EP courses. A passing grade in all prerequisite courses or department consent is required for entry into all EP courses.

## Courses

### EP 101 Current Topics in Space Science 1 Hour

A survey seminar intended to explore contemporary topics encountered in the exploration of the upper atmosphere and near space environment.

### EP 199 Special Topics in Engineering Physics 1-3 Hour

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.

### EP 299 Special Topics in Engineering Physics 1-3 Hour

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.

### EP 391L Microcomputer and Electronic Instrumentation Laboratory 1 Hour

This course will provide students with a background as it applies to the design circuits of measuring instruments and to interface sensors and computers. The program of study will concentrate on following the form of the electrical signal from light, pressure temperature and other sensors as it proceeds through signal conditioning circuits and into the microcomputer for further processing.

**Corequisites:** EP 391.

### EP 394 Space Systems Engineering 3 Hours

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.

**Prerequisites:** AE 313 , or EP 393.

### EP 399 Special Topics in Engineering Physics 1-3 Hour

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.

### EP 499 Special Topics in Engineering Physics 1-3 Hour

Individual, independent, or directed study of topics in the fields of applied physics, space systems, and allied engineering disciplines. Student design projects involve significant engineering design such as microgravity experiments and moon-buggy design. May be considered as an engineering elective with approval of the program coordinator.

## Engineering Science (ES)

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.

## Courses

### ES 201 Statics 3 Hours

This course explores a vector treatment of the concepts and characteristics of forces and couples. Topics discussed include distributed forces; center of mass; centroid; equilibrium of particles and rigid bodies; trusses and frames; internal forces; shear and moment distribution in beams; and area moments of inertia.

**Prerequisites:** MA 242 , and PS 150 , or PS 215 **Corequisites:** EGR 115.

### ES 202 Solid Mechanics 3 Hours

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 , and ES 201.

### ES 204 Dynamics 3 Hours

A vector treatment of the kinematics and kinetics of particles and rigid bodies. Acceleration, work, energy, power, impulse, and momentum.

**Prerequisites:** EGR 115 , and ES 201 **Corequisites:** MA 345.

### ES 206 Fluid Mechanics 3 Hours

Physical characteristics of the fluid state. Fluid statics. Kinematics of fluid motion. Flow of an incompressible ideal fluid. Impulse-momentum principles. Similitude and dimensional analysis, fluid measurements.

**Prerequisites:** ES 201.

### ES 207 Fundamentals of Mechanics 3 Hours

Vector analysis of forces and moments. Equilibrium analysis of static systems. Center of gravity. Kinematics, kinetics, work and energy, impulse and momentum.

**Prerequisites:** PS 150.

### ES 299 Special Topics in Engineering Science 1-6 Hour

Individual independent or directed studies of selected topics in engineering science.

### ES 305 Thermodynamics 3 Hours

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:** PS 160 , or PS 208 **Corequisites:** ES 206.

### ES 306 Fiber Optics 3 Hours

An introductory course on optical fiber technology and applications. Course covers optical wave-guide 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 students viewpoint and to achieve credit of engineering design.

**Prerequisites:** MA 441 , and PS 160.

**ES 312 Energy Transfer Fundamentals 3 Hours**

First and Second Laws of Thermodynamics for control masses and control volumes. Fundamentals of heat transfer: conduction, convection, and radiation. Application of energy balances.

**Prerequisites:** PS 160.

**ES 315 Space Environment and Effects 3 Hours**

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.

**Prerequisites:** PS 250.

**ES 320 Engineering Materials Science 2 Hours**

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 , and ES 202 , and PS 105 , or PS 140

**Corequisites:** ES 321.

**ES 321 Engineering Materials Science Laboratory 1 Hour**

Students will complete laboratory experiments and study techniques in materials science, composites and solids mechanics. The Engineering Material Science Lab must be taken during the same semester as ES 320.

**Corequisites:** ES 320.

**ES 322 Aerospace Engineering Failure 2 Hours**

A variety of structural and material failure topics will be explored, with emphasis on issues prevalent in the aerospace industry. Topics included are advanced fatigue and fracture, thermo-mechanical failure, fastener failure, wear, certain types of corrosion, impact damage to metals and composites, statistical failure analysis, non-destructive evaluation, and structural health monitoring. Aerospace Engineering Failure Laboratory ES 323 must be taken during the same semester as Aerospace Engineering Failure.

**Prerequisites:** AE 318 , or ME 304 **Corequisites:** ES 323.

**ES 323 Aerospace Engineering Failure Laboratory 1 Hour**

A series of laboratory experiments will be conducted in sequence with the topics presented in Aerospace Engineering Failure ES 322. Interpretation of experimental results, knowledge of select case histories, inspection of failed components removed from service, and the development of skills enabling the student to investigate structural and material failures will be integral to this course. Aerospace Engineering Failure ES 322 must be taken during the same semester as Aerospace Engineering Failure Laboratory ES 323.

**Prerequisites:** AE 318 , or ME 305 **Corequisites:** ES 322.

**ES 399 Special Topics in Engineering Science 1-6 Hour**

Individual independent or directed studies of selected topics in engineering science.

**ES 403 Heat Transfer 3 Hours**

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 , and ES 305 , and MA 345.

**ES 412 Structural Dynamics 3 Hours**

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 , and ES 204 , and MA 345.

**ES 413 Engineering Fundamental Review 1 Hour**

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. Pre-Requirement: Junior standing.

**ES 499 Special Topics in Engineering Science 1-6 Hour**

Individual independent or directed studies of selected topics in engineering science.

## Flight Airplane (FA)

ATSA clearance or Proof of US citizenship is required for all Flight courses.

### Courses

**FA 109 Intermediate Flight Transition and Procedural Familiarization 1 Hour**

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. ATSA clearance or Proof of US citizenship is required. Also students must see flight training manager to register for flight courses.

**FA 119 Private Single Flight 1 Hour**

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. ATSA clearance or Proof of US citizenship is required. Also students must see flight training manager or College of Aviation Academic Advisor to register for this course.

**Corequisites:** AS 119.



**FA 122 Private Multi Flight with Laboratory 1 Hour**

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. ATSA clearance or Proof of US citizenship is required. Also students Must see flight training manager to register for flight courses.

**Prerequisites:** FA 119.

**FA 199 Special Topics in Flight 1-3 Hour**

Flight training in selected areas for the purpose of gaining proficiency in required pilot operations for various certificates and ratings. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**FA 215 Upset Training 1 Hour**

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. ATSA clearance or Proof of US citizenship is required. Also students Must see flight training manager to register for flight courses.

**FA 221 Instrument Single Flight 1 Hour**

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. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**Prerequisites:** FA 119.

**FA 222 Instrument Multi Flight 1 Hour**

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. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**Prerequisites:** FA 122.

**FA 299 Special Topics in Flight 1-3 Hour**

Flight training in selected areas for the purpose of gaining proficiency in required pilot operations for various certificates and ratings. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**FA 321 Commercial Single Flight 1 Hour**

The student will receive training in the maneuvers and procedures necessary to meet the standards contained in the FAA Commercial Pilot Practical Test Standards. Additionally, the student will receive training in safety awareness, crew resource management, and aeronautical decision-making. At the successful completion of this course the student will have gained the aeronautical experience necessary to attain a Commercial Pilot Certificate with an Airplane Single-Engine Land Rating. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**Prerequisites:** FA 221.

**FA 322 Commercial Multi Flight 1 Hour**

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. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**Prerequisites:** FA 222.

**FA 323 Commercial Multi Add On 1 Hour**

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. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**Prerequisites:** FA 321.

**FA 326 Commercial Single Add On Flight 1 Hour**

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. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**Prerequisites:** FA 322.

**FA 370 Advanced Multi-Engine Instrument Flight 1 Hour**

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 an emphasis on precision flying skills and the use of automated flight management systems in an IFR environment. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**Prerequisites:** FA 322 , or FA 323.



**FA 399 Special Topics in Flight 3 Hours**

Flight training in selected areas for the purpose of gaining proficiency in required pilot operations for various certificates and ratings. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**FA 420 Airline Flight Crew Techniques and Procedures 2 Hours**

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. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**Prerequisites:** AS 387 , and AS 435.

**FA 421 Flight Instructor Rating 1 Hour**

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.

**Prerequisites:** FA 321 , or FA 326.

**FA 460 Multi-Engine Flight Instructor Rating 2 Hours**

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. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

**Prerequisites:** FA 421.

**FA 499 Special Topics in Flight 3 Hours**

Flight training in selected areas for the purpose of gaining proficiency in required pilot operations for various certificates and ratings. ATSA clearance or Proof of US citizenship is required. Also, students must see flight training manager to register for flight courses.

## Flight Helicopter (FH)

For FH 142, FH 252, FH 372, and FH 442: The FAA requires the corresponding ground school course to be completed at Embry-Riddle with a "C" or higher. Students who transfer credit for the ground school course will be required to complete additional training to meet the FAA requirement. ATSA clearance or Proof of US citizenship is required for all helicopter courses.

## Courses

**FH 142 Helicopter Pilot Flight Private 1 Hour**

The student will receive the required training in the basic aerodynamic fundamentals of helicopter flight including maneuvers and procedures necessary for the student to meet the standards as described in the FAA Private Rotorcraft Practical Test Standards. In addition, the student will receive training in safety awareness, and aeronautical decision making. At the successful completion of this course, the student will have gained the aeronautical knowledge and experience necessary to attain a Private Pilot Certificate with a Rotorcraft Rating. ATSA clearance or Proof of US citizenship is required. Also students must see College of Aviation Academic Advisor to register for helicopter courses.

**Corequisites:** AS 142.

**FH 145 Intermediate Helicopter Flight Transition 1 Hour**

A review of elementary commercial pilot flight operations including basic rotorcraft control, elementary radio navigation, air traffic control procedures, cross-country operations, and solo flight. Associated ground instruction will include a review of knowledge areas required for Private Pilot Helicopter certification. This course is specifically designed for students entering Embry-Riddle's Commercial Helicopter Pilot Program with a Private Pilot certificate and desiring advance standing.

**FH 252 Helicopter Pilot Flight Instrument 1 Hour**

The student will receive the required training in the maneuvers and procedures necessary to meet the standards in the FAA Instrument-Rotorcraft Practical Test Standards. In addition, the student will receive training in safety awareness and hazardous weather. At the successful completion of this course, the student will have gained the aeronautical knowledge and experience necessary to attain an Instrument Rating for a Private Pilot Rotorcraft Certificate. Pre-Requisite: ATSA clearance or Proof of US citizenship is required. Also students must see College of Aviation Academic Advisor to register for helicopter courses.

**Prerequisites:** FH 142 , or FH 145 **Corequisites:** AS 252.

**FH 372 Helicopter Pilot Flight Commercial 1 Hour**

The student will receive the required training in the maneuvers and procedures necessary to meet the standards in the FAA Commercial Rotorcraft Practical Test Standards. In addition, the student will receive training in safety awareness and advanced helicopter operations. At the successful completion of this course, the student will have gained the aeronautical knowledge and experience necessary to attain a Commercial Pilot Certificate with a Rotorcraft Rating. Pre-Requisite: ATSA clearance or Proof of US citizenship is required. Also students must see College of Aviation Academic Advisor to register for helicopter courses.

**Prerequisites:** FH 252 **Corequisites:** AS 372.

**FH 375 NVG Initial Pilot Qualification 1 Hour**

The purpose of this course is to introduce and educate the student/aircrew member on Night Vision Goggles (NVG) equipment and flight operations. Flight tasks range from basic flight maneuvers and confined area operations to more demanding emergency procedures. This course meets FAA NVG Ground Training requirements of FAR 61.31 (k)(2). Upon successful completion of the course, the student will receive an NVG PIC endorsement validating the training received.

**FH 430 Initial Helicopter Turbine Transition Flight Course 1 Hour**

At the successful completion of this course, the student will demonstrate piloting skills, in a single engine turbine powered helicopter, within the parameters listed in the FAA Practical Test Standards for their pilot certificate level. They will be required to demonstrate competency by the successful completion of written test(s), oral exam(s), and practical flight test(s) showing that they meet the requisite level of aeronautical knowledge, including aircraft system master, to safely qualify for endorsement as a pilot in command of a turbine helicopter. Flight training for this course does not include Instrument Flight Rules (IFR) flight training, currency or certification.

**FH 442 Helicopter Pilot Flight Instructor 1 Hour**

The student will receive the required training in the maneuvers and procedures necessary to meet the standards in the FAA Certified Flight Instructor - Rotorcraft Practical Test Standards. In addition, the student will receive training in classroom instruction and best teaching practices. At the successful completion of this course, the student will have gained the aeronautical knowledge and experience necessary to attain a Certified Flight Instructor Certificate with a Rotorcraft Rating. Pre-Requisite: ATSA clearance or Proof of US citizenship is required. Also students must see College of Aviation Academic Advisor to register for helicopter courses.

**Prerequisites:** FH 252, and FH 372 **Corequisites:** AS 442.

## Honors (HON)

### Courses

**HON 150 Honors Seminar I 3 Hours**

This course is open only to freshmen enrolled in the Honors program, and will satisfy the lower-level Humanities requirement in general education. An interdisciplinary Humanities course, it focuses on aesthetic, philosophical, and historical aspects of a subject, making use of text materials from several disciplines and varied media. The course also emphasizes student participation in a seminar discussion format and requires that students develop their research, critical thinking, and oral and written communication abilities. Requirements will include (but will not be limited to) text and Web-based original research, written essays, oral presentations, and participation in group discussion. Topics may vary according to instructor.

**HON 199 Honors Special Topics 1-3 Hour**

Individual independent or directed studies of selected topics in honors.

**HON 250 Honors Seminar II 3 Hours**

This course is intended to satisfy 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 Studies. 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.

**Prerequisites:** HON 150.

**HON 299 Honors Special Topics 1-3 Hour**

Individual independent or directed studies of selected topics in honors.

**HON 350 Honors Seminar III 3 Hours**

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.

**Prerequisites:** HON 250.

## Humanities (HU)

Note: Regional Studies (RS) courses are also considered Humanities (HU) courses and can be taken as Humanities electives.

### 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.

### Courses

**HU 142 Studies in Literature 3 Hours**

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.

**Prerequisites:** COM 122.

**HU 143 Introduction to Rhetoric 3 Hours**

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.

**Prerequisites:** COM 122.

**HU 144 Studies in Art 3 Hours**

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.

**Prerequisites:** COM 122.

**HU 145 Themes in the Humanities 3 Hours**

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.

**Prerequisites:** COM 122.

**HU 146 Music Appreciation and Criticism 3 Hours**

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.

**Prerequisites:** COM 122.

**HU 199 Special Topics in Humanities 1-3 Hour**

Individual independent or directed studies of selected topics in humanities.

**HU 299 Special Topics in Humanities 1-6 Hour**

Individual independent or directed studies of selected topics in the humanities.

**HU 300 World Literature 3 Hours**

Major works and literary trends in world literature. Course content varies by instructor and is listed in the Schedule of Courses.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 302 Contemporary Issues in Science 3 Hours**

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.

**Prerequisites:** COM 221.

**HU 305 Modern Literature 3 Hours**

The mainstreams of literature of this century. Course content varies by instructor and is listed in the Schedule of Courses.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 310 American Literature 3 Hours**

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.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 316 Studies in Music 3 Hours**

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.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 319 Advanced Speech 3 Hours**

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.

**Prerequisites:** COM 219.

**HU 320 Aesthetics of Visual and Musical Arts 3 Hours**

Provides a survey of the major artistic monuments of Western culture and discusses the methods by which artistic productions are analyzed.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 321 Mythology 3 Hours**

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.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 325 Exploring Film 3 Hours**

A survey of the art of 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.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 330 Values and Ethics 3 Hours**

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 devaluing 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.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 335 Technology and Modern Civilization 3 Hours**

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.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 341 World Philosophy 3 Hours**

This course focuses on an investigation of some of the central problems of philosophical inquiry such as what we can know and what we cannot know, how we reason, who we are, why we are here, and what we can hope for. Freedom, beauty, knowledge and logical thinking, mind, morality, god or gods, religion, truth, death, and existence might be explored using a variety of sources, including but not limited to contemporary thinkers of the European and the Anglo-American traditions. This course is designed to challenge assumptions and to help students deal with contemporary philosophical issues.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 345 Comparative Religions 3 Hours**

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.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 355 Creative Writing 3 Hours**

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.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146.

**HU 363 Communication and Society 3 Hours**

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. Pre-Requisite: Junior standing.

**HU 375 The Nature of Language 3 Hours**

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.

**Prerequisites:** COM 221 , or COM 222 , or COM 223.

**HU 399 Special Topics in Humanities 1-6 Hour**

Individual independent or directed studies of selected topics in the humanities.

**HU 415 Nonverbal Communication 3 Hours**

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 , and COM 221.

**HU 420 Applied Cross-Cultural Communication 3 Hours**

An examination of the challenges to communicating across the variety of sub-cultures 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 sub-cultural differences will be considered.

**Prerequisites:** COM 219 , and COM 221 , or COM 222 , or COM 223.

**HU 475 Senior Thesis 3 Hours**

As the culmination of the student's experience in Interdisciplinary 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 Hour**

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.

**Prerequisites:** COM 221 , or COM 222 , or COM 223.

**HU 485 Senior Thesis Writing 2 Hours**

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.

**Prerequisites:** HU 480.

**HU 499 Special Topics in Humanities 1-6 Hour**

Individual independent or directed studies of selected topics in the humanities.



## Information Technology (IT)

### Courses

#### IT 109 Introduction to Computers and Applications 3 Hours

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.

#### IT 210 Web Page Authoring and Design 3 Hours

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.

**Prerequisites:** IT 109 , or BA 120 , or BA 221 , or CS 223.

## Interdisciplinary Studies (IS)

### Courses

#### IS 100 Interdisciplinary Studies - Issues in Facing the Future 3 Hours

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 3-6 Hour

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

## Mathematics (MA)

### Courses

#### MA 106 Basic Algebra and Trigonometry 3 Hours

A study of the basic laws of fractions, exponents, radicals, inequalities, quadratic equations, complex numbers, and the elements of trigonometry. (This is a developmental course; credit is not applicable to any degree.)

#### MA 111 College Mathematics for Aviation I 3 Hours

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.

**Prerequisites:** MA 106.

#### MA 112 College Mathematics for Aviation II 3 Hours

This course presents basic calculus, designed for the student of aviation. Topics include differentiation and integration of algebraic functions; applications to velocity, acceleration, area curve sketching and computation of extreme values.

**Prerequisites:** MA 111.

#### MA 120 Quantitative Methods I 3 Hours

An algebra methods course with applications to business and economics. Operations, relations, functions, modeling, and problem solving; systems of linear equations and inequalities.

#### MA 140 College Algebra 3 Hours

This course focuses on fundamentals of exponents, radicals, linear and quadratic equations, inequalities, functions, graphing techniques, and complex numbers. It includes an introduction to function; curve sketching; elementary theory of equations; sequences and series; matrix algebra and systems of equations; linear; polynomial; logarithmic; exponential; inverse and composite functions; variation; and systems of equations.

**Prerequisites:** MA 106.

#### MA 142 Trigonometry 3 Hours

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; inverse trigonometric functions; vectors and trigonometric form of a complex number.

**Prerequisites:** MA 106.

#### MA 145 College Algebra and Trigonometry 5 Hours

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.

**Prerequisites:** MA 106.

#### MA 199 Special Topic in Mathematics 1-4 Hour

Individual independent or directed studies of selected topics in mathematics.

#### MA 220 Quantitative Methods II 3 Hours

This course is an introductory calculus course with applications to business and economics; limits; differentiation and integration of algebraic, exponential, and logarithmic functions; applications of differentiation to maximizing and minimizing; curve sketching; and marginal values.

**Prerequisites:** MA 111 , or MA 120.

#### MA 222 Business Statistics 3 Hours

This course is a study of basic descriptive and inferential statistics. Topics include types of data, sampling techniques, measures of central tendency and dispersion, elementary probability, discrete and continuous probability distributions, sampling distributions, hypothesis testing, confidence intervals, and simple linear regression.

**Prerequisites:** MA 111 , or MA 120 , or MA 140 , or MA 145.

#### MA 225 Introduction to Discrete Structures 3 Hours

An introduction to the fundamental algebraic, logical, and combinatorial concepts of mathematics that provides a foundation for the study of computer science.

#### MA 241 Calculus and Analytical Geometry I 4 Hours

Graphs and functions; limits and continuity; differentiation and integration of algebraic and elementary trigonometric functions; applications of first and second derivatives.

**Prerequisites:** MA 140 , or MA 145.



**MA 242 Calculus and Analytical Geometry II 4 Hours**

Differentiation and integration of transcendental functions; special integration techniques; polar coordinates; applications of the definite integral; numerical methods.

**Prerequisites:** MA 241.

**MA 243 Calculus and Analytical Geometry III 4 Hours**

Solid analytic geometry; vector functions in three dimensions; elements of infinite series; partial differentiation; directional derivative and gradient; multiple integrals.

**Prerequisites:** MA 242.

**MA 299 Special Topics in Mathematics 1-6 Hour**

Individual independent or directed studies of selected topics in mathematics.

**MA 320 Decision Mathematics 3 Hours**

The mathematical concepts and applications in mathematical model building and problem solving. Included are mathematical areas that are basic to decision theory

**Prerequisites:** MA 222.

**MA 335 Introduction to Linear and Abstract Algebra 3 Hours**

Theoretical aspects of modern algebra are presented. Methods of proof writing are introduced. Introductory topics in linear and abstract algebra will be discussed, as well as some of their applications.

**Prerequisites:** MA 242 **Corequisites:** MA 243.

**MA 341 Introduction to Mathematical Analysis 3 Hours**

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.

**Prerequisites:** MA 243.

**MA 345 Differential Equations and Matrix Methods 4 Hours**

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; and applications to physics and engineering.

**Prerequisites:** MA 243.

**MA 348 Numerical Analysis I 3 Hours**

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 , and MA 345.

**MA 399 Special Topics in Mathematics 1-6 Hour**

Individual independent or directed studies of selected topics in mathematics.

**MA 404 Statistics and Research Methods 3 Hours**

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.

**Prerequisites:** MA 112 , or MA 241.

**MA 412 Probability and Statistics 3 Hours**

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.

**Prerequisites:** MA 243.

**MA 432 Linear Algebra 3 Hours**

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.

**Corequisites:** MA 345.

**MA 433 Introduction to Optimization 3 Hours**

This course will cover mathematical optimization methods, problem formulation, and optimality criteria, linear programming methods for optimality problems, numerical methods for unconstrained and constrained problems, sequential linear programming, genetic algorithms, and hybrid optimal control.

**Prerequisites:** EGR 115 , and MA 345.

**MA 435 Linear and Abstract Algebra II 3 Hours**

This course is designed to provide students with some advanced skills and knowledge of linear and abstract algebra. Brief introductions of several advanced topics are expected to be discussed. Assuming a basic knowledge of linear and abstract algebra, topics that are covered in this course include but are not limited to: Hilbert spaces, finite-dimensional spectral theorem for normal operators, a brief introduction to tensor products, and non-associative algebra.

**MA 441 Mathematical Methods for Engineering and Physics I 3 Hours**

Line and surface integrals; vector fields with the study of Green, Gauss, and Stokes Theorems; applications of vector field theory; Fourier series.

**Prerequisites:** MA 345.

**MA 442 Mathematical Methods for Engineering and Physics II 3 Hours**

The solution of linear differential equations with variable coefficients; study of the derivation, characteristics, and solutions of partial differential equations; Fourier series, Fourier transform, Laplace transform, and Green's function; applications in science and engineering.

**Prerequisites:** MA 441.

**MA 443 Complex Variables 3 Hours**

Algebra of complex numbers; complex functions, analytic functions; mapping by elementary functions; conformal mappings and their applications; additional topics may include complex integration, power series expansion.

**Prerequisites:** MA 441.

**MA 499 Special Topics in Mathematics 1-6 Hour**

Individual independent or directed studies of selected topics in mathematics.

## Mechanical Engineering (ME)

A grade of C or better is required in MA 241, MA 242, and either PS 150 and PS 160 or PS 215, PS 216 and PS 208 for entry into

all ME courses. A passing grade in all prerequisite courses or department consent is required for entry into all ME courses.

## Courses

### **ME 299 Special Topics in Mechanical Engineering 1-3 Hour**

Individual independent or directed studies of selected topics in Mechanical Engineering.

### **ME 302 Introduction to Robotics I 3 Hours**

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 an introduction to topics in manipulator control and computer vision.

**Prerequisites:** ES 204.

### **ME 302L Introduction to Robotics Laboratory 1 Hour**

This laboratory course programs a manipulator arm to perform industrial robotic applications. Topics follow ME 302 lectures on robot kinematics and dynamics. Advanced topics include visual feedback control such as using a Cognex machine vision system with the Denso robots.

**Prerequisites:** ES 204 **Corequisites:** ME 302.

### **ME 303 Vehicle Dynamics 3 Hours**

This course covers design considerations for high-performance vehicles such as competition automobiles and high-speed mass transit vehicles. Considered are propulsion, aerodynamics, stability, down force enhancement systems, braking, and handling. Engines for various vehicles are compared, such as the conventional internal combustion engine, the rotary or Wankel, for competition applications and long-life requirements such as traction engines for rail applications. Also investigated are crash safety issues for both mass transit and competition. Guided vehicles such as mass transit trains and the Intelligent Transportation System (ITS) are investigated. Finally, future technologies such as magnetically levitated and very high-speed mass transit systems are analyzed.

**Prerequisites:** ES 202 , and ES 204 , and ES 305.

### **ME 304 Introduction to Machine Design 3 Hours**

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:** EGR 200 , and ES 202 , and ES 204.

### **ME 305 Machine Design Laboratory 1 Hour**

A companion laboratory to ME 304.

**Corequisites:** ME 304.

### **ME 306 Robotic Mechanisms 3 Hours**

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.

**Prerequisites:** ES 204.

### **ME 309 Airbreathing and Rocket Propulsion 3 Hours**

A study of airbreathing and rocket engines. Topics include control volume, conservation equations, and thermodynamic analyses as they apply to a propulsion system as well as components, such as inlets, compressors, burners, turbines, and nozzles. Airbreathing engine analysis will cover both on-design (Parametric Cycle Analysis) and off-design (Engine Performance Analysis) performance. Rocket analysis will address performance of both liquid and solid propellant motors.

**Prerequisites:** ES 305.

### **ME 312 Alternative Energy 3 Hours**

The course includes availability and the evaluation of thermodynamic properties, thermodynamics of compressible flow, thermodynamic power systems, mixtures of ideal gases; wind energy conversion, solar photovoltaic and solar thermal energy systems, introduction to combustion as applied to biomass systems, gas turbines, fuel cells and direct energy conversion. Design and optimization a power system for a stationary or a vehicles/craft. Prereq: ES 305

**Prerequisites:** ES 305.

### **ME 399 Special Topics in Mechanical Engineering 1-3 Hour**

Individual independent or directed studies of selected topics in Mechanical Engineering.

### **ME 400 Vibration and Acoustics 3 Hours**

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 , and ES 202 , and ES 204.

### **ME 401 Advanced Fluid Dynamics 3 Hours**

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.

**Prerequisites:** ES 206.

### **ME 402 Robotic Arms 3 Hours**

This course is an introduction to robotics with an emphasis on the 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 in which they program a robotic arm and/or a robotic welder.

**Prerequisites:** ES 204 **Corequisites:** EE 401 , and ME 306.

### **ME 403 Thermal Power Systems 3 Hours**

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 , and MA 345.

**ME 404 Mechatronics 3 Hours**

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:** ES 204 , and EE 223 , and EE 224 , or EE 335 , and EE 336.

**ME 404L Mechatronics Laboratory 1 Hour**

This laboratory course implements real-time systems to control aerospace and robotic systems, with an emphasis on microcontrollers and embedded hardware with a Real Time Operating System (RTOS). Topics follow ME 404 lectures on actuators, motor controllers, sensors, filters and their implementation.

**Prerequisites:** EE 335 , and EE 336 , or EE 223 & EE 224

**Corequisites:** ME 404.

**ME 405 Vehicle Power Systems 3 Hours**

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, and 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.

**Prerequisites:** ES 305.

**ME 406 Robotics II 3 Hours**

This course studies the applications and design of robotic systems. Particular emphasis is placed on aviation and space applications of robotics. Typical robotic motion is investigated as well as the requirements for control systems for the needed accuracy, repeatability, and stability. Sensors such as position, force, and acceleration are explored and the signal conditioning circuits and analog-to-digital conversion required for interfacing these sensors. Activating devices such as electric motors, linear actuators, and other motion devices are analyzed. Systems are modeled and control laws are developed. Software for computer-generated control laws are studied.

**Prerequisites:** ME 302 , and AE 430 **Corequisites:** MA 412.

**ME 406L Robotics II Laboratory 1 Hour**

This laboratory course focuses on the real-time software and computer hardware control of robotic systems necessary for senior detailed design. Multi-degree of freedom robotic manipulators are constructed with a particular emphasis on harmonic drives, AC servo motors, and associated controllers.

**Prerequisites:** ME 302 , and ME 302L , and AE 430

**Corequisites:** ME 406.

**ME 407 Preliminary Design of Robotic Systems with Laboratory 4 Hours**

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, 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.

**Prerequisites:** ME 304 , and ME 302 , or ME 306 **Corequisites:** COM 420.

**ME 409 Vehicle Aerodynamics 3 Hours**

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, and 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 , and ES 204 , and ES 206 , and ES 305.

**ME 410 Advanced Machine Design 2 Hours**

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 , and ME 304.

**ME 415 Modeling and Numerical Simulations of Energy and Environmental Systems 3 Hours**

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 an 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 of 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.

**Prerequisites:** ES 202 , and ES 206 , and ES 305 , and MA 345 , and EGR 115.

**ME 416 Robotics III 2 Hours**

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 , and AE 430.

**ME 417 Advanced Propulsion 3 Hours**

This course is designed to enable the student to analyze jet engines in depth using the fundamental principles developed in AE 408/ME 309 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 turbo shaft family of jet engines, the scramjet will be analyzed.

**Prerequisites:** AE 408 , or ME 309.

**ME 420 Detail Design of Robotic Systems with Laboratory 4 Hours**

Principles of detailed robotic and mechanical design, analysis, modeling and testing are covered and incorporated into projects to give actual experience in the detail design and integration of robotic systems and subsystems. Integration of multiple mechanical, electrical and computer subsystems into a single functional model is a key component of the course.

**Prerequisites:** ME 404 , and ME 406 , and ME 407.

**ME 421 Clean Energy Systems 3 Hours**

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 by-products. 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 426 Propulsion III 2 Hours**

Engines to provide the propulsion for general aviation aircraft are analyzed. While the standard Otto Cycle engines using avgas have served general aviation well, the fuel crisis and the environmental issues around the over 14,000 suburban airports in the United States have resulted in numerous proposals for new engines. The course will study the various options: electrical, diesel, rotary, turboprop, turbofan, as well as modifications to the conventional spark ignition engine.

**Prerequisites:** ES 305 , and ME 309.

**ME 429 Propulsion System Preliminary Design 4 Hours**

This course is concerned with the preliminary design of a propulsion system, components and/or group of components based on a set of vehicle or propulsion system-specific performance requirements. Students are challenged to perform the appropriate requirements analysis, select a propulsion system type and system-level design characteristics to best meet the requirements. The students will then complete a paper design of the propulsion system components, ensuring proper integration with the propulsion system and, if appropriate, the vehicle for which the system is designed.

**Prerequisites:** ME 417 **Corequisites:** COM 420 , and EGR 200.

**ME 430L Control Systems Laboratory 1 Hour**

A companion laboratory for AE 430.

**Corequisites:** AE 430.

**ME 431 Propulsion System Detail Design 4 Hours**

This course is concerned with the design of a propulsion system component or group of components. Students are challenged to design the component(s) for the operating environment, and ensure that it will properly interface with the neighboring components. The component(s) will be manufactured on-site or by a machine shop according to student designs. Student will then test physical hardware and compare to analytical results. Emphasis is on hardware design, manufacturing and testing.

**Prerequisites:** ME 429 **Corequisites:** AE 416 , and AE 417 , and COM 430.

**ME 432 Advanced Alternative Energy 3 Hours**

The course is the follow-on for ME 312 Alternative Energy . It will be tailored to support the capstone design sequence in the energy track of the mechanical engineering degree. The course will focus on a primary alternative energy system (e.g. wind or solar photovoltaic or solar thermal) and energy storage. Building on the knowledge gained in ME 312, greater depth in a specific system will be gained through a thorough examination of specific system components, system trade-offs, component limitations and potential component advances. The course will focus on design and optimization of an alternative power system to stationary or vehicle/craft as appropriate. Prereq: ME 312

**Prerequisites:** ME 312.

**ME 435 Energy Engineering Preliminary Design 4 Hours**

Alternative energy conceptual design principles are developed to meet specific system requirement. A complete alternative energy system will be designed, resulting in an engineering design package consisting of specifications, aerodynamic and/or thermodynamic calculations, system and site drawing, weight estimates, structural analysis, control system concept, and complete performance report. Prereq: ME 312, ME 432

**Prerequisites:** ME 312 **Corequisites:** ME 432.

**ME 440 Energy Engineering Detail Design 4 Hours**

Principles of alternative energy detail and component part design, manufacture, and production are covered along with projects to give actual experience in the design alternative energy components. The design of an alternative energy system is carried from the general layout to the design of its detail parts and testing of energy system hardware.

**Prerequisites:** ME 435.



**ME 499 Special Topics in Mechanical Engineering 1-3 Hour**

Individual independent or directed studies of selected topics in Mechanical Engineering.

## Military Science Army ROTC (MSL)

### Courses

**MSL 101 Basic Military Science I 1 Hour**

A study of the defense establishment and the organization and development of the U.S. Army. A study of the roles that active Army forces, Army Reserve forces, and the Army National Guard play in our nation's defense. A study of military courtesy, customs, and traditions of the service. A historical perspective of the role of the different branches of the U.S. Army and the role they have played in the freedom of our nation. An introduction to physical readiness training. Course includes lectures and laboratory. Field training exercises normally include M16-A1 rifle firing, rappelling training, and airmobile helicopter operations.

**Corequisites:** MSL 101L.

**MSL 101L Basic Military Science I Laboratory 0 Hours**

Leadership laboratory with emphasis on military leadership and small unit tactics. Students develop leadership abilities through hands-on practical experiences. Training is introductory in scope and includes operations and tactics and land navigation subjects. Practical training exercises familiarize students with the field environment and field survival skills. The Army Physical Fitness Test (APFT) is administered to assess the state of physical development.

**MSL 102 Basic Military Science II 1 Hour**

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.

**Corequisites:** MSL 102L.

**MSL 102L Basic Military Science II Laboratory 0 Hours**

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 199 Special Topics in Military Science 1-3 Hour**

Individual independent or directed studies of selected topics in general military science.

**MSL 201 Basic Military Leadership I 2 Hours**

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.

**Corequisites:** MSL 201L.

**MSL 201L Basic Military Leadership I Laboratory 0 Hours**

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 2 Hours**

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.

**Corequisites:** MSL 202L.

**MSL 202L Basic Military Leadership II Laboratory 0 Hours**

Leadership laboratory with emphasis on military leadership and small unit tactics. Students develop leadership abilities through hands-on practical experiences, with a 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 299 Special Topics in Military Science 1-3 Hour**

Individual independent or directed studies of selected topics in general military science.

**MSL 301 Officership I 3 Hours**

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.

**Corequisites:** MSL 301L.



**MSL 301L Officership I Laboratory 0 Hours**

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 Hours**

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.

**Corequisites:** MSL 302L.

**MSL 302L Officership II Laboratory 0 Hours**

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 drown-proofing. The Army Physical Fitness Test (APFT) is administered to assess the state of physical development.

**MSL 399 Special Topics in Military Science 1-3 Hour**

Individual independent or directed studies of selected topics in general military science.

**MSL 401 Advanced Military Leadership I 3 Hours**

This course is the study of ship handling, relative motion, basic forms of naval communications, and U.S. and adversarial weapons systems and platforms. Midshipmen with the exception of Nurse Corps and Marine Corps options are required to take this course.

**Corequisites:** MSL 401L.

**MSL 401L Advanced Military Leadership I Laboratory 0 Hours**

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 Hours**

A study of ethics and professionalism in the military and the role they play in carrying out the defense policy of the United States. The fundamentals of military law, its impact on the American military society, and its place in the jurisdictional system. A history of the military courts martial as it relates to the jurisdictional process of American society. A study of the Law of Land Warfare and its relationship to the conduct of soldiers in combat. This course includes lecture, laboratory, and physical readiness training.

**Corequisites:** MSL 402L.

**MSL 402L Advanced Military Leadership II Laboratory 0 Hours**

Leadership laboratory with emphasis on military leadership and small unit tactics. Students develop leadership abilities through hands-on practical experiences. Training culminates development of leader skills emphasizing the transition from cadet to second lieutenant. Expands the frame of reference and gradually shifts it to orient on future assignments as an officer. Training is supplementary and includes operations and tactics, land navigation, and radio wire communication subjects. Students perform as subject matter experts and are responsible for conducting and evaluating training. The Army Physical Fitness Test (APFT) is administered to assess the state of physical development.

**MSL 499 Special Topics in Military Science 1-3 Hour**

Individual independent or directed studies of selected topics in general military science.

## Physical Science (PS)

### Courses

**PS 101 Basic Chemistry 3 Hours**

This course is a study of elementary chemical theory. It covers basic atomic theory, elements, compounds, and mixtures, calculation of weight and weight volume relationships, basic descriptive chemistry and one 1.5 hour lab session per week. (Cannot be used for credit in chemistry toward degrees in Aerospace or Electrical Engineering.) Passing grade required for Lab. NOTE: Students must register for lab section PS 101L.

**Prerequisites:** MA 111 **Corequisites:** MA 140.

**PS 102 Explorations in Physics 3 Hours**

Survey course in elementary physics. Stress will be placed on basic concepts, principles and history of the development of physics. Presentation 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 Aerospace or Electrical Engineering, Space Physics, Aircraft Engineering Technology, Aeronautical Science, or Avionics Technology.)

**Prerequisites:** MA 111.

**PS 103 Technical Physics I 3 Hours**

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, and momentum. (Cannot be used for credit in physics toward degrees in Engineering Physics, Civil, Aerospace, or Electrical Engineering.)

**Prerequisites:** MA 111 , or MA 140 **Corequisites:** MA 112 , or MA 241.

**PS 104 Technical Physics II 3 Hours**

Application of basic physics principles discussed in PS 103. Other areas will include fluids, properties of matter, thermodynamics, wave motion, sound, simple harmonic motion, kinetic theory, basic electromagnetic theory, and elementary circuits. (Cannot be used for credit in physics toward degrees in Computer Science, Engineering Physics, Civil, Aerospace, or Electrical Engineering.)

**Prerequisites:** PS 103 , and MA 112 , or MA 241 **Corequisites:** PS 115L.

**PS 105 General Chemistry I 4 Hours**

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. Students who have not taken high school chemistry are strongly urged to take PS 101 first.

**Prerequisites:** HS CHEM , or PS 101 , or PS 108 , and MA 111 , or MA 120 , or MA 140 , or MA 241 **Corequisites:** PS 105L.

**PS 105L General Chemistry I Laboratory 0 Hours**

One three-hour laboratory session per week, with experiments related to the material of PS 105.

**Corequisites:** PS 105.

**PS 106 General Chemistry II 4 Hours**

Chemical principles that include thermodynamics, acids and bases, rates of reaction, electrochemistry, organic chemistry, synthetic materials.

**Prerequisites:** PS 105.

**PS 107 Elements of Biological Science 3 Hours**

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 Hours**

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.

**Corequisites:** PS 108L.

**PS 113 Introductory Physics I 3 Hours**

Survey 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, and momentum. (Cannot be used for credit in physics toward degrees in Aerospace Engineering, Electrical Engineering, or Aircraft Engineering Technology.)

**Prerequisites:** MA 111 , or MA 120 , or MA 140 **Corequisites:** MA 112 , or MA 220 , or MA 241.

**PS 114 Introductory Physics II 4 Hours**

Application of basics physics principles discussed in PS 113. Other areas will include fluids, properties of matter, thermodynamics, wave motion, sound, simple harmonic motion, kinetic theory, basic electromagnetic theory and elementary circuits. Laboratory includes both descriptive and quantitative work. (Cannot be used for credit in physics toward degree in Aerospace Engineering, Electrical Engineering, or Aircraft Engineering Technology.)

**Prerequisites:** PS 113 , or MA 112 , or MA 220 , or MA 241.

**PS 114L Introductory Physics Laboratory 0 Hours**

Introductory Physics Laboratory

**Corequisites:** PS 114.

**PS 140 Chemistry for Engineers 4 Hours**

Chemical stoichiometry, states of matter, solutions, thermodynamics, rate of reaction, equilibrium, oxidation-reduction, corrosion, organic compounds, and polymers.

**Prerequisites:** PS 101 **Corequisites:** PS 141.

**PS 141 Chemistry for Engineers Laboratory 1 Hour**

One three-hour laboratory session per week, with experiments paralleling the material of PS 140.

**Corequisites:** PS 140.

**PS 150 Physics for Engineers I 3 Hours**

This course explores vectors and scalar quantities; kinematics; Newton's Law of Motion; work; work-energy; conversion of energy; conversion of momentum; center of mass and its motion, torque, equilibrium; and orbital motion.

**Corequisites:** MA 241.

**PS 160 Physics for Engineers II 3 Hours**

This is a calculus-based study of the fundamental principles of classical mechanics. Topics include rotational motion, simple harmonic motion, waves, fluid, heat, kinetic energy, and thermodynamics.

**Prerequisites:** PS 150 , or PS 215 **Corequisites:** MA 242.

**PS 199 Special Topics in Physical Science 1-6 Hour**

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.

**PS 204 General Astronomy 3 Hours**

An introductory course in astronomy, primarily intended for Space Physics majors. Topics include the history of astronomy, celestial mechanics, light and spectra, telescopes, the solar system, and exoplanets. Includes night observing sessions.

**Prerequisites:** PS 160 , or PS 208.

**PS 208 Physics II 3 Hours**

Fluids, temperature, heat, first and second laws of thermodynamics, wave motion, and acoustics

**Prerequisites:** MA 241 , and PS 215 **Corequisites:** MA 242.

**PS 215 Physics I 3 Hours**

Estimations, order of magnitude analysis, Newton's Law, gravitation, kinematics, work and energy, momentum, rotation, and harmonic motion.

**Corequisites:** MA 241.

**PS 216 Physics I Laboratory 1 Hour**

One three-hour laboratory session per week, with experiments chosen primarily from mechanics.

**Corequisites:** PS 215 , or PS 150.

**PS 219 Physics III 3 Hours**

Static electricity, Gauss's law, potential, Ohm's law, direct current circuits, magnetic fields, induced electromotive force, induction, EM waves, the nature of light, alternating circuits.

**Prerequisites:** PS 208 , and PS 221 , and MA 242 **Corequisites:** MA 243.

**PS 221 Intermediate Physics Laboratory 2 Hours**

Two three-hour laboratory sessions per week with experiments chosen primarily from wave motion, thermodynamics, electricity, magnetism, and geometric optics.

**Prerequisites:** PS 215 , and PS 216 **Corequisites:** MA 242 , and PS 208.

**PS 222 Intermediate Astronomy 3 Hours**

An introduction to the sun, stars, galaxies, and the universe as a whole. Overview of the observational properties of these objects, as well as the application of introductory physics for a basic understanding of the objects.

**Prerequisites:** PS 204 **Corequisites:** PS 219 , or PS 250.

**PS 232 Computational Methods in the Physical Sciences 3 Hours**

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 , and PS 215 **Corequisites:** MA 242 , and PS 208.

**PS 250 Physics for Engineers III 3 Hours**

This course is a calculus-based study of the fundamental principles of classical mechanics. It is the third course of a three-semester sequence, intended for students of science and engineering and is designed to provide the student with an appropriate background for more advanced physics and engineering course work. Topics of discussion include electric forces; electric field; Gauss's law; Ohm's law; Ampere's law; Faraday's law; Lenz's law; Kirchhoff's law and Maxwell's equations; electric potential and electrostatic potential energy; capacitance; simple DC circuit theory; magnetic force, magnetic field; inductance; electromagnetic oscillations and wave propagation; linear accelerators; and cyclotrons.

**Prerequisites:** MA 242 , and PS 160.

**PS 253 Physics Laboratory for Engineers 1 Hour**

One three-hour laboratory session per week, with experiments complementing the material of PS 250. Primarily lab report writing workshop, error analysis, damped harmonic oscillations, spectrometers, optics, atomic physics, thermodynamics and circuit theory.

**Corequisites:** PS 250.

**PS 271 Techniques of Observational Astronomy 3 Hours**

An introduction to the concepts and practice of astronomical observing. Planning of astronomical observations. Operation and understanding of telescopes and associated instruments that detect light from astronomical objects. Analysis of astronomical data.

**Prerequisites:** PS 222 , and PS 253 , and ( PS 219 , or PS 250)

**PS 299 Special Topics in Physical Science 1-4 Hour**

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.

**PS 301 Astronomy 3 Hours**

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.

**Prerequisites:** PS 102 , or PS 103 , or PS 150 , or PS 215.

**PS 302 Evolution of Scientific Thought 3 Hours**

This course 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. Students will receive either social science elective credit or physical science elective credit, but not both.

**Prerequisites:** HU 140 , or HU 141 , or HU 142 , and PS 101 , or PS 102 , or PS 103 , or PS 150 , or PS 215.

**PS 303 Modern Physics 3 Hours**

This is an introductory course in non-classical (modern) physics; it introduces students to the modern concepts in physics. Topics discussed include scattering of electromagnetic radiation; special relativity; wave-particle duality; the uncertainty principle and quantum theory of atomic structure; x-rays; lasers; and nuclear reactions.

**Prerequisites:** PS 219 , or PS 250.

**PS 314 Environmental Chemistry 3 Hours**

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.

**Prerequisites:** PS 106.

**PS 315 Modern Physics Laboratory 2 Hours**

Experiments in atomic and nuclear physics, including spectroscopy, nuclear particle analysis, X-ray analysis, and laser applications.

**Prerequisites:** PS 221 **Corequisites:** PS 303.

**PS 321 Classical Mechanics I 3 Hours**

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:** MA 345 , and PS 219 , and PS 303 **Corequisites:** PS 322.

**PS 322 Classical Mechanics II 3 Hours**

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 321.

**PS 330 Electricity and Magnetism I 3 Hours**

Solutions of electrostatics problems using Poissons equation and Laplaces equation, electrostatic energy, electric current, magnetic field, electromagnetic induction, physics of plasmas, Maxwells equations, and application of Maxwells equations (reflection, refraction, waveguides, antenna radiation). Students will write some simple computer programs.

**Prerequisites:** MA 345 , and PS 303 **Corequisites:** MA 441.

**PS 331 Electricity and Magnetism II 3 Hours**

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 **Corequisites:** MA 442.

**PS 340 Astrophysics I 3 Hours**

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 , and PS 303 , and MA 345.

**PS 350 Quantum Mechanics I 3 Hours**

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, Fermis rule, scattering theory. Classical and quantum statistical distributions.

**Prerequisites:** MA 441 , and PS 303 **Corequisites:** MA 442.

**PS 375 Planetary Science 3 Hours**

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 , and PS 330.

**PS 380 Optics Laboratory 3 Hours**

Study of geometrical and physical optics including plane waves, mirrors, lenses, emission and absorption line spectroscopy, diffraction gratings, lasers, and interferometers.

**Prerequisites:** PS 315.

**PS 399 Special Topic in Physical Science 1-4 Hour**

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.

**PS 405 Atomic Nuclear Physics 3 Hours**

This course is a study of multi-electron atoms, x-rays and gamma rays, and radiative transitions in the atom and the nucleus. Topics include time-independent and time-dependent perturbation theory, scattering and the Born approximation, basic properties of nuclei, systematics of nuclear stability, dynamics of nuclear reactions, nuclear models, and nuclear forces.

**Prerequisites:** PS 350.

**PS 408 Astrophysics II 3 Hours**

Radiative transfer in astrophysical environments; stellar atmospheres, stellar interiors, and gaseous nebulae. Emission and absorption processes. Interaction of radiation with matter.

**Prerequisites:** PS 340.

**PS 412 Particle Physics and Cosmology 3 Hours**

Study of modern particle physics and the foundations of general relativity including special relativity and Minkowski space-time, particle collisions and conservation laws, the Standard Model of particle physics, and introduction to classical and quantum scattering theory.

**Prerequisites:** PS 350 , and MA 442.

**PS 413 Particle Physics and Cosmology II 3 Hours**

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.

**Prerequisites:** PS 412.

**PS 420 Remote Sensing 3 Hours**

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.

**Prerequisites:** MA 441 **Corequisites:** PS 405.

**PS 422 Space Propulsion 3 Hours**

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:** PS 105 , and PS 405.

**PS 430 Thermodynamics and Statistical Mechanics 3 Hours**

Basic thermodynamics, entropy, kinetic theory, distribution of molecular velocities, Maxwell-Boltzmann statistics, Bose-Einstein statistics, Fermi-Dirac statistics, microcanonical ensemble, canonical ensemble

**Prerequisites:** PS 303.

**PS 451 Quantum Mechanics II 3 Hours**

Multiparticle wave functions, second quantization, creation and annihilation operators, commutation relations, representations of one and two-body operators, simple applications, Wicks Theorem, and Hartree-Fock theory

**Prerequisites:** PS 350.



**PS 490 Senior Research Thesis, Part I 3 Hours**

First semester optional capstone course for senior Space Physics students. Students will begin their senior research project in an area of interest that overlaps the interest of the supervising faculty.

**Prerequisites:** PS 350 , and MA 442.

**PS 491 Senior Research Thesis, Part II 3 Hours**

Second semester optional capstone course for senior Space Physics students. Students will complete their senior research project culminating in a research paper that follows an accepted scientific publishing format.

**Prerequisites:** PS 490.

**PS 499 Special Topic in Physical Science 1-4 Hour**

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.

## Psychology (PSY)

### Courses

**PSY 101 Introduction to Psychology 3 Hours**

This course will introduce the student to the field of psychology, and is a survey of the bio-psychosocial 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 examine the rationalist, empiricist and experimental foundations of the scientific method and how these foundations can be critiqued. Topics include sensation, perception, learning, motivation, emotion, 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 299 Special Topics in Psychology 3 Hours**

Individual independent or directed studies of selected topics in psychology.

**PSY 306 Deceptions 3 Hours**

This course covers contemporary research on the psychology of deception detection and strategic deception analysis and planning. It includes a critique of this research and research applications. Topics include the incidence, prevalence, social contexts, and types of deception; putative indices of deception comprising nonverbal behavior, verbal behavior (speech and writing), and neurophysiological phenomena; common difficulties in deception detection assessing detection's validity and utility; critiquing methods to improve deception detection and strategic deception analysis and planning; and an analysis of commercial deception detection products. Prereq: PSY 101 or permission of the instructor.

**PSY 313 Personality and Profiling 3 Hours**

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 trustnamely, committing espionageand 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 courses end, students will have profiled a U.S. citizen convicted of spying against his country.

**Prerequisites:** PSY 101.

**PSY 350 Social Psychology 3 Hours**

This course is intended to provide students with an introduction to the interactional forces between groups and the individual in society. Topics include the following: introduction to social psychology, group influence, the self in a social world, prejudice-disliking others, social beliefs and judgments, attraction and intimacy, genes, culture and gender, altruism-helping others, conformity, and persuasion.

**Prerequisites:** PSY 101.

**PSY 365 Abnormal Psychology 3 Hours**

This course is intended to familiarize students with the theory and research on the biological, cognitive-behavioral, and social-family perspectives and interventions of psychological disorders as problems that affect nearly everyone. Its emphasis on the research process, family issues, and the line between normal and abnormal behavior is intended to encourage students to think critically about social and personal issues, and to understand the strategies, methodologies, and the applicability of research in abnormal psychology.

**Prerequisites:** PSY 101.

**PSY 399 Special Topics in Psychology 1-3 Hour**

Individual independent or directed studies of selected topics in psychology.

**PSY 499 Special Topics in Psychology 1-3 Hour**

Individual independent or directed studies of selected topics in psychology.

## Regional Studies (RS)

Regional Studies (RS) courses are also considered Humanities (HU) courses and can be taken as Humanities electives.

### Courses

**RS 200 Modern Asia 3 Hours**

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 instructors expertise. For example, an instructor may focus on East Asia rather than South Asia, on history rather than economy.

**RS 299 Special Topics in Regional Studies 1-3 Hour**

Individual independent or directed studies of selected topics in Regional Studies.



**RS 300 Observing Asian Cultures 3 Hours**

An interdisciplinary course that takes an anthropological, philosophical, and geographical approach to traveling in Asia. Topics include geographical changes in Asia, philosophical issues of travel, and the theory and methodology of studying other cultures and societies. The course culminates in an optional yet strongly recommended field trip to an Asian country.

**RS 305 Asian Literature 3 Hours**

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 instructors expertise. For example, an instructor may focus on East Asia rather than South Asia, on prose rather than drama.

**RS 306 Studies in Middle Eastern History and Culture 3 Hours**

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.

**RS 307 Islam and Arabic Culture 3 Hours**

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 Quran 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 Quran is the principal source of the Arab-Islamic culture and constitutes the framework that charts Arabic character and aspirations.

**Prerequisites:** RS 307.

**RS 399 Special Topics in Regional Studies 1-3 Hour**

Individual independent or directed studies of selected topics in Regional Studies.

## Safety Science (SF)

### Courses

**SF 201 Introduction to Health, Occupational, and Transportation Safety 3 Hours**

This course introduces the student to the field of safety and covers basic health, safety, and regulatory issues that apply to aviation and non-aviation business in the United States. Included is a comprehensive health and safety overview of legislative development and enactment of appropriate statutes, regulations, and laws. This course also provides an introduction to hazard recognition, reporting, analysis, and control used in risk management and accident prevention. Additional topics include accident investigation; safety data statistics; ergonomics; security and emergency preparedness; safety culture; aircraft systems; air traffic control; and workers' compensation. This course reviews theories, applications, and practices of the field of safety.

**SF 205 Principles of Accident Investigation 3 Hours**

This course is an introduction to the process required for the investigation of accidents. Topics will include different methods of accident investigation, such as root cause analysis and Management Oversight Risk Tree (MORT), among others. Further topics will include filing appropriate accident reports and applications of corrective actions.

**Prerequisites:** SF 201 , or SF 210.

**SF 210 Introduction to Aerospace Safety 3 Hours**

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 299 Special Topics in Safety 1-3 Hour**

Individual independent or directed studies of selected topics in aviation or non-aviation safety topics.

**SF 315 Environmental Compliance and Safety 3 Hours**

This course examines matters associated with health and safety relating to the environment including air, water quality and sanitation. Areas of concentration include hazardous materials, their storage, handling, and transportation. Additional study includes waste management and cleanup as well as a detailed study of environmental laws, regulations, and protection of workers involved in activities associated with hazardous material activities.

**Prerequisites:** SF 201 , or SF 210.

**SF 320 Human Factors in Aviation Safety 3 Hours**

This course focuses on the major human causative agent in aircraft accidents: the human being. Emphasis is placed on the psychological and physiological factors that enhance the accident probability. Included is a detailed analysis of ergonomics (human engineering) and its influence in aviation design.

**SF 325 Human Factors and Ergonomics I 3 Hours**

This course is an introduction to cognitive and physical ergonomics. Topics will include musculoskeletal anatomy and physiology, anatomy and physiology of the perceptual system, and basic introduction to perception, experimental psychology, and cognitive psychology. Applications will include design of both the physical and cognitive interfaces with the work environment.

**SF 326 System Safety 3 Hours**

This course will emphasize the specialized integration of safety skills and resources into all phases of a systems 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 , and MA 222.

**SF 330 Aircraft Accident Investigation 3 Hours**

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 follow-up work designed to avoid similar or related aircraft accidents.

**Prerequisites:** SF 201 , or SF 210.

**SF 335 Mechanical and Structural Factors in Aviation Safety 3 Hours**

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.

**Prerequisites:** SF 330.

**SF 341 Safety and Security of Airport Ground Operations 3 Hours**

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 Hours**

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.

**Prerequisites:** SF 201 , or SF 210.

**SF 350 Aircraft Crash and Emergency Management 3 Hours**

Theory, practices, and techniques utilized in the response phase of aircraft crashes and emergencies are examined. This course is designed as a "real world" introduction to the field of emergency response at the CFR agency level, the airport response and administration levels, and the related and associated entities involved in aircraft mishaps.

**Prerequisites:** SF 201 , or SF 210.

**SF 355 Industrial Hygiene and Toxicology 3 Hours**

This course examines principles associated with industrial hygiene. Topics include recognition, evaluation, and control of hazards related to noise; vibration; ionizing and non-ionizing radiation; thermal conditions; chemicals; airborne contaminants; cumulative trauma; and biological substances. These subjects will be discussed in relation to all regulatory requirements using engineering and non-engineering controls for reducing or eliminating health hazards in the workplace.

**Prerequisites:** SF 201.

**SF 375 Propulsion Plant Investigation 3 Hours**

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. Powerplant 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.

**Prerequisites:** SF 330.

**SF 399 Special Topics in Safety 1-3 Hour**

Individual independent or directed studies of selected topics in aviation safety.

**SF 405 Applications in Industrial Hygiene 3 Hours**

This course advances and expands on the concepts discussed in SF 355 and emphasizes the measurement and evaluation of workplace health hazards. Design and regulatory compliance of environments in office settings and manufacturing environments are addressed. Students develop and/or evaluate industrial hygiene programs for selected industries.

**Prerequisites:** SF 355.

**SF 410 Design of Engineering Hazard Controls 3 Hours**

This course addresses the application of scientific and engineering principles and methods to achieve optimum safety and health through the analysis and design of processes, equipment, products, facilities, operations, and environments. Subjects will include product design, plant layout, construction maintenance, pressure vessels, and transportation vehicles and systems. These subjects will be discussed in relation to all regulatory requirements

**Prerequisites:** SF 201 , or SF 210.

**SF 420 Analysis of Observational Data 3 Hours**

Methods for the analysis of observational data are primarily drawn from the discipline of epidemiology. This will include a set of heuristics and quantitative methods used to analyze the distributions of events (diseases, crashes, fatalities, etc.) in populations to infer the causes of those events. This course is a survey of these quantitative methods with an emphasis on occupational applications. Topics will include rates, standardized mortality ratios, methods of assessing agreement, case-control studies, cohort studies, recognizing and assessing causes of error, and advanced techniques in observational data analysis.

**Prerequisites:** MA 222 , and SF 201 , and SF 210.

**SF 425 Human Factors and Ergonomics II 3 Hours**

This course is an extension of Human Factors and Ergonomics I and will provide greater depth in such topics as biomechanics, work physiology, ergonomics field methods, psychophysical methods, signal detection theory, information theory and human error/reliability.

**Prerequisites:** SF 325.

**SF 435 Aircraft Crash Survival Analysis and Design 3 Hours**

An in-depth analysis of the accident environment with particular emphasis on the protection of 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.

**Prerequisites:** SF 335.

**SF 440 Design of Engineering Hazard Controls II 3 Hours**

This course covers all relevant standards and regulations related to construction together with the development and implementation of construction safety programs. OSHA Standards 29 CFR 1926 and work methods design will serve as a basis for this course.

**Prerequisites:** SF 201.

**SF 445 System Safety in Aviation 3 Hours**

This course entails the 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.

**Prerequisites:** SF 201 , or SF 210.

**SF 462 Health, Safety, and Aviation Law 3 Hours**

This course introduces the student to the legal issues and concerns confronting the health and safety industry. Included is an overview of the historical legal precedence established for the aviation industry, as well as a comprehensive examination of laws, regulations, and legislation that govern the actions and authority of the health and safety professional. This course also provides an introduction to the governing bodies and associations that are tasked with setting the legal standards by which the industry must operate, including the scope and level of their authority.

**Prerequisites:** SF 201 , or SF 210.

**SF 475 Senior Project 3 Hours**

This course requires senior-level students to conduct research in a safety-related topic of his or her choosing under the direction of a faculty member.

**SF 499 Special Topics in Safety 1-3 Hour**

Individual independent or directed studies of selected topics in aviation or non-aviation safety topics.

## Security and Intelligence Studies (SIS)

### Courses

**SIS 100 Introduction to Global Security 3 Hours**

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 199 Special Topics in Global Security and Intelligence Studies 1-3 Hour**

Individual independent or directed studies of selected topics in Global Security and Intelligence Studies related topics.

**SIS 200 Introduction to the U.S. Legal System 3 Hours**

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.

**Prerequisites:** SS 110 , or SS 120.

**SIS 210 Security Fundamentals 3 Hours**

This course provides students with a familiarity with the general concepts of security, threat assessment, personnel security, physical security and information security both in the government and private sectors. Students will learn the importance of applying proper security protection measures to protect an organizations personnel, physical assets, and sensitive information. Students will learn the basic personnel security screening methods, the general types of security equipment and its protective applications, the ways of protecting both sensitive information and computer systems storing and transmitting such information. The students will also learn the basic methodology for conducting investigations in private and government organizations.

**SIS 215 Personal Security and Defensive Skills 3 Hours**

Students who successfully complete SIS 215 - Personal Security Defense Skills (3 credit hours) may elect to take a practical firearms instruction course off-campus at their own cost for an additional one credit hour for the laboratory. The instruction course must incorporate the necessary classroom and practical instruction and be recognized by the GSIS Program Chairman as providing relevant knowledge level and skill sets. Once the student has successfully completed SIS 215, the student may apply for the 1 credit hour and must provide a certificate of course completion to the GSIS Program Chairman. GSIS students may only use this course and optional laboratory as an open elective course in their program.

**SIS 260 Forensic Science Applications in Security and Intelligence 4 Hours**

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 available 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.

**Prerequisites:** AES 111 , or AES 112 , or AES 195.

**SIS 299 Special Topics in Global Security and Intelligence Studies 1-3 Hour**

Individual independent or directed studies of selected topics in Global Security and Intelligence Studies related topics.

**SIS 312 Global Crime and International Justice Systems 3 Hours**

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 globalizations 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 , and SS 327 , and SS 312 , and SIS 200.

**SIS 315 Studies in Global Intelligence I 3 Hours**

This course will examine the uses of strategic intelligence by world leaders in shaping policy and the effects of strategic intelligence on world events. Issues to be covered include theoretical models of strategic intelligence; intelligence collection, evaluation, analysis, production, and dissemination; intelligence oversight; covert and clandestine operations; intelligence bureaucracies; ethical and moral issues in intelligence; counterintelligence. The course emphasizes strategic intelligence in the business, political, military, scientific, and technological domains.

**Prerequisites:** COM 223.

**SIS 317 Political Change, Revolution, and War 3 Hours**

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:** SIS 315 , or SS 327 , or SS 340.

**SIS 320 Global History, Politics, and Culture 3 Hours**

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 , or LCH 400.

**SIS 323 Intelligence and Technology 3 Hours**

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.

**Prerequisites:** SIS 315.



**SIS 325 History of Terrorism 3 Hours**

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:** SIS 100 , and SS 110 , or LCH 400.

**SIS 328 Intelligence Analysis, Writing, and Briefing 3 Hours**

This course is designed to strengthen the students 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.

**Prerequisites:** COM 223.

**SIS 330 World Political Thought 3 Hours**

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, Katulya 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.

**Prerequisites:** SS 110 , or LCH 400.

**SIS 335 Counter-Intelligence 3 Hours**

Counterintelligence is the study of how to protect ones intelligence community from external penetration, including ones 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 history 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.

**Prerequisites:** SIS 315.

**SIS 340 Security Investigations and Interview 3 Hours**

This course will focus on understanding and applying the elicitation approaches and techniques employed during security and counterintelligence investigations. The student will learn how to evaluate and investigate allegations of wrong doing objectively and systematically. The student will become familiar with the various psychological approaches and behavior observation techniques used during the interview process. The students will learn to observe and read body language, behavior and other cues to help evaluate a person's truthfulness during an interview. The students will learn to plan and scope an investigation based on the legal and or regulatory elements of proof. The students will plan and conduct investigations of fictitious security violations and criminal acts including participating in mock interviews, interrogations, evidence collection and report writing. They will also learn the Constitutional and legal constraints and requirements involved in both general Criminal and counterintelligence investigations.

**SIS 399 Special Topics in Global Security and Intelligence Studies 1-3 Hour**

Individual independent or directed studies of selected topics in Global Security and Intelligence Studies related topics.

**SIS 400 International Security and Globalization 3 Hours**

An analysis of 21st-century international security issues related to scientific and technological change. Topics include the nature of security-economic, socio-cultural, 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:** SS 110 , or SS 120 , and PSY 101 , or PSY 350 , or PSY 365 , and SS 327.



**SIS 405 Environment and Security 3 Hours**

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 nations 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.

**Prerequisites:** SIS 315.

**SIS 414 Government and Corporate Security Management 3 Hours**

During this course students will apply security concepts and methods employed in protecting personnel, assets and information in government organizations and private business organizations. This course will focus on understanding the role and functions of a security manager in such organizations and their organizational structure, and budgeting practices. The student will learn the critical importance of personnel screening and information protection in preventing espionage and other crimes. Students will gain knowledge and skill in selecting physical security equipment including its applications, effectiveness and cost. Students will also learn about access control and identification, system security system design and application, close circuit television and surveillance, security and theft investigations, and executive protection. The important role of the National Industrial Security Program and the DOD Security classification system will be discussed. Students will develop and practice briefing employees and senior executives on security awareness issues including counterintelligence threats. The student will draft security plans and policies in these critical areas. Finally, the course will review the professional, legal and ethical issues that influence the implementation of various security measure and intelligence operations

**Prerequisites:** BA 201 , and SIS 210.

**SIS 415 Studies in Global Intelligence II 3 Hours**

This course is one of the three options that students may choose in order to complete their senior project requirement in the GSIS program. It is only available to students with junior or senior standing. It 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 ones intelligence station, among stations, and between ones 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 todays era of globalization. Pre-Requisite: Senior Standing.

**Prerequisites:** SIS 210 , and SIS 315.

**SIS 416 Middle Eastern Comparative Law 3 Hours**

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 , and SS 320.

**SIS 418 Islam: Origins, History, and Role in the Modern World 3 Hours**

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 Quran (Koran), the early history and territorial expansion of the Umayyads, the glories of the Abbasids, the major sectarian splits (Sunni, Shia, 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-Qaida), and jihadi movements in Afghanistan, the Balkans, the Caucasus, the Philippines, and Kashmir.

**Prerequisites:** SS 110 , or LCH 400.

**SIS 420 Aviation Security and Technology 3 Hours**

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.

**SIS 421 History and Philosophy of Law/Jurisprudence 3 Hours**

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 , and SS 320.

**SIS 422 Homeland Security and Technology 3 Hours**

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.

**Prerequisites:** SIS 315.

**SIS 425 Information Protection and Computer Security 3 Hours**

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. governments 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.

**Prerequisites:** IT 109.

**SIS 426 Physical Security and Facility Design 3 Hours**

This course will focus on understanding and applying physical security concepts and principles to protect people, information, and facilities against criminal activities and terrorist attacks. The students will learn the basic security concepts underlying such protective activities, the types of physical security measures and equipment that may be employed, and their effectiveness in terms of threat mitigation and cost. The students will become familiar with integrating security into the facility planning process, blueprint reading, and equipment selection based on threat assessment and facility use. Student teams will review building designs for security effectiveness and conduct security audits of existing buildings. The teams will also be responsible for physical security measures and equipment to be chosen in designing for retrofitting a major government or private facility. This project will include evaluating the security needs based on the facility's proposed operations, personnel staffing, and assets, including the development of a capital budget.

**SIS 430 Emergency Management and Contingency Planning 3 Hours**

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 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 440 Security Operations Management Practicum 3 Hours**

This course will draw on the knowledge and skill sets that the student has obtained throughout their course study in security operations through practicum based role-play and security scenarios. The students will act as Program Security Officers, Information System Security Officers, and Facility Security Officers (National Industrial Security Program). The students will practice performing government clearance procedures for personnel and facilities including prescreening applicants, using government databases, and briefing and debriefing government and contractor employees. The students will also role-play interaction with a variety of day-to-day personnel security issues, involving security inspection audit deficiencies and corrections, security violation investigations, and classified information loss or authorized disclosure.

**SIS 470 Senior Cooperative Internship 3 Hours**

This course is one of three options that students may choose in order to complete their senior project requirement in the GSIS Program. This course is only available to students with junior or senior standing and with the prior approval of either the Department or Program Chair. This course is designed to permit the student to use the security and intelligence knowledge gained throughout the program in a related professional environment while sharpening their research and analytical skills. The sponsoring organization will independently evaluate the students work skills and on-the-job performance. The student is also required to demonstrate their research and analytical skills by identifying a problem or issue related to the sponsoring organizations responsibilities or functions, analyzing the various solutions, determining the most effective solution and detailing the results of their analysis in a major research paper. The students faculty sponsor will review and evaluate the students research project and the results of both evaluations will be combined to arrive at a final course grade. Pre-Requisite: Junior Standing.

**SIS 475 Senior Thesis 3 Hours**

This course is one of three options that students may 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. It 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. Pre-Requisite: Senior Standing.

**SIS 499 Special Topics in Global Security and Intelligence Studies 1-3 Hour**

Individual independent or directed studies of selected topics in Global Security and Intelligence Studies related topics.

## Social Science (SS)

### Courses

**SS 110 World History 3 Hours**

This course is primarily a survey of the development and evolution of World Civilization from 1500 to the present. Emphasis is placed on the effect of Western influence on the world.

**SS 120 U.S. History 3 Hours**

This course is a survey of the United States history from the conclusion of the Civil War in 1865 to the present. Reconstruction, the age of big business, the United States as a world power, The Great Depression, World War II, The Cold War, Civil Rights, Vietnam, and its aftermath.

**SS 130 History of Aviation in America 3 Hours**

A survey of the history of America in the 20th century, emphasizing the explosive growth of aviation as a major influence on the economic, military, and societal development of the United States.

**SS 199 Special Topics in Social Science 1-6 Hour**

Individual independent or directed study of selected topics in the areas of history, sociology, psychology, and human culture in general.

**SS 204 Introduction to Geography 3 Hours**

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 Hours**

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 Hours**

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.

**SS 290 History of Modern Europe 3 Hours**

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 299 Special Topics in Social Science 1-6 Hour**

Individual independent or directed study of selected topics in the areas of history, sociology, psychology, and human culture in general.

**SS 302 Evolution of Scientific Thought 3 Hours**

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:** HU 140 , or HU 141 , or HU 142 , or HU 143 , or HU 144 , or HU 145 , or HU 146 , and PS 101 , or PS 102 , or PS 103 , or PS 150 , and PS 215.

**SS 310 Personality Development 3 Hours**

A survey of selected theories of human nature and functioning from the beginning of modern psychology to present developments, including psychodynamic, cognitive, behavioral, biological, humanistic, and other types. Various concepts of personality and the associated methodologies for gathering and validating knowledge are explored. Theories are applied to normal issues in personal, professional, and relational life, and theory-related skills are taught for self-awareness, problem solving, habit change, and emotional and interpersonal competence.

**Prerequisites:** PSY 101.

**SS 311 U.S Military History 1775-1900 3 Hours**

Military history with an emphasis on military policy, organization and technology as they relate to political, social and economic developments from 1775 to the present.

**Prerequisites:** SS 110 , or SS 120.

**SS 320 Government of the U.S. 3 Hours**

An introduction of basic issues of democracy in the U.S., constitutional principles and the executive, legislative and judicial branches of government.

**Prerequisites:** SS 110.

**SS 321 U.S. Military History 1900-Present 3 Hours**

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.

**Prerequisites:** SS 120.

**SS 324 Topics in U.S. History 3 Hours**

Specific problems, issues, crises and developments in U.S. History and their political, economic and social causes and impacts. Course topics vary according to instructor and are subject to approval by the department chair. May be repeated for credit when topics change.

**Prerequisites:** SS 110 , or SS 120 , or SS 130.

**SS 326 Russian-U.S. Relations 3 Hours**

This course explores the development of Russian-American economic and political relations, emphasizing the era of the 20th century.

**Prerequisites:** SS 110 , or SS 120.

**SS 327 International Relations 3 Hours**

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.

**Prerequisites:** SS 110.

**SS 331 Current Issues in America 3 Hours**

A course in selected political-economic issues of national and international importance. Extensive use of journals, magazines, and newspapers to supplement lectures and discussions.

**Prerequisites:** SS 110 , or SS 120.

**SS 333 U.S. - Asian Relations 3 Hours**

This course explores the development of U.S.-Asian political, cultural, and economic relations, from their beginning in the 19th century to the present. The course will examine America's domestic motivations for expanding into the Pacific, the various impacts that the United States has had on Asian nations, and Asia's collaboration with and resistance to the American presence.

**Prerequisites:** SS 110 , or SS 120.

**SS 336 The Modern Middle East in World Affairs 3 Hours**

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.

**Prerequisites:** SS 110 , or SS 120.

**SS 340 U.S. Foreign Policy 3 Hours**

A survey of the evolution of present American foreign policy, stressing the factors that affect and shape this policy. Attention is given to current governmental offices, agencies, and departments, as well as the role each plays in policy formulation. Emphasis is on the period since World War II.

**PC Prerequisites:** SS 110 , or SS 120.

**SS 360 Environmental Law 3 Hours**

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.

**Prerequisites:** AES 142.

**SS 363 Inter-American Relations 3 Hours**

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.

**Prerequisites:** SS 327 , or SS 340.

**SS 399 Special Topics in Social Science 1-6 Hour**

Individual independent or directed study of selected topics in the areas of history, sociology, psychology, and human culture in general.

**SS 410 International Human Rights 3 Hours**

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.

**Prerequisites:** SIS 200.

**SS 499 Special Topics in Social Science 1-6 Hour**

Individual independent or directed study of selected topics in the areas of history, sociology, psychology, and human culture in general.

## Spanish (LSP)

### Courses

#### **LSP 101 Spanish I 3 Hours**

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 Hours**

A continuation of LSP 101.

#### **LSP 199 Special Topics in the Spanish Language 1-3 Hour**

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

#### **LSP 201 Spanish III 3 Hours**

A continuation of LSP 102.

#### **LSP 202 Spanish IV 3 Hours**

A continuation of LSP 201. Students will enhance their speaking skills, learn advanced forms of grammar, and begin reading and formal writing.

#### **LSP 299 Special Topics in the Spanish Language 1-3 Hour**

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

#### **LSP 399 Special Topics in Spanish Language 1-6 Hour**

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

#### **LSP 499 Special Topics in Spanish Language 1-6 Hour**

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

## University Student Success (UNIV)

### Courses

#### **UNIV 101 College Success 1 Hour**

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 Hour**

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.

## Weather (WX)

### Courses

#### **WX 201 Survey of Meteorology 3 Hours**

This is a survey course in atmospheric science that 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.

#### **WX 202 Current Weather Discussion 1 Hour**

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.

**Prerequisites:** WX 201, or WX 252.

#### **WX 210 Introduction to Geographic Information Systems 3 Hours**

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 Hours**

This course builds on CS 125 to include fundamentals of programming in IDL (Interactive Data Language), addressing a wide range of meteorological problem-solving, data analysis, and visualization techniques. Students will use a problem-solving approach for understanding IDL structures, procedures, and functions, with emphasis on scientific techniques and applications. The students will also receive a brief introduction to Fortran and C++.

**Prerequisites:** CS 125.

#### **WX 252 Introduction to Meteorology 3 Hours**

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 Hours**

This course is an in-depth survey of the varied climates of the world and of the impact of climate on aviation. Emphasis is placed on understanding energy exchange processes that control climate and in describing in detail how and why temperature, precipitation and wind vary during the year and in relation to geography. Included is a treatment of climate variability, including how and why climate is thought to have changed in the past, and how it might change in the future, and of the tools used to understand this variability.

**Prerequisites:** WX 201 , or WX 252.

**WX 270 Weather Information Systems 3 Hours**

This course provides an introduction to the various weather-sensing equipment and the systems that deliver weather information to various users. The development of various sensing devices will be explored and current instrumentation technology explained. The course will provide an overview of how various instruments make measurements, the physical principles involved in the measurements, the limitations of the measurements, and how these data are used in weather operations and forecasts. The use of these measurements will be illustrated in class weather briefings, labs, and homework assignments. Students will be required to design, build, calibrate, and take data with a weather instrument.

**Prerequisites:** WX 201 , or WX 252.

**WX 299 Special Topics in Applied Meteorology 1-6 Hour**

Individual independent or directed studies of selected topics in applied meteorology.

**WX 301 Aviation Weather 3 Hours**

The course is an expansion of WX 201 Survey of Meteorology with a focus on aviation weather hazards, including convective hazards (thunderstorms, hail, high winds), non-convective weather hazards (fog, icing, turbulence, wind shear, winter weather), and special weather hazards (volcanic ash and space weather). Meteorological concepts such as pressure, atmospheric forces, thickness, thermal wind, fronts, jet streams, cyclone formation, and atmospheric stability are expanded and applied to aviation operations. Emphasis is on navigating today's online environment for obtaining and analyzing real-time surface observations, upper-air observations, satellite data, and radar data, as well as both primary and supplementary aviation weather products. Lab exercises and projects complement the lectures through use of current and historic weather examples to provide practical experience in making informed weather-sensitive decisions.

**Prerequisites:** WX 201 , or WX 252.

**WX 321 Atmospheric Environmental Studies 3 Hours**

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 source of air pollution especially from the aerospace industries. Includes discussions of monitoring, regulations, and control of air pollution.

**Prerequisites:** AES 142.

**WX 322 Space Weather 3 Hours**

This course is an introduction to the Sun-Earth relationship and focused on understanding its societal and technological impacts. With the continued growth of the satellite communications industry and our growing dependence on wireless communication and instant access to global information, we are becoming more and more susceptible to problems caused by space weather. The course provides the students with understanding of the key concepts of radiation and convection, solar structure, the heliosphere: the corona and the solar wind, the interplanetary magnetic field, cosmic rays, Earth's space environment and upper atmosphere, the technological impacts of space storms, the perils of living in space, the impact of space weather on climate variability, and will discuss other space weather phenomena. The students will investigate several case studies of space weather storms and how they can damage or destroy orbiting satellites, injure or kill astronauts, degrade or blackout certain radio and navigation communications, and cause regional power failures by destroying critical components of electrical power grids.

**Prerequisites:** PS 150.

**WX 353 Thermodynamics of the Atmosphere 3 Hours**

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:** WX 201 , or WX 252.

**WX 354 Dynamics of the Atmosphere 3 Hours**

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:** WX 201 , or WX 252 , and WX 353.

**WX 355 Weather Analysis 5 Hours**

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 geo-potential 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.

**Prerequisites:** WX 354.

**WX 363 Thunderstorms 3 Hours**

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.

**Prerequisites:** WX 301 , or WX 353 , or WX 252.

**WX 364 Weather for Aircrews 3 Hours**

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.

**Prerequisites:** WX 252 , or WX 301.

**WX 365 Satellite and Radar Weather Interpretation 3 Hours**

A practical introduction to meteorological interpretation of satellite and weather radar imagery. This course surveys the basic physics of electromagnetic (EM) radiation and shows how characteristics of the EM spectrum are exploited in passive (satellite) and active (radar) remote sensing to create digital images of geophysical information. The theory of radar signal propagation and precipitation estimation is applied to the meteorological interpretation of radar imagery and supplemented with practical analysis of various radar product types. Weather satellite image types, including visible, conventional infrared, and water vapor channels and their meteorological applications, are examined. Real-time satellite identification of meteorological phenomena will be emphasized, including mountain waves, mid-latitude 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.

**Prerequisites:** WX 252 , or WX 301 , or WX 353.

**WX 390 Atmospheric Physics 3 Hours**

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:** WX 353 , and PS 105 , and MA 112 , or MA 242.

**WX 399 Special Topics in Applied Meteorology 1-6 Hour**

Individual independent or directed studies of selected topics in applied meteorology.

**WX 420 Advanced Atmospheric Thermodynamics 3 Hours**

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 , and MA 242 , and WX 353.

**WX 427 Forecasting Techniques 3 Hours**

An advanced course in meteorology that includes applications to a variety of forecast problems, from large-scale, multi-day traditional forecasting, to short-term, tailored forecasts for weather-sensitive operations. The course is basically divided into two parts: 1) a study of the various phases of the forecasting process, and 2) a look at weather forecasting from a business process point of view. The first part of the course examines meteorological collection platforms and how they are evolving, the importance of data assimilation in operational numerical analysis and forecast systems, characteristics of numerical models run at the National Centers for Environmental Prediction, model post-processing (including an introduction to Model Output Statistics), and product tailoring for different user communities. A set of city pair forecast exercises allows the students to apply the knowledge gained during this segment before moving on to the second portion of the course. In the second part of the course, the students are introduced to weather forecasting from the business process perspective. This part of the course examines the relationship between the provider of meteorological information and the user of that information. Within the provider-user relationship, we explore concepts such as the provider's knowledge of meteorology and the users operation, the user's knowledge of meteorology, how weather/climate impacts his/her operations, and his/her understanding of the provider's capabilities. These principles are used to illustrate how different types of users (e.g., general public, business, the military) employ tailored weather forecast products and integrate them into their decision-making processes. The exercises introduced here give the students, now working in teams, experience in preparing different types of forecasts, varying from synoptic-scale, national forecasts, to local forecasts for a hypothetical weather-sensitive customer. The capstone for this portion of the course is a visit to the 45th Weather Squadron at Cape Canaveral Air Force Station to get a first-hand look at weather operations there, and how their tailored weather decision guidance is integrated into the decision-making process for space launches.

**Prerequisites:** WX 353 , and WX 354 , and WX 355 , and WX 363 , and WX 365.

**WX 457 Weather Operations Seminar 3 Hours**

This course synthesizes previous knowledge by examining methodologies employed by decision makers in weather forecasting, military operations, flight planning operations, research and other career areas. The student will apply these methodologies to real-time or pre-programmed scenarios, or survey their use by means of visiting speakers and field trips. Students will prepare for future careers in weather operations or research by either designing support for an industry customer or completing a research project under a faculty mentor. In both cases, the student will acquire and analyze data and evaluate the significance of weather impact variables. Effective written and oral communication skills will be emphasized throughout.

**Prerequisites:** WX 355.

**WX 490 Advanced Dynamic Meteorology I 3 Hours**

This is the first course in atmospheric dynamics that uses calculus. The focus of this course is on the full development of the momentum equation on a rotating earth and the subsequent applications of this equation to atmospheric flows. Applications will include the concepts of geostrophic balance and the geostrophic wind, gradient balance and the gradient wind, hydrostatic balance, the hypsometric equation, and thermal wind balance. Synoptic examples will be examined to illustrate these concepts.

**Prerequisites:** MA 243 , and WX 354 , and WX 420.

**WX 491 Advanced Dynamic Meteorology II 3 Hours**

This is the second course in atmospheric dynamics that uses calculus. The dynamical set of equations and expressions that govern atmospheric phenomenon will be developed and applied. These equations and expressions will include the primitive set of equations, a kinematic description of the atmosphere, the absolute and barotropic vorticity equation, and the quasi-geostrophic set of equations. Applications will include the use of these equations to better understand Rossby wave dynamics and the cyclogenesis process.

**Prerequisites:** WX 490.

**WX 499 Special Topics in Applied Meteorology 1-6 Hour**

Individual independent or directed studies of selected topics in applied meteorology.

# Graduate Courses

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The following courses are not necessarily offered every term, nor are they necessarily offered at all campus locations.

## Business Administration (BA)

### Courses

#### **BA 655 Aviation Law and Insurance 3 Hours**

Examination of the governmental regulatory functions affecting statutory and administrative law pertaining to aviation. The national and international impact of these laws on aviation policies and operations are studied. The legal aspects of business contracts, negotiable instruments, and commercial codes as they relate to aviation are analyzed. The course concludes with an overview of the principles of insurance and risk applied to aviation.

## Master Aeronautical Science (MSA)

### Courses

#### **MSA 602 The Air Transportation System 3 Hours**

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.

#### **MSA 613 Airport Operations Safety 3 Hours**

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.

#### **MSA 654 Adult Teaching and Learning Techniques 3 Hours**

The major instructional strategies used in education with particular emphasis on higher education and adult learning are the core of this course. Multiple approaches as they relate to academic disciplines and grade levels are studied. The unique "flight deck cockpit classroom" environment will be discussed and evaluated.

# Faculty and Administration

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## Legend

Letter designations for aviation qualifications are as follows:

A	Airplane
C	Commercial Pilot
G	Glider
H	Helicopter
I	Instrument
L	Land
P	Private Pilot
S	Seaplane
AD	Aircraft Dispatcher
IA	Inspection Authorization
ME	Multi-Engine
SE	Single-Engine
A&P	Airframe and Powerplant Maintenance Technician
AGI	Advanced Ground Instructor
ATP	Airline Transport Pilot
BGI	Basic Ground Instructor
CFI	Certified Flight Instructor
CTO	Control Tower Operations
DME	Designated Mechanic Examiner
DWE	Designated Written Examiner
HTA	Heavier Than Air
IGI	Instrument Ground Instructor
LTA	Lighter Than Air
SME	Single- and Multi-Engine
FCC	Federal Communication Commission
FE	Flight Engineer
AC	Advanced Graduate Credit



# Contact Us

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# Index

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## A

About the University .....	3
Academic Regulations and Procedures .....	18
Academic Standing - Graduate .....	29
Academic Standing - Undergraduate .....	24
Accreditations and Affiliations .....	5
Admissions .....	10
Aeronautical Science (AS) .....	117
Aeronautical Studies .....	110
Aerospace Engineering .....	110
Aerospace Engineering (AE) .....	121
Air Force .....	46
Air Force Aerospace Studies (AF) .....	123
Air Traffic Control .....	110
Air Traffic Management (AT) .....	124
Aircraft Dispatcher Certification .....	93
Applied Meteorology .....	111
Arabic (LAR) .....	125
Arabic and Middle Eastern Studies .....	111
Army .....	47
Asian Studies .....	111
Athletics .....	44
Aviation Environmental Science (AES) .....	126
Aviation Safety .....	111

## B

B.S. in Aeronautical Science .....	74
B.S. in Aeronautics .....	80
B.S. in Aerospace Engineering .....	96
B.S. in Air Traffic Management .....	82
B.S. in Applied Meteorology .....	84
B.S. in Astronomy .....	54
B.S. in Aviation Business Administration .....	56
B.S. in Aviation Environmental Science .....	59
B.S. in Computer Engineering .....	99
B.S. in Cyber Intelligence and Security .....	61
B.S. in Electrical Engineering .....	101

B.S. in Global Security and Intelligence Studies .....	63
B.S. in Interdisciplinary Studies .....	69
B.S. in Mechanical Engineering .....	103
B.S. in Safety Science .....	86
B.S. in Software Engineering .....	107
B.S. in Space Physics .....	71
B.S./M.S. in Safety Science .....	88
Board of Trustees .....	172
Business Administration .....	112
Business Administration (BA) .....	127
Business Administration (BA) .....	170

## C

Calendar .....	8
Campus Academic Administration .....	175
Campus Staff Administration .....	174
Chinese (LCH) .....	129
College of Arts and Sciences .....	53
College of Arts and Sciences .....	176
College of Aviation .....	73
College of Aviation .....	178
College of Engineering .....	94
College of Engineering .....	179
Communication (COM) .....	131
Computer Engineering (CEC) .....	133
Computer Science .....	112
Computer Science (CS) .....	134
Computer Security .....	112
Contact Us .....	182
Cyber Intelligence and Security (CI) .....	135

## D

Degrees and Programs .....	50
----------------------------	----

## E

Eagle Card .....	42
Economics (EC) .....	136
Electrical Engineering .....	112
Electrical Engineering (EE) .....	137
Embry-Riddle at a Glance .....	6
Embry-Riddle's History .....	4

Emeriti .....	180	Mathematics .....	115
Engineering (EGR) .....	138	Mathematics (MA) .....	146
Engineering Physics (EP) .....	138	Mechanical Engineering .....	115
Engineering Science .....	112	Mechanical Engineering (ME) .....	147
Engineering Science (ES) .....	139	Message from the President .....	4
Environmental Studies .....	113	Military Science Army ROTC (MSL) .....	151
<b>F</b>		Minor Courses of Study .....	109
Faculty and Administration .....	171	Mission of the University .....	4
Financial Assistance .....	33	<b>N</b>	
Financial Information .....	31	Naval .....	48
Flight .....	21	<b>O</b>	
Flight (Fixed Wing) .....	113	Our Student Philosophy .....	7
Flight Airplane (FA) .....	140	<b>P</b>	
Flight Helicopter (FH) .....	142	Physical Science (PS) .....	152
<b>G</b>		Program Specific Criteria .....	17
Graduate .....	15	Psychology .....	115
Graduate Courses .....	170	Psychology (PSY) .....	156
Graduate Regulations and Procedures .....	26	<b>R</b>	
Graduate Requirements .....	51	Regional Studies (RS) .....	156
Graduation Requirements and Honors - Graduate .....	29	Residence Life and Dining .....	43
Graduation Requirements and Honors - Undergraduate .....	26	Robotics .....	115
<b>H</b>		ROTC .....	46
Health and Wellbeing .....	41	<b>S</b>	
Helicopter Flight .....	113	Safety Science (SF) .....	157
Helicopter Operations and Safety .....	114	Security and Intelligence Studies .....	116
Honors (HON) .....	143	Security and Intelligence Studies (SIS) .....	159
Humanities .....	114	Social Science (SS) .....	164
Humanities (HU) .....	143	Spanish (LSP) .....	166
<b>I</b>		Special Opportunities .....	46
Information Technology (IT) .....	146	Student Grievance Procedure .....	25
Interdisciplinary Studies (IS) .....	146	Student Life and Services .....	36
International Applicants - Graduate .....	16	Student Services .....	39
International Applicants - Undergraduate .....	13	Systems Engineering .....	109
<b>L</b>		<b>T</b>	
Legend .....	181	Technical Intelligence .....	116
<b>M</b>		Tobacco and Drug Policy .....	20
Mandarin Chinese .....	114	Tuition and Fees .....	31
Master Aeronautical Science (MSA) .....	170	<b>U</b>	
Master of Science in Safety Science .....	90	Undergraduate .....	10

Undergraduate Courses .....	117
Undergraduate Regulations and Procedures .....	22
Undergraduate Requirements .....	50
University Administration .....	173
University Student Success (UNIV) .....	166
Unmanned Aircraft Systems .....	116
<b>W</b>	
Weather (WX) .....	166