

2008-2009 catalog  
united states air force academy



# table of contents

<b>Admissions</b> .....	<b>1</b>	Meeting the Challenge .....	32
Academic Preparation .....	2	Professional Development .....	32
Eligibility .....	3	Cadet Commanders' Leadership Enrichment Seminar	33
Leadership Preparation .....	3	The Chain of Command .....	33
Physical Preparation .....	3	Aviation and Airmanship Programs .....	34
Definition of Terms .....	3		
Application Process .....	4	<b>Center for Character Development</b> .....	<b>41</b>
Nomination Categories .....	4	Academy Counseling Center .....	44
Class Profile .....	6		
Appointee Requirements .....	10	<b>Academics</b> .....	<b>45</b>
Early Notification .....	10	Semester Schedule .....	46
Late Selections .....	10	Grading .....	46
Regular Selections .....	10	Cadet Achievement .....	47
Selection Procedures .....	10	Post-Graduate Education Opportunities .....	47
Discharge Policy .....	11	Career Opportunities .....	47
Service Obligations .....	11	Enrichment .....	47
Admissions Liaison Officers (ALO) .....	12	Exchange Programs .....	49
Resignation Policy .....	12	Study Abroad .....	49
		Degree Paths .....	49
<b>Cadet Life</b> .....	<b>13</b>	Graduation Requirements .....	49
Cadet Schedule .....	14	Accreditation .....	49
Leaves and Passes .....	14	Instructional Methods .....	49
Recreation .....	15	Directorate of Education .....	50
Extracurricular Activities .....	15	Office of the Registrar .....	50
Sponsor Program .....	16	Visual Services .....	50
Counseling and Advising .....	16	Classrooms and Laboratories .....	50
Religious Activities .....	17	Computers .....	51
Legal Service .....	17	McDermott Library .....	51
Cadet Benefits .....	17	Deficiency and Disenrollment .....	51
Medical Care .....	18	The Faculty .....	52
Cadet Uniforms .....	18	Divisional and Disciplinary Majors Outlined .....	52
Graduation Week .....	18		
Life After the Academy .....	18	<b>Faculty</b> .....	<b>151</b>
Your Future in the Air Force/Careers .....	19		
		<b>Physical Education &amp; Fitness</b> .....	<b>153</b>
<b>The Academy Preparatory School</b> .....	<b>23</b>	Physical Education Curriculum .....	157
Academics .....	24	Intramural Program .....	158
Character Development .....	25	Facilities .....	161
Military Training .....	25		
Athletics .....	25	<b>Appendix</b> .....	<b>165</b>
Admission .....	26	Vision Requirements .....	166
Eligibility Requirements .....	26	Medical Standards .....	167
		Potential Pilot and Navigator .....	167
<b>Scholarship Opportunities</b> .....	<b>27</b>	Commission .....	167
Falcon Foundation .....	28	Candidate Fitness Assessment .....	169
Henry H. Arnold Educational Fund .....	28		
		<b>Questions &amp; Answers</b> .....	<b>171</b>
<b>Professional Military Education</b> .....	<b>29</b>	<b>Who Can I Call?</b> .....	<b>185</b>
Arrival .....	30	<b>How Do I get There?</b> .....	<b>187</b>
Oath .....	30		
Basic Cadet Training .....	31		
Field Day .....	31		
BCT in Jacks Valley .....	31		
Acceptance Parade .....	31		

## lieutenant general john f. regni Superintendent



Lieutenant General Regni is a 1973 graduate of the U.S. Air Force Academy, where he earned a Bachelor of Science degree in Biology. He earned a Master's Degree in Systems Management in 1981 from Saint Mary's University in San Antonio, Texas. General Regni completed Air Command and Staff College in 1984, and Air War College in 1990, both at Maxwell Air Force Base, Alabama. The general attended the Advanced Management Program at the University of Illinois in 1983, and the Capstone, National Defense University at Fort Lesley J. McNair in Washington, D.C. in 1997. General Regni's career has encompassed a wide range of personnel, training and command assignments. His command tours include Base Commander and 8th Combat Support Group Commander, Kunsan Air Base, South Korea; Commander, Second Air Force; and Commander, Air University. Among his staff assignments are Director of Manpower, Personnel and Support, U.S. Pacific Command; Director of Personnel at Air Mobility Command; and Director of Military Personnel

Policy, Headquarters U.S. Air Force. He also served on the Reserve Forces Policy Board from 1996 to 1998. His most recent assignment was Commander, Air University, Maxwell Air Force Base, Alabama. General Regni's decorations include the Distinguished Service Medal with oak leaf cluster, the Defense Superior Service Medal, the Legion of Merit, the Meritorious Service Medal with silver oak leaf cluster and the Air Force Commendation Medal. General Regni became the seventeenth Superintendent of the Air Force Academy on October 24, 2005.

*"The Air Force Academy is a challenging environment by design. Our mission is to inspire and develop outstanding young men and women to become Air Force officers with knowledge, character and discipline; motivated to lead the world's greatest aerospace force in service to the nation. This website describes many of the ways we accomplish that mission. Academics, athletics, professional military training, and social activities play a big part. But the most important part of our program is the individual cadet's commitment to hard work, individual and team excellence, development of leadership skills, unquestioned integrity, and strong character. The demands are tough, the rewards are many, and successful completion means becoming an officer in the world's most respected aerospace force!"*

# admissions



The Air Force Academy is one of the most selective colleges in the country. Start preparing now—junior high school is not too soon to meet the high admission requirements, intense competition for appointments, and the demands you'll face at the Academy. It takes a well-rounded program of academic, physical, and leadership preparation to meet the challenge. In addition, you need dedication, a desire to serve others, the ability to accept discipline, and a sense of duty. Home schooled students are as competitive for appointment as any other student—academic, athletic, and leadership potential are evaluated just as any other applicant. Make your own decision to attend the Academy. Don't let parents or friends make it for you. You will be the one facing the challenges. If you enjoy responsibility, welcome new experiences and opportunities, and like to excel and lead others, you have the attributes to become a successful cadet and Air Force officer.

## colonel chevalier p. cleaves

### Director of Admissions



As Director of Admissions, Colonel Cleaves is responsible for recruiting the nation's finest young men and women for entrance into the United States Air Force Academy. To accomplish this mission, Colonel Cleaves leads a 60 person permanent staff and an Admissions Liaison Officer Program of nearly 1,700 Reserve and active duty Air Force officers. Colonel Cleaves is a 1985 Graduate with Military Distinction from The United States Air Force Academy. He earned a master's degree from Webster University in Human Resource Development as a Distinguished Graduate in 1994. Colonel Cleaves earned a second master's degree in Joint Campaign Planning and Strategy upon graduation from the National Defense University's first Joint Advanced Warfighting School in 2005. He is also a graduate of Air Command and Staff College and a Distinguished Graduate of Squadron Officers School. A command pilot with over 2,600 flying hours (160 combat/combat support), Colonel Cleaves has served at Joint Staff, Air Staff,

Numbered Air Force, and Wing levels including assignments at McConnell AFB, Kansas, Whiteman AFB, Missouri, the Pentagon, and an overseas tour in England. He has served as KC-135 squadron commander, Instructor Pilot and Assistant Operations Officer, UPT T-38 Flight Commander, and Chief B-1 Companion Trainer Program. Colonel Cleaves' decorations include the Defense Superior Service Medal, Meritorious Service Medal with six oak-leaf clusters, the Air Medal, Air Force Commendation Medal with oak leaf cluster and the Air Force Achievement Medal. Prior to returning to the United States Air Force Academy Colonel Cleaves was Chief, Program Support Division, The Joint Staff/J3 at the Pentagon. Colonel Cleaves was appointed Director of Admissions in September 2007.

*"The Air Force Academy is one of the most selective colleges in America. We seek young men and women who have the qualities and genuine motivation to succeed in a very challenging environment and whose primary goal is to serve our nation as Air Force officers and warriors. The competition for an appointment is extremely high. You must have a proven record of achievement in leadership, academics, athletics, extracurricular activities and be of high moral character. This catalog clearly describes what you need to do and when to do it, the key is starting early. Our professional staff and Admissions Liaison Officers will guide you through each step. For those who are accepted, there are endless opportunities and challenges that wait with a wonderful future in the world's premier air, space, and cyberspace force, and in service as leaders of character for our Nation."*

## academic preparation

A college preparatory education in high school provides the best background for the Academy's academic challenges. We strongly recommend you take four years of English, including a college preparatory course in writing; four years of math, with a strong background in algebra, trigonometry, and analytic geometry; four years of lab science; three years of social studies; and two years of foreign language. A computer course is also helpful. Strive for the best grades possible. Also, develop effective study habits and efficient time management. Because the ACT or SAT tests are an important indicator of your academic ability, you should plan to take them early. Each of these tests has a slightly different emphasis, so you should take both to reflect your true potential. You may take these tests several times to try to improve your scores. Your highest scores will be accepted. You must have the results in our records to be considered for an appointment. When you register for the tests, request your scores be sent to the Air Force Academy. The SAT code for the Academy is 4830 and the ACT code is 0530. See your guidance counselor, Air Force Admissions Liaison Officer, or base education officer for registration procedures and test dates.

## leadership preparation

Earn leadership positions in a few selected activities rather than being a member of many. Both your athletic and nonathletic activities indicate your leadership potential, but quality of involvement means more than quantity of activities.

## physical preparation

At the Academy, cadets literally hit the ground running. You'll take the Candidate Fitness Assessment (CFA) during the admissions process and a Physical Fitness Test (PFT) each semester while at the Academy. To meet the physical demands of Academy life, develop your fitness by participating in individual and team sports or an individual fitness program. Upper body strength, running speed, and endurance should be your objectives. Keep in mind, the Academy's high altitude makes cardiovascular preparation a must. You'll take aquatic classes while at the Academy. If you don't already know how to swim, you should learn.

## definitions of terms

<b>Precandidate</b>	A student interested in attending the Air Force Academy who has completed the application/precandidate questionnaire.
<b>Tentative Candidate</b>	A precandidate who appears to have the potential to be a qualified candidate, based upon self-reported information.
<b>Nomination</b>	The selection of a precandidate as an official candidate for admission to the Academy by a legal nominating authority.
<b>Candidate</b>	A precandidate who has a nomination in an authorized category (also referred to as a nominee).
<b>Principal Nominee</b>	A nominee whom the member of Congress ranks as first choice for an authorized vacancy.
<b>Qualified Candidate</b>	A candidate who has met all admission requirements.
<b>Appointment</b>	An offer of admission to a candidate.
<b>Appointee</b>	A competitive candidate who has been offered an appointment to the Academy.
<b>Qualified Alternate</b>	A competitive candidate not chosen to fill any specific nomination category but placed in a nationwide pool from which additional appointments are made to fill the entering class.
<b>Cadet</b>	An appointee who has been admitted to the Academy and has taken the oath of allegiance.

## eligibility

To be eligible for appointment consideration, you must:

- be at least 17 years old by July 1 of the year you enter the Academy,
- not have passed your 23rd birthday on July 1 of the year you enter the Academy,
- be a U.S. citizen (international students authorized admission are exempt from the U.S. citizenship requirement),
- be of high moral character,
- meet high leadership, academic, physical and medical standards, and
- be unmarried, with no dependents.

## application process

Complete a precandidate questionnaire from the Admissions website, [academyadmissions.com](http://academyadmissions.com), after 1 March of your junior year but not later than 31 January of the year you wish to enter. Apply as soon as possible so we can evaluate your qualifications, schedule you for a physical exam and provide information to members of Congress on your potential as a nominee. If you need assistance, ask your high school guidance counselor for the name of the nearest Air Force Admissions Liaison Officer.

## nomination categories

The laws governing our appointments require that you have a nomination to attend the Academy. Since the nomination process is lengthy, you should seek a nomination at the same time you return your questionnaire (see the following information regarding congressional deadlines). To increase your chances of being selected, you should apply for a nomination from your U.S. Representative, your two U.S. Senators and the Vice President.

Each member of Congress and the Vice President may have five cadets at the Air Force Academy at any one time. They may nominate up to ten candidates for each vacancy. Vacancies occur when cadets graduate or leave prior to graduation. You also may be eligible for a nomination in one or more of the military-affiliated categories. Use the sample formats included in this section to prepare your requests for nomination. If you are from Puerto Rico, you should seek a nomination from the Governor of Puerto Rico and the Resident Commissioner. If you are from the Commonwealth of the Northern Mariana Islands, write to the Resident Representative.

If you are from the District of Columbia, Guam, the U.S. Virgin Islands, or American Samoa, you should seek nomination from your appropriate delegate in the House of Representatives.

### **Congressional**

This is the primary nomination source for most candidates.

Apply to both your U.S. senators and your U.S. Representative. You must legally reside in the state and congressional district to which you apply, but you need not know the members of Congress personally. Each Congressional office has its own procedures and deadlines for accepting nomination requests, but all use a competitive method of selection.

To obtain the name of your senator visit [senate.gov](http://senate.gov) and for your representative, visit [house.gov](http://house.gov). You can then access each member's website for specifics on application procedures and deadlines, including which office you should contact.

No political affiliation is necessary to apply for a nomination. Members of Congress want to nominate outstanding individuals who are competitive for an appointment.

Each Senator and Representative has considerable latitude in awarding nominations; however, most are based upon some combination of academic achievement, leadership performance, and athletic participation. Most members of Congress do not accept requests for nominations after October, so you should contact them in the spring semester of your junior year.

### **Other Categories**

Several other authorities also nominate candidates. The Vice President of the United States nominates from the U.S. at large. The deadline for requesting a nomination in the Vice Presidential category is October 31.

You may address your request to:

Honorable (name of the Vice President)  
Vice President  
Dwight D. Eisenhower Executive Office Building  
Washington, DC 20501

For the Governor of Puerto Rico, address your request to:

Honorable (name of Governor)  
Governor of Puerto Rico  
La Fortaleza San Juan PR 00901

The Governor and Resident Commissioner of Puerto Rico are allowed to have six cadets cumulative at the Academy at any one time. The delegates in the House of Representatives are allowed the following number of cadets at the Academy at any one time.

The District of Columbia.....	5
Guam .....	3
The U.S. Virgin Islands .....	3
American Samoa .....	3
Commonwealth of the Northern Mariana Islands.....	1

Address your requests to the Resident Commissioner of Puerto Rico and the delegates in the House of Representatives from the District of Columbia, Guam, the U.S. Virgin Islands, American Samoa, and the Resident Representative of the Northern Mariana Islands to:

Honorable (name of appropriate Delegate, Commissioner or Resident Representative)  
House of Representatives  
Washington DC 20515

### **Military Affiliated**

To request a nomination in the Presidential, Children of Deceased or Disabled Veterans, Military or Civilian Personnel in a Missing Status, or Children of Medal of Honor recipients categories, follow the sample military-affiliated format included in this section. Mail the letter to the Admissions Office, HQ USAFA/RRS, 2304 Cadet Drive, Suite 2300, USAF Academy, CO 80840-5025. If you are eligible to apply in one of the other military-affiliated categories, follow the specific instructions for that category.

### **Presidential**

We may have up to 100 appointments in the Presidential category. This category is reserved for children of career military personnel. To qualify, the parent must meet one of the following criteria:

- be on active duty and have served continuously on active duty for at least eight years.
- have retired with pay or have been granted retired or retainer pay.
- children of reservists may also be eligible (see Section 12733 Title 10 U.S.C for details).
- for adopted children proceedings must have begun before the child's 15th birthday.
- have died after being retired with pay or being granted retired or retainer pay.

### **Children Of Deceased Or Disabled Veterans**

The child of a deceased or disabled member of the Armed Forces is eligible if the parent was killed or 100 percent disabled by wounds or injuries received or diseases contracted while in active service or from a pre-existing injury or disease aggravated by active service.

### **Children Of Military Or Civilian Personnel In Missing Status**

The child of a parent who is in "missing status" is eligible if the parent is a member of the armed services or a civilian employee in active government service who is officially carried or determined to be absent in a status of missing; missing in action; interred in a foreign country; captured, beleaguered, or besieged by a hostile force; or detained in a foreign country against his or her will.

### **Children Of Medal Of Honor Recipients**

The children of Medal of Honor recipients from any branch of the armed services may apply under this category.

### **Air Force Regular And Reserve Components**

Vacancies are available under this category for members of the Regular Air Force, Air Force Reserve and Air National Guard in accordance with Air Force directives available through any base education office. The application form (AF Form 1786) should be obtained through normal Air Force publications supply channels.

### **Air Force Reserve Officer Training Corps (ROTC) And Air Force Junior ROTC**

Five students may be nominated to the Academy every year from each college or university AFROTC detachment as well as honor graduates from each eligible honor high school with Air Force Junior ROTC. College or university students must submit their applications to the Professor of Aerospace Studies. High school students must submit their applications to the Aerospace Science Instructor.

**Honor Military And Naval Schools**

Any school designated by the Departments of the Army and Navy as an honor school with distinction may nominate five candidates from among its honor graduates. The eligible schools have applications for students.

**International Students**

International students from countries invited by the Department of Defense may request a nomination to the Academy through an appropriate official of their own government. The request should contain information about the applicant's potential for success at the Academy and should be made at least a year prior to the date of admission. The official's nomination should be received at the Academy by December 31.

International students who graduate from the Academy receive a Bachelor of Science degree; however, they are not commissioned in the United States Air Force. They go back to their country and serve in their military. The maximum number of international students at the Academy at any one time is 60.

**Air Force Academy Cadet Wing Appointments**

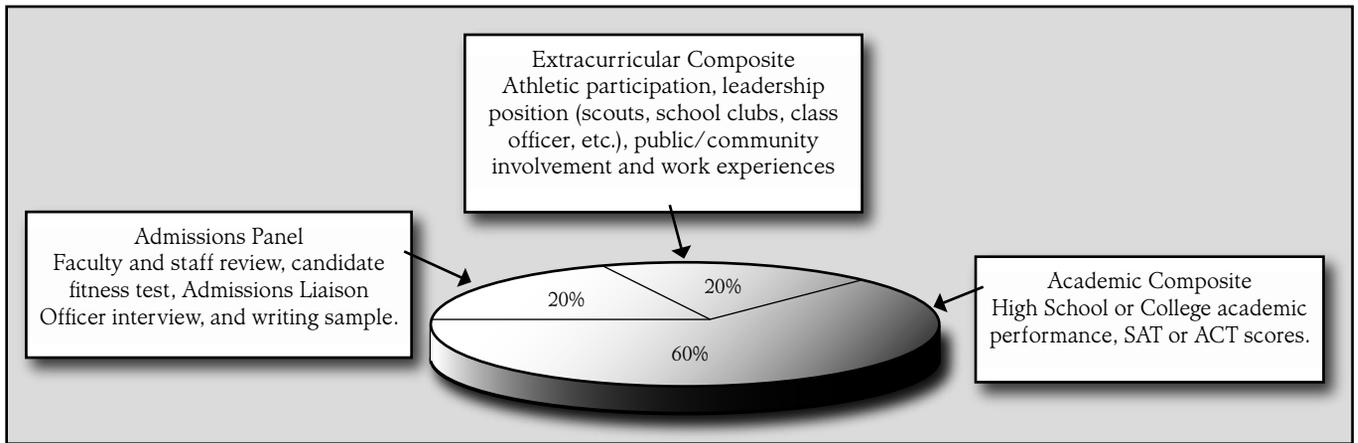
Current directives set the Air Force Academy's cadet strength at 4,000. The authorized appointments at maximum strength for each nomination category are shown in the following chart. Cumulative appointments are the total number available, of which approximately one-fourth will enter each year.

The other appointments are allotted annually.

.....	<b>Appointments Authorized</b>
<b>Nomination</b> .....	<b>(Cumulative)</b>
100 United States Senators (5 each) .....	500
435 United States Representatives (5 each) .....	2,175
Vice President .....	5
District of Columbia .....	5
Puerto Rico .....	6
American Samoa .....	3
Guam .....	3
Virgin Islands .....	3
Commonwealth of the Northern Mariana Islands .....	1
Children of Deceased or Disabled Veterans or Children of Persons in a Missing Status .....	65
International Students (Maximum allowed annually by law) .....	60
Presidential .....	100
Regular Components .....	85
Reserve Components .....	85
Honor Military and Naval Schools, AFROTC and AFJROTC .....	20
Children of Medal of Honor Recipients .....	No Limit
Qualified Alternates .....	Number needed to fill each class

profile of a typical cadet class

Valedictorian/Salutatorian .....	10%
President/Vice President of Class or Student Body ...	16%
Top 10% of High School Class .....	51%
Athletic Letter Award .....	80%
Boys/Girls State or Nation .....	21%
National Honor Society .....	64%
Boy/Girl Scouting (Includes Eagle Scouts) .....	42%



## candidate fitness assessment (cfa)

Events	Average (Men)	Average (Women)
Basketball Throw	69	41'
Cadence Pull-ups	11	3
OR Flexed Arm Hang (Women)	N/A	21 sec.
Shuttle Run	8.8 sec.	.9.8 sec.
Modified Sit-ups	80	78
Push-ups	61	40
One Mile Run	6:50	7:45

## academic data

Test	Mid 50% Range	Mean
ACT English	27-31	29
ACT Reading	28-32	30
ACT Math	28-32	30
ACT Science Reasoning	27-31	29
SAT Verbal Aptitude	590-660	629
SAT Math Aptitude	630-690	658

To be eligible to enter the Academy, you must be:

- a citizen of the United States
- unmarried with no dependents
- of good moral character
- at least 17, but less than 23 years of age by July 1st of the year you would enter

To be competitive for an Air Force Academy appointment, we recommend you complete the following high school courses at a minimum:

- 4 years of English
- 4 years of college-prep math
- 3 years of social studies
- 2 years of foreign languages
- 1 year of computer studies

Carefully consider the characteristics of dedication to duty, desire to serve others, ability to accept discipline, morality, and the enjoyment of challenge in deciding if you want to pursue an Air Force Academy education.

# format of request for congressional or vice presidential nomination

(This is intended as a guide. A separate letter must be sent to the Vice President and to each Senator and Representative to whom you apply.) (Contact your Senator and/or Representative before preparing this letter to ensure you send it to their preferred location.)

Date

Honorable (Name of Appropriate Authority)  
House of Representatives OR United States Senate  
Washington DC 20515 OR Washington DC 20510

OR

The Vice President  
Dwight D. Eisenhower Executive Office Bldg  
Washington DC 20501

Dear Mr./Mrs./Ms. (Name) OR Dear Senator (Name) OR Mr. Vice President

I want to attend the Air Force Academy and to serve in the United States Air Force. I request that I be considered as one of your nominees for the class that enters the Academy in June 20\_\_\_\_.

My pertinent data is:

Name (print name exactly as it appears on the birth certificate or, if legally changed, attach a copy of the court order):

Social Security Number:

Permanent address (street, city, county, state, zip code):

Temporary address (if applicable):

Permanent phone number (with area code):

Temporary phone number (with area code if applicable):

Name of father:

Name of mother:

Date (spell out month) and place of birth:

Name and address of high school:

Date of graduation:

Approximate grade point average (GPA), rank-in-class and PSAT, PACT/PLAN, ATP (SAT) and ACT scores if you have taken these tests. Include verbal and math scores for the PSAT and ATP (SAT) tests, the composite for the PLAN, and English, reading, math, and science reasoning scores for the ACT test.

Extracurricular activities:

Reasons for wanting to enter the Air Force Academy:

Thank you for considering me as one of your nominees to the Air Force Academy.

Sincerely

Signature

# format of request for military-affiliated nomination

(Use this format for any of these categories: Presidential, Children of Deceased or Disabled Veterans, Children of Military or Civilian Personnel in Missing Status, or Children of Medal of Honor Recipients.)

Date

Director of Admissions  
HQ USAFA/RR  
2304 Cadet Drive, Suite 2400  
USAF Academy CO 80840-5025

Dear Sir:

I want to attend the Air Force Academy and to serve in the United States Air Force. I request a nomination under the (name of appropriate category) for the class that enters the Academy in June 20\_\_.

My pertinent data is:

Name (print name exactly as it appears on the birth certificate or, if legally changed, attach a copy of the court order):

Social Security Number:

Permanent address (street, city, county, state, zip code):

Temporary address (if applicable):

Permanent phone number (with area code):

Temporary phone number (with area code if applicable):

Date (spell out month) and place of birth:

If member of military, include rank, regular or reserve component, branch of service and organizational address including

PSC Box Number:

If previous candidate, indicate year:

Information on parents:

Name, rank, social security number, regular or reserve component and branch of service:

If your parent is on active duty, attach a statement of the service dated and signed by current personnel officer specifying all periods of active duty and any breaks therein. If your parent is retired or deceased, attach a copy of the retirement orders or casualty report; include Veterans Administration (VA) claim number and VA office where case is filed, if appropriate; include brief statement with date and circumstances of Medal of Honor award, if appropriate).

Sincerely

Signature

## selection procedures

Your academic and leadership potential, physical fitness, motivation and aptitude for the Academy determine your rank among the other candidates. Starting in October, the Admissions Panel meets weekly to review completed files. The panel of senior officers considers your qualifications based on all information contained in your records.

The Secretary of the Air Force, through the Superintendent and his senior staff officers, appoints candidates to fill vacancies in each nominating category. We'll notify you of your appointment status by mid-May. Qualified candidates not selected to fill the specific vacancies for which they were nominated are placed in a nationwide qualified alternate pool. We offer appointments to enough people from this pool to fill the entering class. We consider all qualified candidates in all nominating categories and selection is on a competitive basis.

## early notification

If you are a highly qualified candidate and have a nomination, we may notify you of an appointment as early as October, if your records are complete. If you don't have a nomination yet, we'll send you a letter of assurance. As soon as you receive a nomination, you'll receive an appointment. To be considered for an early appointment, our records must include all correspondence about you and the following documents: official results of required examinations (SAT or ACT and Candidate Fitness Assessment); candidate activities records; high school transcript; drug and alcohol abuse certificate; and personal data record. If we don't have your medical clearance or your preparatory school or college transcript, you will receive a conditional appointment.

## regular selections

If you haven't received an early notification, we'll consider you in March if your records are complete and you meet all of our admissions requirements. If we don't have your medical clearance or your preparatory school or college transcript by March 15, you will be considered for a conditional appointment. If we select you, your final appointment will depend on your medical qualifications and our receiving a satisfactory college or preparatory school transcript.

## late selections

If your records are not complete by March 15, we'll consider you for an appointment at a later date if a vacancy occurs and you are eligible in that category. Some initial appointees decline their appointment offers, and we select other qualified candidates to fill those vacancies. In such cases, we may not notify replacement candidates until shortly before the class enters.

## appointee requirements

### **Medical Examination and Fitness Requirements**

All academies and commissioning sources use one general standardized examination to determine medical qualifications. You will take your examination at designated examining centers located throughout the United States and at some overseas bases on or after June 1 of the year preceding the year of admission. Prior candidates who are reapplying must retake portions of the medical examination. Specific medical and fitness preparation information is discussed at Appendix A.

### **Transcripts and Activities Record**

You must submit your entire scholastic record from secondary school as well as transcripts for any preparatory school or college you've attended. High school students must submit their current rank in class if known. We also need a high school activities record outlining your performance in extracurricular or other activities that indicate leadership potential.

### **Social Security Number**

You must have a social security number to open an admissions file. If you don't have one, ask for an SSA-5 Form from your local Social Security Administration Office. You must furnish evidence of your date of birth, identity, and U.S. citizenship.

### **Birth Certificate or Proof of Citizenship.**

You must use your name as it appears on your birth certificate on all official records unless the Admissions Office has received legal evidence authorizing a name change. If you are adopted and claim eligibility in a nominating category through an adoptive parent, you must submit a copy of the court order of adoption. Also, adoption proceedings must have begun before your 15th birthday. You must submit proof of citizenship if you were foreign born or naturalized. U.S. citizenship is required unless you are applying as an international student. For tax purposes, international students will obtain a valid social security account number when they arrive.

## travel expenses

Appointees will receive instructions concerning reimbursement for travel to the Academy. Travel allowances will be credited to your personal checking account. If you refuse to take the Oath of Allegiance upon arrival at the Academy or are disqualified for admission because of some fault of your own, you won't be entitled to any travel allowances.

## service obligations

Before you take the Oath of Allegiance, you'll sign an agreement, with the consent of your parents or guardian if you are a minor. This agreement states that you'll fulfill the following service obligations, which apply to all cadets except international students.

- complete the course of instruction at the Academy (unless you are disenrolled by proper authority), and
- accept an appointment and serve as a commissioned officer in the Air Force for at least eight years after graduation—five of which must be active duty, and the remainder can be served as inactive reserve. You become eligible to request a separation from the Air Force after five years' service.

If you entered the Academy from the Regular or Reserve component of any service and are discharged from the Academy before graduation, you'll normally return to former rank and branch of service to serve the rest of your obligation.

Graduates who enter pilot training incur a longer commitment when they've completed that training. The Air Force policy in effect when you enter flight training determines the length of your commitment.

## discharge policy

The policy requiring discharged cadets to serve in the Air Force may vary depending on manpower needs of the Department of Defense. Air Force policy now states:

- fourth- and third-class cadets (freshman and sophomore) who are separated by the Academy or whose resignations are accepted will ordinarily be completely relieved from all military duty-active or reserve.
- second- and first-class cadets (junior and senior) who are separated by the Academy or whose resignations are accepted will normally incur a commitment for active-duty. Exceptions will be made for humanitarian reasons and those few cases in which it is not in the best interest of the Air Force to call a cadet to active duty because of physical disqualification, misconduct or demonstrated unsuitability for military service in an enlisted status. If you incur a commitment, you'll normally transfer to the Air Force Reserve and serve on active duty as an enlisted airman.
- second-class cadets who are disenrolled or resign on or after the first day of academics in the fall semester of the second-class year will incur a two-year commitment for active-duty service. This commitment is three years for first-class cadets on or after the beginning of the first-class year academic semester. First-class cadets who complete the entire academic program and then resign or refuse to accept a commission may be ordered to active duty for four years as enlisted airmen.
- cadets who fail to complete any period of active duty may incur a liability to reimburse the U.S. government for an appropriate proportion of the cost of their Academy education. The cost of an Academy education for the Class of 2007 was \$403,353 per graduate.

## resignation policy

A cadet who submits a request to resign must state a specific reason for the action. The cadet will be counseled to determine if the problem can be resolved prior to action being taken to process the resignation.

## admissions liaison officers

The Air Force Admissions Liaison Officer (ALO) force consists of nearly 1,700 Air Force officers who live in neighborhoods throughout the United States and overseas locations. Lieutenant Colonel Steve Orié, Chief, Admissions Liaison division oversees five regional directors and all ALO activities, by area, from their offices at the Academy. The Regional Directors may be reached at HQ USAFA/RRA, 2304 Cadet Drive, Suite 2300, USAF Academy, CO 80840-5025, telephone 1-800-443-8187.

### **Academy Region I:**

CT, DC, DE, MD, ME, MA, NH, NJ, NY, PA, RI, VA, VT, and WV plus Europe, Africa, Middle East, and all APO AE addresses.

### **Academy Region II:**

AL, FL, GA, KY, MS, NC, SC, and TN, plus the Caribbean, and Central/South America.

### **Academy Region III:**

ID, IL, IN, IA, MI, MN, MT, ND, NE, OH, SD, WA, WI, WY and Canada.

### **Academy Region IV:**

AR, AZ, KS, LA, MO, NM, OK, TX.

### **Academy Region V:**

AK, CA, CO, HI, NV, OR, UT, plus the Pacific region, and all APO AP addresses.

An ALO will help you throughout the admissions process. The majority of ALOs are Air Force officers, either Reserve, Air National Guard, retired or active duty, who are very knowledgeable about the Academy and the admissions process. They are qualified to assist you in all aspects of admissions and answer questions about the Academy's education and training. In addition, ALOs provide counseling for the Air Force Reserve Officer Training Corps (AFROTC) commissioning program. They can also tell you what being an Air Force officer will be like after you graduate.

You must meet with your ALO or an Academy representative as part of the admissions process. During an interview with one of them, you may ask any questions you have about the Academy or AFROTC. This is your chance to personalize the selection process and communicate directly with the admissions panel members who review your folder.

You are encouraged to contact your ALO at your earliest opportunity.

Ask your guidance counselor for the ALO's name. If your guidance counselor does not know the ALO's name, please contact your Academy Regional Director at 1-800-443-8187.

cadet life



No matter what your background, the cadet lifestyle is probably different from any in your experience. Individual dedication, sacrifice, and stamina are vital to meet the mental, ethical, and physical demands of daily living. You must organize your time and establish self-discipline. The Academy's military environment requires structure, rules, and instructions to train you as a professional Air Force officer and leader.

## jacob a. schonig

**Cadet Wing Commander, Fall 2008**



C1C Jacob A. Schonig is the proud son of Lillian McFarland and Frank Schonig. Born in Los Gatos, CA, he graduated from Los Gatos High School. Jacob is majoring in Space Operations and hopes to go on to graduate school, then Undergraduate Pilot Training (UPT) and to fly jet fighters. He also aspires to one day become an astronaut. Jacob has served as FalconSat 3 Director of Operations, been a Gymnastics Team Captain, was twice an Academic and an Athletic All-American and is a USA Gymnastics National Champion on the rings. His military training has taken him to deployments at Patrick AFB FL, and Ramstein AB Germany. Jacob has been a Squadron First Sergeant, a Squadron PEER counselor and a BCT Group First Sergeant during his time at the Academy. After serving in Cadet Squadron 37 for the past three years, C1C Schonig is currently the Fall 2008 Wing Commander. As such he is responsible for directing and supporting the Cadet Wing comprised

of 4,000 cadets.

*"The cadets of the United States Air Force Academy are the finest young men and women our Nation has to offer. The Academy's mission is to develop these individuals into character-based officers, motivated to lead the United States Air Force in service to our Nation. Upon acceptance, your limits will be tested, challenged and ultimately redefined. Only then will you join a proud heritage, a tradition of honor and a legacy of valor. Join our team, and be part of something great."*

## cadet schedule

You'll have four 55-minute periods each morning and three each afternoon. Breakfast and lunch are mandatory formations and after classes you'll join in mandatory athletic activities. Unless you're an intercollegiate athlete, you'll play on an intramural team two afternoons a week after classes. The other three afternoons you have squadron activities or discretionary time. Intercollegiate athletes usually practice or compete every afternoon and frequently on weekends, too. Many cadets take additional academic instruction after classes or during other unscheduled times. You'll also spend many evenings studying in your room or in the library. You must be in your room at taps, (the last bugle call before lights out). You'll frequently attend parades and inspections and study on Saturday mornings, but you're usually free Saturday afternoons and Sundays. Your fall and spring semesters last seventeen weeks each, and the summer term lasts ten weeks. Instead of a three-month summer break, you'll have three weeks. During the summer term, you'll take academic classes if necessary, or you may participate in one of various leadership and military training programs, depending on your class year. Many assignments include travel to Air Force bases, some of which are overseas. Some cadets stay at the Academy for summer flight training or to help train other cadets. Each year the new class enters in late June and begins an intense period of military training called Basic Cadet Training (BCT).

## leaves and passes

You'll have limited time away from the Academy during your first year. During the first five weeks, while you're in BCT, you may not have visitors, or receive phone calls. After Parent's Weekend, the restrictions relax somewhat. During your fourth-class year you may receive phone calls and have visitors on Saturday afternoons and evenings, as well as on Sunday mornings and afternoons. You may also invite friends to attend balls, concerts, and other live entertainment at the Academy. The athletic schedule provides many activities to enjoy with your friends. Your activity fee covers the cost of most events for you, and usually you may buy discount tickets for your friends.

After your first year, when you become an upper-class cadet, your privileges gradually increase. As a third-class cadet, you'll have limited chances to go into the local area; you'll have more during your second-class year, and as a first-class cadet, you must still attend scheduled military duties such as parades, training, inspections, and football games.

When you're on a Friday or Saturday pass, you must return to the dormitory by 1:30 a.m. Your assigned squadron is

assessed twice each semester – the overall grade it receives will determine the number of passes you receive. Unsatisfactory performance in military training, academic studies, or athletics restricts your free time; above-average work increases your free time.

Most cadets go to Colorado Springs during off-duty time. You may not own or maintain an automobile as a fourth- or third-class cadet, but you may rent one while on an authorized pass or privilege. Eligible second- and first-class cadets may own cars and keep them at the Academy. In most instances, you'll receive three weeks of summer leave (except during the summer you enter), approximately two weeks of winter holiday leave, and one week during the spring. You may receive emergency leave if an emergency involves a member of your immediate family. Other requests for special leave are considered individually.

## recreation

Opportunities abound when you can relax briefly away from the demanding schedules, discipline, and restrictions of cadet life.

You may check out ski equipment and other recreation accessories from Cadet Recreation Supply in Vandenberg Hall for weekend outings. The Cadet Information, Tickets, and Tours (ITT) Office in Vandenberg Hall can help you book lodging and car rentals so you can get to the nearby ski areas. Transportation is also available from the Academy to airports in Denver and Colorado Springs during Thanksgiving, winter, and spring breaks. The Cadet Recreation Lodge plus Lawrence Paul Pavilion, located just west of the cadet area, is available for squadron parties and picnics. Enjoy a fishing trip or picnic with friends at nearby Farish Memorial recreational area. Journey to a nearby resort area for fabulous skiing. Go on a weekend jaunt of sightseeing. Or just hike the hills and enjoy the scenery.

Even if you can't get away, Arnold Hall is near enough so upperclassmen can relax in the informal lounges and recreational areas. Arnie's food court, game rooms, a sports bar, nightly movie showings and live entertainment in the theater and lounges offer you chances to unwind, visit with friends, and share the good times. In the cadet sports areas you can hone your golf or tennis game, play touch football, jog, and swim.

You'll quickly learn that recreation possibilities on and off the Academy are limited only by the time you have to participate.

## extracurricular activities, cadet clubs and sponsor program

Voluntary cadet clubs and activities are available to develop your talents and interests outside the curriculum. Currently, there are over 80 extracurricular clubs and teams at the Academy. These clubs are run by cadets, for cadets, with oversight by officers and staff. While some of these clubs offer recreational releases, they all offer cadets the chance to engage in various competitive, professional and humanitarian projects.

### **Mission Support Clubs**

Drum and Bugle Corps  
Falconry  
First Responders Team  
Flying  
Forensics  
Honor Guard/Sabre Drill  
Media (Yearbook and Video productions)  
Soaring (Cross-Country and Aerobatic Teams)  
Wings of Blue

### **Mission Clubs**

Choirs: Catholic, Gospel, Jewish, Latter Day Saints,  
Protestant, Protestant Praise Team  
Chorale  
RATTEX (Entertainment Technician)

### **Professional Clubs**

AIAA (American Institute of Aeronautics and  
Astronautics)  
Astronomy and Physics

Biology (Tri Beta Honor Society)  
Chemistry  
Civil Engineering  
Forum  
French  
Geosciences  
History  
IEEE (Institute of Electrical and Electronic Engineers)  
International Club  
Mechanics  
Mock Trial  
National Space Society, Student Chapter  
Omega Rho Honor Society  
Psychology  
Russian  
Sigma Gamma Tau (Aero Engineering Honor Society)  
Tau Beta Pi (Engineering Honor Society)  
Tri Beta

### **Competitive Teams**

Cycling/Mountain Biking  
Fast pitch, Women's  
Handball, Men's Team  
Lacrosse, Women's  
Rugby (Men's and Women's)  
Ski Racing (Alpine and Nordic)  
Volleyball, Men's  
Water polo, Women's

### **Recreational Clubs**

Academy Concerts  
Aikido  
Amateur Radio  
Archery  
Arnold Air Society  
Aviation  
Big Brother/Big Sister  
Bluebards (Dramatics)  
Bowling  
Car  
Chess  
Colorado Leadership Alliance (CLA)  
Explorers/Scouting  
Equestrian  
Fitness/Power lifting  
Fly Fishing  
Hunting

Ice Hockey  
Judo  
Karate  
Karate, Traditional  
Los Padrinos (Hispanic)  
Marathon  
Model Engineering  
Mountaineering  
Ninjutsu  
Pacific Rim  
Paintball  
Pistol/Combat  
Pistol/Collegiate  
Prior Enlisted Council  
Racquetball  
Rodeo  
Scuba  
Show Choir (Singing/Dancing)  
Ski Club  
Squash  
Trap and Skeet  
Triathlon  
Tuskegee Airmen  
Ultimate Frisbee  
Wargaming  
Way of Life (African American)

Community service is an integral part of life at the Air Force Academy. Volunteer community service allows cadets to become involved with the local community. By volunteering, cadets come to understand one of the Air Force's Core Values of "service before self." Through community service, you will learn to empathize and show respect to and for others; two critical ingredients in the professional military character.

Community service activities are accomplished through our Cadet Service Learning Program (CSL). CSL helps cadets develop their leadership and organizational abilities while enhancing their sense of responsibility to others by giving of their free time to meet community needs. Our community service program continually seeks out service opportunities in the local area, and then makes these opportunities available to cadets who choose this avenue for personal development.

## sponsor program

The sponsor program matches fourth-class cadets with a "Sponsor Family" in the local area. Sponsors provide a home away from home for cadets and many keep in touch long after they have graduated from the Academy.

## counseling and advising

Many sources provide counseling to help you adjust to your new lifestyle and develop as a professional officer. You may visit them whether you simply want someone to talk to or need more complete guidance.

The **Academy Counseling Center** offers a variety of counseling services to assist cadets as they strive to become Air Force officers. The internationally accredited center is comprised of a staff of licensed masters- or doctoral-level behavioral health providers. The Academy Counseling Center offers individual and group counseling to increase military, academic, social and physical performance.

**Air Officers Commanding** (AOC) are responsible for the health, morale, and welfare of his/her squadron. They continually review your progress and are the primary points of contact between your parents and the Academy.

**Academy Military Training** (AMT) NCOs complement the AOC in providing daily support to all cadets.

**Squadron Faculty Officers** advise you in academic areas and help you with problems of academic deficiency or probation. Instructors help you in academic course work, as well as in selecting major academic fields and developing officer skills.

**Academic Advisors** help you gain the most satisfaction from cadet life and attain the highest degree of academic success in your courses. Personnel in Curriculum and Scheduling Services advise you on course selection and scheduling, academic majors, and postgraduate scholarship opportunities.

**Officers and Noncommissioned officers** (NCO) in the Cadet Personnel Office help you select your initial Air Force career field. They also advise you of personnel programs and policies, which may affect your career goals.

**First-class cadets**, serving as cadet officers, play a major role in guiding you. They provide much of the training and athletic supervision within each squadron and help in tutoring. Members of the Way of Life Committee and Los Padrinos Club also offer support.

The **PEER** (Personal Ethics and Education Representative) program is a volunteer cadet-run program. Each cadet squadron has two PEERs assigned who are trained to be a referral source to cadets in need of help.

**A Jewish rabbi, Catholic priests, Muslim chaplain, and Protestant ministers** offer counseling in personal, moral, and spiritual matters. The Mental Health Clinic, under the Command Surgeon, offers complete psychiatric service.

## religious activities

The Academy's spiritual aspect, present in all facets of cadet life, provides an extra dimension to traditional learning.

The Cadet Chapel, the center of religious activities for the cadet wing, contains Protestant, Catholic, and Jewish worship areas, as well as an all-faith worship room. Chaplains provide all cadets daily opportunities for worship and regularly visit cadet-training areas.

Many cadets attend optional service, taking advantage of the chance to grow spiritually. They participate regularly, share worship leadership and planning, and serve in various ways. You may participate in a broad range of activities related to spiritual and moral growth including Sunday or Sabbath worship activities, daily morning and evening services, special denominational services and activities, cadet choirs, religious classes, religious discussion groups, values-education classes, and weekend retreats. Air Force chaplains-ordained clergymen- conduct the religious services. You may attend church and teach Sunday school classes in local religious education programs when not on duty and participate in one or more cadet fellowship organizations.

Thousands from the local area join the cadets for the Christmas "Messiah" and "A Festival of Lessons and Carols" programs. During Lent, many come to see the dramatic "Living Portrayal of the Last Supper." Organ recitals, guest artists, and special concerts complement the busy regular schedule. Graduation Week, with Baccalaureate services and a long parade of weddings, brings each academic year to a close.

## legal service

The Academy's professional legal staff may provide you confidential advice, and help you prepare legal documents, or advise you on legal problems, but they can't represent you in a civilian court.

## cadet benefits

You'll receive full tuition, room and board, medical care, and monthly pay. The pay covers the cost of uniforms, books, and supplies, with a modest amount left for personal spending and a savings account. You'll purchase uniforms and meet other initial expenses with these savings when you graduate. You may receive an interest-free loan to cover an emergency situation if necessary. You may participate in a government-sponsored life insurance program, Servicemen's Group Life Insurance (SGLI), which provides term life insurance from \$10,000 to \$400,000 in \$10,000 increments. You may deduct the fee from your monthly pay, and carry the policy forward after graduation.

## medical care

You'll receive outpatient medical treatment, physical examinations, and routine dental care in the cadet clinic located in Fairchild Hall in the cadet area proper. After hours medical and dental care will be provided at the nearby 24-hour Acute Care Clinic (ACC). The ACC is located at the Air Force Academy medical treatment facility (MTF) which is served by the 10<sup>th</sup> Medical Group. If you experience a medical emergency which might lead to loss of life, limb or eyesight, call 911 and you'll be transported to the nearest local emergency care facility. The 10<sup>th</sup> Medical Group will coordinate any necessary overnight care in a manner that supports ongoing academic studies when possible.

## cadet uniforms

You'll wear various uniforms depending upon the occasion and the weather. Men wear a blue shirt and trousers during the academic year. Women wear a blue blouse with a skirt or slacks. You'll be able to wear a jacket in cool weather and a parka in cold weather. For dress occasions, you'll wear a blue uniform, with a skirt or slacks matching the jacket for women and trousers for men. Other uniforms are the mess dress for formal or social functions, parade dress for formal ceremonies, battle dress uniform for field training, flight suits for flying activities, and athletic uniforms.

First-, second-, and third-class cadets may wear civilian clothes when on leave and weekend privileges. Fourth-class cadets are not permitted to wear civilian clothing until approved by the Commandant.

## graduation week

Graduation completes an extremely challenging program. After testing your character, as well as your intellectual, physical, and leadership abilities, you're ready to serve your country.

During the week before graduation, the Academy honors your class with parades, socials, and other events. The week has special significance for members of all classes as they look forward to new opportunities in the coming year.

Several award ceremonies highlight the week by recognizing individual cadets and cadet units, which have achieved scholastic, military, and athletic honors. Baccalaureate exercises, the graduation parade, and finally, the graduation exercises wrap up Graduation Week and your years at the Academy. Proud families and friends share the excitement and sense of accomplishment with you. You'll hear a distinguished guest speaker, receive your Bachelor of Science degree, and take the oath of office for your commission in the Air Force. The years you spent, which sometimes seemed long and difficult, may already seem short and memorable.

The Academy's military training, academics, athletics, and chances to develop character prepare you to be a professional officer who can lead tomorrow's Air Force.

## life after the academy

### Careers

As the 21st century begins, a challenging career faces the Air Force officer. Technological advances, increased demands for innovative resource management, and the continuing pledge to guard and defend our national goals—these are the challenges you will face.

Your assignment following graduation will relate directly to your Academy training and the needs of the Air Force. If not selected for pilot or navigator training and subsequent assignment to a flying career, you'll enter one of several nonflying career fields. No matter what field you enter, you'll be an Air Force officer! That's why we seek men and women who are devoted to their country, to developing their skills as leaders of character, and to serving in the United States Air Force.

### Discover The Opportunities

You can do nothing of real or lasting value without dedication and commitment. That's why we seek men and women who are devoted to their country and to serving in the United States Air Force.

# your future in the air force

Every Air Force assignment involves hard work and increasing responsibilities. Yet, each assignment offers many personal and professional rewards. Your unique skills and talents will match you to an appropriate Air Force officer career field.

Over half of Academy graduates may be selected for flying training. These graduates serve in approximately 15 flying-related careers as navigators and pilots. We've outlined some of them for you. No matter which career you choose, it offers unique and exciting opportunities after graduation.

## Fighter Pilot

Defining the Air Force by their expertise and courage are the Fighter Pilots. These denizens of the air are trained in the latest and most powerful jet fighters in the world. As fighter pilots you'll command crews to complete combat and training missions. Your responsibilities will include reviewing mission tasking, intelligence/weather information and ensuring that mission preparation is complete. During missions, you'll operate aircraft controls and equipment, direct or supervise navigation, monitor in-flight refueling and oversee weapon delivery. You'll ensure the readiness of the crew by conducting or supervising mission-specific crewmember training.

## Combat Systems Officer

At the forefront of Air Force operations are Combat Systems Officers. You might be a weapons systems officer (WSO) or electronic warfare officer (EWO), or a panel navigator who successfully completes combat and training missions.

WSOs are assigned to the F-15E and B-1 aircraft. EWOs have the opportunity to fill positions in the RC-135, E-3A, EC-130, MC-130, and the B-52. Navigators are assigned to RC-135, B-52, C-130, and E-3A airframes. In preparing for missions you'll review mission tasking, intelligence/weather information, mission and flight operations, and conduct crew briefings. Additionally, you'll ensure the aircraft is properly equipped and crewmembers are "mission-ready."

## Air Battle Managers

All Air Force air operations require the command and control function to be successful. Air Battle Managers are assigned to the E-3A or the E-8 aircraft. In preparing for missions you'll review mission tasking, intelligence/weather information, mission and flight operations, and conduct crew briefings. Additionally, you'll ensure the aircraft is properly equipped and crewmembers are "mission-ready."

## Bomber Pilot

Bombing missions require expert flying skills, nerves of steel, and training available only in the Air Force. As a bomber pilot you'll command aircraft and crew during combat and training missions. You are responsible for mission planning—reviewing mission tasking, intelligence/weather information, and supervision of overall mission preparation. During missions you'll operate aircraft controls and equipment, and supervise/direct navigation activities. In-flight refueling and weapon delivery are also your responsibility. Bomber pilots ensure operational readiness of aircraft and crew by conducting or supervising mission-specific crewmember training.

## Airlift Pilot

Airlift Pilots transport equipment and personnel in order to safely and successfully complete assigned missions. Included in your responsibilities are mission planning/preparation, operation of aircraft and equipment, supervision of navigation, in-flight refueling,

Category/Specialty	Officers	% of Non-Flying
<b>Operations:</b>		<b>11%</b>
Air Traffic Controller	1%	
Air Battle Manager	1%	
Combat System Operator	1%	
Space and Missile Operations	8%	
<b>Scientific/Technical:</b>		<b>45%</b>
Weather	1%	
Scientific	6%	
Civil Engineering	7%	
Development Engineering	11%	
Acquisition Management	7%	
Communications/Computers	13%	
<b>Sortie Generation/Logistics:</b>		<b>14%</b>
Missile Maintenance	1%	
Aircraft Maintenance	4%	
Logistics Plans/Programs	3%	
Intelligence	6%	
<b>Mission Support:</b>		<b>30%</b>
Contracting	7%	
Financial	3%	
Manpower/Personnel	3%	
Security Police	2%	
Services	1%	
Information Management	4%	
Public Affairs	1%	
Special Investigations	1%	
Health Services Administration	5%	
Biomedical Services	1%	
Other	2%	

and cargo/passenger delivery. You'll ensure operational readiness by conducting or supervising mission-specific crewmember training.

### **Helicopter Pilot**

Air Force helicopter pilots are an important and integral part of the Air Force's world-class flying team. As a helicopter pilot, you'll operate rotary wing aircraft and command crews to accomplish combat and training missions. Mission planning—reviewing mission tasking, intelligence/weather information, and supervising mission preparations are your responsibility. During missions you'll operate aircraft controls and equipment and supervise or direct navigation activities. You'll also oversee in-flight refueling and weapon delivery. You are responsible for overall operational readiness by conducting or supervising mission-specific crewmember training.

### **Reconnaissance/Surveillance/Electronic Warfare Pilot**

This is a high security assignment requiring quick thinking, cool nerves, and a lot of highly specialized training. As a select member of the Air Force team you might perform reconnaissance, surveillance, search and rescue, or electronic combat missions. Mission preparations include reviewing mission tasking, intelligence/weather information, mission and flight planning, and crew briefings. You'll navigate aircraft using available navigation systems, and conduct and supervise crewmember training.

### **Special Operations Pilot**

In this career you'll receive specialized training as you learn to fly special operations aircraft (either fixed-wing or helicopter). You'll be in command of aircraft and crew while completing special operations and training missions. Reviewing mission tasking, intelligence/weather information, supervising preparations and planning and conducting crew briefings are additional responsibilities. During flights you'll operate aircraft controls and direct/supervise navigation, oversee in-flight refueling operations, reconnaissance, weapons delivery, and conduct specialized crewmember training.

### **Tanker Pilot**

Readiness and effectiveness of every Air Force squadron rely on the talents and expertise of tanker pilots. As a tanker pilot you'll review mission tasking, intelligence/weather information, supervise preparations and planning as well as conduct crew briefings. During flights you'll operate aircraft controls, direct or supervise navigation, ensure proper weapons delivery and supervise crewmember training.

### **Astronaut**

Astronauts command space shuttle missions, pilot space shuttles, perform on-orbit duties, and provide manned space flight consultation. Commanding space shuttle missions requires operation of all shuttle vehicle systems and supervision of crewmembers. You'll be an integral part of onboard flight operations. As an astronaut you'll operate and reconfigure orbiter systems, monitor payload/shuttle interface, and perform extra-vehicular activities to make repairs, refurbish/inspect satellites in orbit or in the payload bay.

Officers who serve as doctors and legal officers are not included here because their assignment depends on academic qualifications completed after graduation from the Academy. But, some graduates do serve in these specialties. Other Air Force members may serve in one of four non-flying categories.

### **Air Weapons Controller**

Officers in air weapons control handle the interception of hostile aircraft and missiles. As an air weapons control officer you may fly as a crewmember on an Airborne Warning and Control System (AWACS) aircraft. You'll use the sophisticated AWACS equipment to see and identify airborne objects. Or, you may work with ground mobile and fixed radar. You'll also electronically jam hostile radar and communications.

### **Operations Management**

As an operations management officer, you'll plan and coordinate weapons and other combat resources for use. You'll oversee installation of communications equipment required to keep an air base operational while it is under attack and plan tactical deceptions to confuse the enemy.

You'll get excellent leadership and administrative experience working with U.S. and foreign forces. You'll operate command posts, implement higher headquarters policy, plan and analyze training programs to ensure people are prepared to do their jobs safely and correctly.

### **Air Traffic Controller**

Officers in air traffic control oversee aircraft takeoffs and landings by supervising centers covering radar approach, air route

traffic, ground control approach, and air base towers. You'll oversee air traffic flying operations and systems; you'll serve as a staff officer on matters concerning air traffic control; and you'll advise flying units on air traffic control support.

### **Space Operations**

It has been said that space is the ultimate high ground. If you are interested in space, using space, or even being in this high ground, then the Academy is the place for you! The Air Force Academy is the premier undergraduate institution, educating and training its graduates to understand and exploit space in defense of the United States. From core classes that all cadets take, to advanced classes aimed specifically at building satellites and rockets for Air Force missions, the Academy is a "hotbed" of space activity. After graduation there are a host of opportunities to actually work in the space career field. Here are a few of the exciting space related careers, and a short description of each:

### **Space And Missile Operations**

Using space capabilities to defend our nation, covers the full spectrum of space related jobs in launch vehicle and launch pad operations, space range control, satellite command and control, orbit analysis, space surveillance or space object tracking, missile warning, space control, and missile combat crew. Space operators perform duties around the world. This career needs people who are technologically savvy—able to manage people and hardware to meet national security objectives. Missile combat crew involves responsibility for the nation's most powerful weapon system—Intercontinental Ballistic Missiles (ICBMs).

### **Space Engineers**

The space community relies not only on astronautical engineers but mechanical, electrical, environmental, civil, and systems engineers to produce cutting edge systems. The astronautical engineer is uniquely prepared for Air Force duty with space systems as they are specialists in research, design, development, test, and analysis of space technology and aerospace avionics. Space engineers are needed throughout the space community and serve around the United States.

### **Space Aggressors**

Understanding space systems' vulnerabilities to attack is the job of the Space Aggressor. Highly skilled warriors, they design and participate in war games to better understand our space system's strengths and weaknesses. From their work we develop next generation systems as well as cutting edge tactics and technology to protect U.S. space assets and defeat enemy space systems. These jobs are located in the Colorado Springs area.

### **Science And Engineering**

Our engineers are planning the Air Force of tomorrow—today! If it has to be designed, built, tested, moved, or remodeled, our engineers will do it. Whether it's constructing a 30,000-squarefoot building on an Air Force base, developing the guidance and control systems for spacecraft and missiles, or doing flight and wind tunnel testing on new aircraft, Air Force engineers are there. Some engineering opportunities include: aeronautical, astronautical, architectural, civil, electrical, and nuclear. Hundreds of diverse specialties are included in a variety of work settings.

### **Acquisition Management**

Acquisition management officers may be involved in life-cycle management of a major system or subsystem. You'll participate in a project from its beginning through the validation and engineering phases. You may continue to monitor a project during production or deployment.

### **Communications And Computers**

Air Force technology is speeding into the 21st century. As an Air Force communications computer officer, you'll be a part of this exciting process—tracing electrical impulses to a computer's brain, fine-tuning aircraft navigational aids, or translating ideas for communications-computer systems into engineering specifications.

You'll be at the forefront of technology, implementing and maintaining software, firmware, and databases to support functional mission requirements. With the rapid advances in communication, computer, and video technology, your expertise will influence the day-to-day activities of nearly all Air Force organizations.

### **Weather**

As a weather officer you'll be utilizing cutting edge technology in providing timely, accurate, and relevant weather information to our nation's war fighters. You'll be an integral part of operational mission planning to provide critical weather information needed to make accurate decisions worldwide. Whether providing support from centralized, unit, or forward locations, weather officers exploit the weather to ensure mission success!

### **Aircraft Maintenance**

Maintaining a squadron of high-tech aircraft in mission-ready status requires the dedication of skilled aircraft maintenance

and munitions officers. You'll oversee all phases of aircraft support including armament systems and related conventional and nuclear weapons functions, avionics and propulsion systems, and disposal of unfit or unstable explosives.

### **Logistics**

Supply and transportation come under logistics and each is critical to carrying out the Air Force mission. As a supply officer, you're responsible for inventories worth millions of dollars—from jet planes to jet fuel. Logistics officers are the leaders who keep the supplies, people, and equipment moving.

### **Intelligence**

As an intelligence officer you'll use some of the Air Force's most sophisticated equipment to map and interpret images. Through interpretation and assessment, you'll prepare the information that's key to combat planning. You'll be a principal decision-maker, shaping the employment of our forces.

### **Finance**

In today's environment, a financial expert must make sure an Air Force organization has enough money in the right places to get the job done. You'll devise budgets and have an early opportunity to prove your leadership and financial ability while ensuring the Air Force best uses limited resources.

### **Personnel**

The name of the personnel game is taking care of Air Force people. As a personnel officer, you'll help determine the assignments and career progression of other officers and airmen.

### **Contracting**

As a contracting officer, you'll buy the things the Air Force needs to function—from weapons systems to supplies and services. You'll work closely with other Air Force people and civilian contractors. Advertising, negotiating, writing, and awarding contracts will be some of your main responsibilities.

### **Manpower**

As a manpower officer, you'll help decide how many people it takes to get the job done. You'll analyze time, task, and action studies. Your formulas and on-site job surveys will help drive personnel decisions.

### **Public Affairs**

It's not a routine business. One day you may host reporters visiting your base. The next day you may conduct a meeting between base officials and local business and civic leaders. The following day you could review the base newspaper before it is published. It's a diversified career area in which you'll use all your public relations and communications skills.

# the academy preparatory school



The Air Force Academy Preparatory School, popularly known as the “Prep School,” prepares young men and women academically, physically, and militarily to enter the Air Force Academy. Located on the Academy grounds, this ten-month school affords intensive preparation, making selected applicants more competitive for entrance into the Academy. Approximately 240 students between the ages of seventeen and twenty-two begin the program in late July. The Prep School emphasizes the same four areas as the Academy—academic, military, athletic, and character development. The curriculum includes math, English, and science. Students at the Prep School are addressed as “cadet candidates.”

## colonel todd m. zachary

### Commander, USAF Academy Preparatory School



Colonel Todd M. Zachary is commander of the United States Air Force Academy Preparatory School. He directs a one-year academic, military-training, athletic and character development program leading graduates to possible appointment in the Cadet Wing. The colonel entered the Air Force in 1987 as a graduate of the Reserve Officer Training Corps program at California State University in Northridge. Colonel Zachary earned a Master's degree in Humanities, from California State University, Dominguez Hills in 1996 and a Master's degree in Defense Studies from Kings College, London in 1999. He is a graduate of the Joint Services Command and Staff College, RAF Bracknell, UK, the Air Force School of Advanced Airpower Studies, Maxwell AFB, AL, and the US Naval War College, Newport, RI. Colonel Zachary is a Command Navigator with over 2,400 flying hours in the T-37, T43A, B-52G and B-52H aircraft. His first assignment was flying the B-52 Stratofortress at Minot AFB, ND. In addition to Minot AFB, the colonel has served at Randolph AFB, TX; RAF Bracknell, UK; Maxwell AFB, AL; the Pentagon; Naval War College, RI; and Elmendorf AFB, AK. Colonel Zachary assumed duties as Preparatory School Commander in Jun 2008.

*“The USAF Academy Preparatory School provides a special opportunity for selected young men and women to earn an appointment to the Air Force Academy. Completion of the Prep School's challenging curriculum increases the student's potential for admission to and successful completion of the Air Force Academy. To earn an appointment to the Academy however, students must complete the Prep School program, meet Academy entrance requirements, and be selected by the Academy Board. Awaiting those who are offered appointments are superior professional leadership training, an outstanding academic education, and preparation to be a highly successful career officer in the United States Air Force.”*

## academics

The academic program at the Prep School is rigorous and specifically designed to transition students from a high-school academic environment to the world-class collegiate academic program at the Air Force Academy. To earn an appointment to the Air Force Academy, students must meet historically established academic standards. To accomplish these goals the Prep School divides the academic year into four quarters, each approximately nine weeks long. An integrated course in basic study skills is required in the first quarter to learn time management and study techniques that will facilitate the transition to the demanding requirements of college academics. The rest of the curriculum is designed to lay the groundwork for success in both the technical and social science courses required at the Academy.

The Preparatory School offers a robust mathematics sequence, providing intense instruction in a spectrum of topics including college algebra, trigonometry, calculus, and applications in science and engineering. The science curriculum uses chemistry to teach all students fundamentals in scientific reasoning and problem-solving skills. The primary focus of English is to develop solid writing skills through a composition program that incorporates literature and character-focused readings. The English department also requires a course in reading in the social sciences to ready students for the reading requirements of college courses in history, political science, and philosophy as well as hone writing and critical-thinking skills. Honors programs are available for more advanced students in math, chemistry, and physics, as is the opportunity to take a freshman-level English, or math course at the Academy in the spring. Instructors are readily accessible for extra academic assistance to anyone who needs it. The success of the Prep School's academic program has been borne out over the years with a graduation rate from the Academy that very nearly matches the graduation rate of those appointed directly to the Academy.

## character development

Character development is the process that builds and reinforces the traits, which form a cadet candidate's commitment to personal excellence, and produces quality officers to lead the Air Force. Implementation of this program is through a yearlong comprehensive process, which focuses on the Honor Code, human relations, and spiritual development.

All cadet candidates must accept the Honor Code when entering the Preparatory School and agree to live by principles of character that extend beyond the Honor Code. Character development training starts during Basic Military Training (BMT) and continues throughout the entire year. Cadet candidates also have the opportunity to participate in community service projects, honor and ethics symposiums, and distinguished visitor testimonials as part of the continuous character development process.

## military training

Military training at the Prep School is centered on the Air Force Core Values: Integrity First, Service Before Self, and Excellence In All We Do. Military training is a part of a cadet candidate's everyday life.

Upon arrival at the Prep School, cadet candidates enter a twenty-one day indoctrination into the military called Basic Military Training (BMT). BMT is designed to orient cadet candidates to the military lifestyle and provide them with information on the organization of the Air Force, military customs and courtesies, drill and ceremonies, military history, Core Values, the Honor Code, and proper wear of the uniform.

Cadet candidates are briefed in detail on the standards of conduct and appearance they will be expected to maintain while at the Prep School. To ensure they uphold these standards, candidates undergo regular inspections of their uniforms and personal appearance as well as their rooms and the overall dormitory. The Department of Military Training is headed by the Commander, 1st Preparatory Group.

Working directly with each squadron is a major known as the Air Officer Commanding (AOC) and a senior non-commissioned officer who is the Academy Military Training Noncommissioned Officer (AMT). The role of the AOC and AMT is varied—trainer, disciplinarian, counselor, advisor, and often mentor and confidante to the cadet candidates.

Each year is concluded with a three-day exercise called the Teamwork Exercise, or TX. It is designed to be a physical and mental review of all the cadet candidates have learned for the year and to prepare them for basic training at the Academy.

## athletics

The Prep School Athletic Department's mission is to prepare cadet candidates for the rigors of athletic competition and the physical conditioning required of all Academy cadets. Additionally, the Prep School athletic program provides cadet candidates with a realistic leadership experience in a mentally and physically challenging environment. This prepares and motivates cadet candidates for a lifetime of service through physical education, fitness training and testing, intramural and intercollegiate athletic competition.

The Prep School athletic program includes four main areas: physical conditioning, intercollegiate sports, club sports, and intramural sports. Each cadet candidate will be involved in one of these areas at all times during the school year. Physical conditioning and intramural sports start during BMT and continue until graduation. Prep School intercollegiate athletic teams compete against top-rated NJCAA and NCAA junior varsity teams and other service academy Prep School teams.

Our intercollegiate athletic teams include football, men's and women's basketball, and women's volleyball. The Prep School club sports program consists of men's and women's soccer, wrestling and cheerleading. The men's and women's soccer teams compete against club teams from NCAA schools and against top-rated NJCAA schools. The wrestling team competes against NCAA Junior Varsity teams, and cheerleading supports all athletic teams.

The Prep School intramural program usually consists of flag football, ultimate Frisbee and flicker ball. The coaching staff at the Prep School is dedicated to ensuring an effective transition for our cadet candidates to the highly competitive athletic environment at the Academy.

## admission to the preparatory school

Admission is limited to enlisted members of the Air Force Regular and Reserve components and to selected civilian students. Civilian students applying for, but not receiving an appointment to the Air Force Academy need not reapply to the Preparatory School; they will automatically be considered for a Prep School appointment. Only Air Force enlisted members may apply directly to the Prep School via Air Force Form 1786, submitted through the unit commander and Military Personnel Flight. Consult Air Force Instruction 36-2021 for details. Enlisted members from the Army, Navy, and Marine Corps are not eligible for a nomination in the airman category, but are considered as civilians.

Civilian selectees are placed on active duty as Air Force Reserve airmen while attending the Prep School. Successful completion of the Prep School improves chances for appointment as an Air Force Academy cadet, but appointment is not guaranteed. If not selected for an Academy appointment, Regular Air Force airmen are made available for assignment to other duties. Reserve Air Force candidates are discharged from the Reserves with no further obligation to the Air Force.

For more information about the Air Force Academy Preparatory School, visit [academyadmissions.com](https://academyadmissions.com) click on Admissions Center and then Prep School.

## eligibility requirements

Prospective cadet candidates must:

- be at least seventeen and not have passed their twenty-second birthday by 1 July of the year they enter the Prep School,
- be eligible to be a U.S. citizen,
- be unmarried and have no dependents, and
- meet specific medical standards for a commission in the United States Air Force.

scholarship opportunities

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## falcon foundation

The Falcon Foundation provides a limited number of highly motivated students the opportunity to prepare for admission to the United States Air Force Academy by providing scholarships at specially selected civilian junior colleges and preparatory schools in various parts of the nation.

The Foundation recognizes that many deserving young people with outstanding potential for an Academy education and a desire for an Air Force career need additional academic preparation. The Foundation endeavors to meet this need through its sustaining program of annual scholarship grants. The Foundation recognizes that the request for a scholarship is an alternate plan to obtain additional education because the applicant has failed to gain an appointment on their first attempt.

The Foundation acquires funds necessary to undertake the scholarship program from memberships, contributions and donations. The number of scholarships awarded annually is determined by the funds available. Each sponsorship is dedicated in honor of a pioneer in aviation or individuals who have distinguished themselves in aviation or defense positions.

Each scholarship award provides a significant portion of the cost of room, board and tuition. Scholarship recipients must be able to pay for transportation to and from school and for clothing, laundry and other personal expenses.

Young people who desire to apply for a Falcon Foundation Scholarship should send their requests to:

The Falcon Foundation  
3116 Academy Drive, Suite 200  
USAF Academy, Co 80840-4480  
Telephone 719.333.4096  
[falconfoundation.org](http://falconfoundation.org)

## the general henry h. arnold educational fund

The General Henry H. Arnold Educational Fund provides educational assistance to children of Air Force personnel. Applicants may make their own choice of an accredited preparatory school or college.

Request an application from:

Director  
Air Force Aid Society  
National Headquarters  
Washington, DC 20333

Or you may obtain an application online at: [afas.org](http://afas.org)

professional military education



The purpose of the Air Force Academy is to produce Air and Space leaders of character with vision for tomorrow—officers who ascribe to our Core Values of integrity first, service before self, and excellence in all we do. To that end, we seek to ensure that each graduate enters the Air Force with a unique combination of education and experience—military, athletic, academic, ethical—designed to produce leaders of character who have special qualities. The experiences are largely intellectual and physical challenges. The challenges begin in Basic Cadet Training (BCT), and continue across the next four years. Meeting those challenges requires dedication, character, sacrifice, stamina, and courage.

## brigadier general susan y. desjardins

### Commandant of Cadets



Brigadier General Susan Y. Desjardins graduated from the Air Force Academy in 1980. She is a command pilot with more than 3,800 flying hours in KC-10, C-17, C-5, KC-135R, KC-135A and T-37 aircraft. General Desjardins earned a Master's Degree in Industrial Psychology and Human Relations at Louisiana Technical University in 1991, attended Naval Command and Staff College at Newport, Rhode Island in 1993, Air War College at Maxwell Air Force Base, Alabama in 1997 and the General Manager Program at the Harvard Business School, Harvard University, Cambridge Massachusetts in 2004. General Desjardins has commanded at the squadron, group and wing levels, has served as Deputy Military Assistant to the Secretary of the Air Force, and in a variety of staff positions at the Joint Staff, Headquarters U.S. Air Force and major command levels. Most recently General Desjardins was Commander, 437th Airlift Wing, Charleston Air Force Base, South Carolina. Her decorations include the Defense Superior Service Medal, Legion of Merit with oak leaf cluster, Defense Meritorious Service Medal, Air Force Meritorious Service Medal with three oak-leaf clusters, Aerial Achievement Medal, Joint Commendation Medal, Air Force Commendation Medal with oak-leaf cluster, and the Air Force Achievement Medal. On 8 December 2005 General Desjardins was sworn in as the 23rd Commandant of Cadets at the United States Air Force Academy.

*“Our nation requires intelligent, assertive, well-rounded young men and women as leaders and defenders of freedom. The mission at the United States Air Force Academy is to inspire and develop outstanding young men and women to become Air Force officers with knowledge, character, and discipline. Rock solid integrity is essential for honorable military service to our country. A cornerstone of cadet life at the Academy is the Cadet Wing Honor Code that states: ‘We will not lie, steal or cheat, nor tolerate among us anyone who does.’ Rigorous military training, a stimulating academic curriculum, and challenging athletics highlight the four-year Academy program. The Academy’s world-class military training and academic curriculum prepares graduates to meet the diversified and specific challenges of military service. From survival school to flying sailplanes, you’ll have opportunities to demonstrate ‘excellence in all we do’ while learning and growing physically, mentally and spiritually. It’s not easy to get into the Academy; it’s even tougher to make it through to graduation—but it’s more than worth every bit of the effort.”*

## arrival

As soon as you arrive, you’ll recognize the Air Force Academy is not a typical college or university—it’s a military institution and, the demands are unique. You’ll shed civilian clothes for military uniforms, and your hair will be cut to Academy standards. You may not use tobacco products during BCT. If you smoke, dip, or chew, you should quit before you arrive so you can adapt more easily. From the start, second-and first-class cadets help you make the transition from civilian to Air Force life. They’ll teach you everything from marching and proper wear of the uniform to how to complete the Assault Course. The first day of BCT will be a long one, full of new sights, sounds, situations, and experiences. It will remain forever etched in your memory.

## oath

Shortly after you arrive, you’ll participate in one of the more solemn occasions of your cadet career—taking the oath that makes you a member of the Armed Forces of the United States. This is the pledge of loyalty:

I, (name), having been appointed an Air Force cadet in the United States Air Force, do solemnly swear (or affirm) that I will support and defend the Constitution of the United States against all enemies, foreign and domestic; that I will bear true faith and allegiance to the same; that I take this obligation freely, without any mental reservation or purpose of evasion; and I will well and faithfully discharge the duties of the office on which I am about to enter. So help me God.

Consider what this country means to you and what defending it involves. You must serve wholeheartedly. If you have any reservations, resolve them before you commit.

## basic cadet training

Basic Cadet Training (BCT), a rigorous 38 day program during your first summer at the Academy, introduces you to military life. Your performance and attitude in this program will strongly influence your future success at the Academy, so be sure you understand that BCT is a serious and very rigorous undertaking.

## the rigors of bct

Each of BCT's two phases—one in the cadet area, the other in Jacks Valley—makes its own demands and offers its own rewards. BCT will challenge you physically, mentally, and emotionally. Few of your high school friends will ever face such tests. Your commitment to yourself, to those close to you, and ultimately, your nation, will be tested daily. You'll expand your limits and emerge with a deep sense of pride and confidence in your accomplishments and abilities. You'll begin to understand what sets the Academy apart from other colleges and universities.

## bct in the cadet area

This phase focuses on the transition from civilian to military life. Upper-class cadets instruct you in military topics ranging from customs, courtesies, the Honor Code, Air Force heritage, marching, to room inspection. You'll demonstrate your proficiency through knowledge tests, drill, rifle-manual competitions, parades, and inspections. Your daily physical conditioning training includes strenuous exercises, running, and competitive sports. All activities condition you to meet the physical demands of BCT in Jacks Valley and the academic school year.

## field day

During Field Day, your squadron competes against other BCT squadrons in events such as distance races, log relays, and the tug-of-war to test teamwork. Points earned, added to those awarded throughout BCT for marching, knowledge tests, and performance in various other activities, determine the "honor squadron."

## bct in jacks valley

Following the military and physical preparation of BCT in the cadet area, training continues in Jacks Valley, a wooded area on the Academy grounds. Your stay in Jacks Valley will involve many activities, which will push you to your physical limits and build within you self-confidence and confidence in your classmates. You'll also become familiar with small-unit tactics and firearms. After a challenging and rewarding experience in Jacks Valley, BCT training concludes back in the cadet area.

## acceptance parade

The end of BCT and transition into the academic year are marked by the Acceptance Parade. There you will receive your fourth-class shoulder boards to recognize completing BCT and to signify your acceptance into the cadet wing. In a ceremony associated with the parade, new fourth-class cadets culminate the intensive BCT Core Values, honor, ethics, and human relations training by taking the Academy Honor Code Oath and pledging to live by its principles. It's the end of one test but the beginning of another—meeting the new and different challenges that each succeeding year at the Academy will bring.

## meeting the challenge

The training you'll receive during your fourth-class year will serve as a foundation for your conduct throughout your time as a cadet and career as an officer. You, as a fourth-class cadet, are expected to enter the Academy armed with physical fitness, mental resolve, enthusiasm for competition and challenge, and an attitude positively directed toward success. Your training will be rigorous and well disciplined, designed to test and strengthen your motivation and capabilities.

Along with BCT, the fourth-class year will probably be more emotionally and physically demanding than anything you have done in your life. To succeed, you must accept the challenges that the Air Force Academy presents, realizing that the training you receive is directed toward making you an effective member of the Air Force. You must commit strongly to succeed at the Academy. Candidates who enter training because of pressure from peers or parents, with the attitude that they'll just "give it a try," usually have great difficulties. More than 32,000 graduates have met the challenges of the fourth-class year and have succeeded. You too can join that group of winners and become a leader of character.

## professional development

The four-year Cadet Military Education and Training Plan (CMETP), allows cadets of each class to take prescribed classes during commandant's time. The program prepares cadets to apply their knowledge and experience in an operational military environment using the Officer Development System (ODS) as the foundation.

The CMETP carefully integrates the Officer Development System, cadet roles and responsibilities with other Academy experiences to equip cadets with the attitude, knowledge and leadership skills necessary to excel as Air Force Officers. The CMETP follows a developmental approach throughout the duration of a cadet's tenure at the Academy, and consists of four distinct Cadet Professional Military Education (CPME) courses based on cadet year groups (classes). Course content addresses four core areas: profession of arms, leadership studies, military studies, and communication studies. CPME is comprised of self-study material, graded written/briefing assignments, guided discussions and lectures, discussions on selected key topics for each class and graded military certification examinations/tests.

### **Fourth class Year**

The fourth class CPME provides you with an initial foundation of the Officer Development System and focuses on developing personal leadership and followership skills. The focus is on developing your appreciation for the qualities of a professional officer, while stressing individual professional values such as self-discipline, teamwork, duty, and commitment. When you've completed the fourth-class year, you'll feel accomplished and self-confident. Moreover, you'll have the sense of responsibility, self-discipline, and duty required of a third-class cadet.

### **Third class Summer**

Going through Global Engagement as a third class cadet, you will find out what it takes to support the aircraft you may someday fly. From contingency experienced officers and enlisted personnel, you will acquire skills in expandable, modular tent setup, contingency utilities, passive defense, force protection, security force individual and team movement, mortuary affairs, contingency food service and much more. We'll explain concepts and you will receive personal experience as part of an Air Expeditionary Force deployment, employment and redeployment.

Some of the most exciting experiences of the third-class summer involve flying, as you will read later in the aviation part of military education.

### **Third class Year**

The third class CPME concentrates on the transition from a follower to a leader. As a third-class cadet, your main goal is to become an effective military role model or coach for the fourth-class cadets as you learn and apply effective teaching, training and ultimately mentoring skill. The third class cadet program prepares you for increased levels of responsibility, helps you internalize standards essential for success (both at the Academy and in the operational Air Force), and equips you with training and skills required of leaders. You'll receive extensive experience using the Academy Training Philosophy to include establishing expectations, providing skills, exchanging feedback, and ensuring the professional growth of your subordinates.

## **Second class Summer**

During your third summer at the Academy, you'll apply your leadership skills and increase your knowledge of the rest of the operational Air Force. You'll practice leadership principles while serving as cadre members in BCT, Global Engagement (GE), or as instructors in parachuting, soaring, or navigation. You'll have the chance to practice your leadership style while directly contributing to the professional growth of other cadets. You will visit and interact with members of an operational unit during Operation Air Force, a three-week program during which you'll experience firsthand the mission and lifestyle of Air Force airmen, noncommissioned officers (NCOs), and company grade officers. Cadets are sent all over the world to operational Air Force bases. Operation Air Force is one of the most rewarding experiences cadets receive during their four-year education.

## **Second class Year**

The second class CPME will prepare you for your responsibilities as the primary trainers of third-and fourth-class cadets. You'll receive instruction in practical leadership and supervisory skills as you serve in senior NCO positions within your squadron chain of command. You will be a technical expert in drill and ceremonies, personal appearance, and room inspections, and you will train the third- and fourth-class cadets. In addition, you'll be taught specific leadership and organizational improvement skills needed by junior officers and examine how to apply these skills correctly when you run the cadet wing as a first class cadet.

## **First class Summer**

As first class cadets, you and your classmates will take the reins of command as the cadet wing leadership. The positions of responsibility you will hold and your leadership skills will contribute to the success of the Academy's military training programs during your final summer at the Academy. BCT, GE, aviation, and airmanship programs will all rely upon you for meaningful training and learning. This is your chance to put the finishing touches on your leadership style and skills as you prepare to be commissioned a second lieutenant.

## **First class Year**

As a first class cadet, you'll serve as a cadet officer in leadership positions throughout the cadet wing. You'll practice your leadership skills by leading and supervising the professional development of the lower three cadet classes. Your leadership experiences will be invaluable when assuming the responsibilities of a second lieutenant. The first-class CPME is designed to prepare you for commissioning as a second lieutenant in the United States Air Force. Thus, you'll learn basic, "need-to-know" information for prospective officers.

## cadet commanders' leadership enrichment seminar

Military training at the Air Force Academy also includes specific leadership enrichment experiences for cadet commanders. From wing commander through squadron flight commander, cadet leaders must face the challenges that come with having the success of 4,000 members of the cadet wing in their hands, but you don't face this challenge alone. To help you succeed in your first real tests of command, the Academy conducts seminars on teamwork, communication, problem solving, delegation of authority, setting standards, wing goals, and conflict resolution. These seminars are very popular among cadets and have proven to be highly successful in helping develop the leadership skills of our future Air Force leaders.

## the chain of command

Integral to all aspects of military education is how cadets live and work in their daily activities. The cadet wing is organized into a military chain of command to mirror the organization of the rest of the Air Force. First-class cadet commanders and their cadet staffs command forty squadrons of approximately 100 cadets each. Those commanders in turn report to four Cadet Group Commanders who are led by the Cadet Wing Commander, the cadet in charge of the entire cadet wing. Supervising these cadets are Air Officers Commanding (AOC), located in each squadron and group. These Air Force officers oversee all cadet activities, provide instruction, and serve as role models as the cadets experience firsthand the processes of command and organization to accomplish the mission. The Academy Military Training Noncommissioned Officer (AMT NCO) complements the AOC and provides an enlisted role model perspective. Across the wide spectrum of cadet activities, from meals in Mitchell Hall, to the intramural athletic fields, to living arrangements within the dorms, the organizational focus is on the squadron.

## aviation and airmanship programs

A very large part of the Commandant of Cadets' military education program involves flying. Some of the most enjoyable training you will receive is in aviation and airmanship courses offered throughout your four years at the Academy. As early as BCT, you'll be exposed to air power via multiple flyovers of America's top-line aircraft. In addition, every cadet will have the opportunity to fly an orientation flight in a sailplane. After BCT, your training continues with instruction in the concepts of flight, navigation, and operations.

Approximately fifty percent of cadets are enrolled in a soaring course during their third-class year, where you'll pilot a sailplane and have the chance to solo. You'll also have the opportunity to take an elective course in freefall parachuting, complete five freefall parachute jumps and receive your basic military jump wings. You'll even have the chance to become an instructor in various aviation and airmanship programs. Cadets who desire and are qualified for Undergraduate Pilot Training (UPT) after graduation take a flight-screening course during their first-class year, in which they learn to fly and solo a propeller-driven aircraft. Altogether, aviation and airmanship courses will familiarize you with important activities in the Air Force and will possibly introduce you to a satisfying career in aviation.

### **Aviation**

During the fourth-class year, you'll have an opportunity to participate in a voluntary aviation program called "Project Fledgling" that includes a classroom introduction to basic aviation principles, as well as "flying time" in T-6 simulators. Elective aviation courses provide firsthand flight experience while furthering your knowledge and understanding of the flight environment. They teach flight concepts, basic and advanced aviation, and instrument principles and procedures. The aviation courses offered are varied, ranging from a course on Air Force combat operations to courses designed to prepare graduates to excel at Undergraduate Flight Training (UFT). Additionally, selected cadets are offered an opportunity to serve as Cadet Aviation Instructors, where they gain invaluable leadership experience both in the air and on the ground.

### **Airmanship Soaring Programs**

Nearly all third-class cadets receive instruction in flying a two-seat sailplane. Air Force pilots supervise the soaring program but cadets run it. Cadet instructor pilots provide most ground and flight instruction. Students in the basic soaring course may apply for enrollment in an advanced course that trains cadets to become soaring flight instructors. In this and other advanced courses, you can experience many aspects of soaring flight.

### **Parachuting**

Cadet volunteers who meet stringent physical requirements may enroll in the parachute program. Completing five freefall jumps earns you the Air Force parachutist badge. Selected cadets from the basic parachuting course may enroll in the parachute instructor course. Graduates of this course instruct others in the basic parachuting course and participate in advanced parachuting activities, to include demonstrations for the "Wings of Blue" parachute team.

### **Extracurricular Flying**

The Academy has an Aero Club where you can learn to fly club-owned aircraft during your free time. You may also join the Cadet Aviation Club. Members of this club are interested in general aviation and meet regularly to discuss and organize various club activities. As a member of the Aero Club or the Aviation Club, you receive discounts and privileges on certain aviation activities, including the chance to earn FAA ratings.

### **Powered Flight Program (pfp)**

Cadets who are interested in an air force career as a rated pilot, may have the opportunity to participate in the Academy's Powered Flight Program. Using T-41s, military instructors will introduce you to concepts of powered flight – based on proficiency, approximately 50% of these students will solo. The training includes ground and flight instruction under an AETC flying syllabus using the T-41 aircraft.

### **Intercollegiate Competition**

Cadets at the Academy who demonstrate high levels of ability in airmanship programs can compete at the intercollegiate level. Cadet Soaring Instructors compete in regional and national cross-country soaring and aerobatic events as members of the Cross-Country Soaring Team and the Aerobatic Demonstration Team. Cadet members of the Wings of Blue parachuting team compete in events throughout the country, culminating at the College National Parachuting Championships. Cadets on the Academy Flying Team also compete in regional and national level events. All of the teams are nationally recognized and perennially earn top honors. These teams also conduct demonstrations at public events at the Academy and throughout the nation.

## **AIRMANSHIP** (ArmnsHP)

Offered by the 306th Flying Training Group (306 FTG).

**ArmnsHP 251. Basic Soaring.** Ground school, sailplane flight training supporting the Academy's Officer Development System outcomes helping motivate students toward a career in the Air Force. Offered in the summer and both semesters during the academic day. Completion during summer fills one military training requirement.

**ArmnsHP 450. Airplane Rating, Private.** Dual and solo flight training to complete the requirements for an FAA Private Pilot Certificate. This training is conducted at the Academy Aero Club at student expense (some subsidy is available from the Aviation Club). No formal course enrollment.

**ArmnsHP 460. Airplane Rating, Commercial.** Dual and solo flight training to complete the requirements for an FAA Commercial Pilot Certificate. This training is conducted at the Academy Aero Club at student expense (some subsidy is available from the Aviation Club). No formal course enrollment.

**ArmnsHP 461. Cadet Soaring instructor Upgrade.** Current ground school instruction taught by 94 FTS officer personnel consists of 19 classroom hours. Lessons follow a sequential path for becoming a student instructor, starting with the basics of the airplane and finishing with fundamentals of instruction and instructor techniques. The flying portion includes approximately 80 sailplane sorties and 24 flight hours.

**ArmnsHP 465. Precision Flight Training - Academy Flying Team.** Selected cadets receive training in precision landings, cross-country navigation, aircraft preflight, instrument flying, message drop, aircraft identification, Federal Aviation Regulations, Aeronautical Information Manual, and Academy flying regulations. Qualified students may participate in national and international flying competitions. During the first summer following their selection for the competitive team, students spend the third summer period qualifying in the team's aircraft. During the fall and spring semesters, the Flying Team is considered a mission essential activity. ArmnsHP 465X indicates Precision Flying Team tryouts.

**ArmnsHP 470. Airplane Rating, Instrument.** Dual flight instruction to complete the requirements for an FAA Instrument Pilot Rating. Training is conducted at the Academy Aero Club at student expense (some subsidy is available from the Aviation Club). No formal course enrollment.

**ArmnsHP 472. Soaring Instructor.** Selected students serve as instructors in Airmanship 251. Completion during summer fulfills a military training leadership option. Students performing Cadet Soaring instructor Duty will not be eligible to perform Aviation instructor Duty except by written permission of 94 FTS.

**ArmnsHP 473. Cadet Soaring Instructor Duty.** Selected students serve as instructors in Airmanship 461. Students performing Cadet Soaring instructor Duty will not be eligible to perform Aviation instructor Duty except by written permission of 94 FTS and DFMI.

**ArmnsHP 474. Cross Country Soaring.** Ground school to include regulations, planning, weather, thermalling techniques, competition rules, and equipment use. Flight training includes precision on- and off-field landings, thermalling techniques, and dual/solo cross-country and competition sorties. Training camp conducted at a deployed location during 'Dead Week'. Qualified students may be selected to travel to regional and national cross-country soaring competitions. Third-class cadets are scheduled for two summer periods of AM-474 plus Operation Air Force. Second-class team members are scheduled for two summer periods of AM-474.

**ArmnsHP 475. Glider Aerobatics.** Ground and flight instruction includes spins, aerobatic maneuvers, precision flying techniques, and competition rules towards attaining Academy Cadet Spin Instructor Pilot (IP) and Demonstration Pilot ratings. Training camp conducted at a deployed location during Spring Break. Qualified students may be selected to travel to regional and national aerobatic competitions, air shows, and participate in home football game aerial demonstrations as part of the Academy's Soaring Demonstration Team. Third-class cadets are scheduled for two summer periods of AM-475 plus Operation Air Force. Second-class team members will be scheduled for two summer periods of AM-475.

**Armshp 480. Airplane Rating, Flight Instructor.** Dual flight training to complete the requirements for an FAA Flight instructor, Airplane Rating. Training conducted at the Academy Aero Club at the student expense (some subsidy is available from the Aviation Club). No formal course enrollment.

**Armshp 490. Basic Parachuting.** Instruction in basic free fall parachuting and familiarization with emergency parachuting as it pertains to future Air Force careers. Successful completion results in award of basic parachutist rating and badge. Completion during summer fills one military training requirement.

**Armshp 491. Advanced Parachute Training.** Ground and aerial training allows students to progress from initial free fall qualification to advanced free fall techniques, controlled body maneuvers, and precision landings. Introduction to instructional techniques, jumpmaster procedures, competitive parachuting and transition to Ram Air Canopies. (Students upgrading to Cadet Parachuting instructor duty are not eligible to enroll in any other Academy Aviation or Airmanship course during the same semester as Amshp 491.)

**Armshp 492. Jumpmaster/Instructor Training.** Introduces selected students to jumpmaster procedures and instructional concepts. Course follows a sequential path for becoming a student instructor/jumpmaster. Progression affords students advanced instruction in concepts and procedures required of Academy jumpmasters and parachuting instructors. Participation in a spring deployment is mandatory. Students upgrading to Cadet Parachuting instructor duty are not eligible to take any other aviation or airmanship courses during the same semester they are enrolled in Armshp 492. Students must successfully complete a qualification check ride and a final written exam with a minimum of 85% to pass.

**Armshp 496. Parachuting Instructor.** Selected students wishing to serve as instructors and jumpmasters for Armshp 490 and upgrade courses. Students participate in competitive parachuting events and parachute demonstrations throughout the U.S. (Students performing Cadet Parachuting instructor duty are not eligible to train as instructors in any other Academy Aviation or Airmanship courses.) Completion during summer fulfills a military training leadership requirement.

**SPACE** (Space Power Application, Capabilities, and Employment)  
Offered by the Commandant of Cadets.

**Space 215. SPACE Student.** Introduces Air Force Space Power Application, Capabilities, and Employment. Students explore current Air Force space mission areas during this 10-day course. Includes hands-on experience with selected operational space capabilities. Successful completion fulfills one requirement for award of the Cadet Basic Space Badge and one military training requirement.

**Space 350. Satellite Ground Station Certification.** Required to complete certification in the Academy's satellite command and control. Conducted in the Space System Research Center (SSRC) at the Academy. Current ground station instruction consists of eighteen classroom hours. Lessons follow a sequential path for becoming a qualified FalconSat Operator, starting with the basics of the FalconSAT series of satellites and finishing with a check ride. The on-console portion includes approximately 24 scenarios. Successful completion results in the award of the Cadet Senior Space Badge.

**Space 461. SPACE Operations Instructor/Evaluator Upgrade.** Following Space 350, select students may continue to become SPACE instructors. Selection depends on standing in Space 350. Space Operations instructor/Evaluator Upgrade is offered in the spring semester and is a prerequisite to Space 472 and Space 473. Course concludes with a qualification check ride evaluation. Successful completion results in the award of the Cadet Command Space Badge.

**Space 472. SPACE Instructor.** Selected students serve as instructors for Space 251. Completion fulfills a military training leadership option.

**Space 473. SPACE Operations Instructor Duty.** Selected students serve as instructors in Space 350 and Space 461 training the next generation of Space instructors. Completion fulfills a military training leadership option.

## **MILITARY TRAINING** (Mil Tng)

Offered by Training Support Directorate (CWT).

**Mil Tng 100. Basic Cadet Training (BCT).** A five and one-half week transition period from civilian to military life. Indoctrination in the overall Academy program, cadet regulations, the Honor Code, manual of arms, drill, customs and courtesies, introduction to basic Air Force weapons, a field encampment, and other general military subjects. Course is a graduation requirement.

**Mil Tng 101. Operation Air Force Program (OpsAF Non-Comm).** Three-week program conducted at Air Force installations worldwide. Students learn the roles, responsibilities, and expectations of enlisted personnel. Cadets gain an enlisted perspective.

**Mil Tng 201. Operation Air Force Program (OpsAF-3Lt).** Three-week program conducted at Air Force installations worldwide. Students learn the roles, responsibilities, and expectations of second lieutenants and also gain an understanding of the Air Force organization and a broad officer perspective in both support and operational squadrons. This course is a graduation requirement. AETC leadership and Civil Engineering–Field Engineering Research Laboratory (CE-FERL) are substitute courses that fulfill the graduation requirement

**Mil Tng 202. Operation Air Force Staff.** Selected students assist the Operation Air Force CICs with managing all aspects of the Operation Air Force program including: administrative support, transportation arrangements, dormitory management, cadet accountability, and base program manager coordination. Course is only for prior enlisted students who do not require or will not benefit from Mil Tng 101.

**Mil Tng 233/234/235/236. Admin Squadron.** Students in temporary hold for either the Physical Education Review Committee (PERC) (Mil Tng 234), the Academic Review Committee (ARC) (Mil Tng 235), the Military Review Committee (MRC) (Mil Tng 236), or for some other purpose (Mil Tng 233).

**Mil Tng 260. Global Engagement (GE).** Third-class cadets deploy into a pre-existing, bare-base location and are exposed to the challenges they will face as they join the Expeditionary Aerospace Forces (EAF) of the twenty-first century. The 10-day program includes EAF academics; five days of pre-deployment training including DoD certified training that can be transferred to the first active duty assignment (Chemical Warfare Training, and Terrorism/Anti-Terrorism); five days deployment to Jacks Valley Bare-Base location; and reconstitution. Course is a graduation requirement.

**Mil Tng 261. Global Engagement (International Students) (GE).** Program conducted by the international student's home country. Course substitutes for Mil Tng 260 for international students.

**Mil Tng 300. Operation Air Force Program (International Students).** Three-week program conducted by the international student's home country.

**Mil Tng 301. Operation Air Force Program. (OpsAF-Brevet Lt)** Three-week program conducted at Air Force installations worldwide. Students learn the roles, responsibilities, and expectations of company grade officers in an AFSC focused program, gain understanding of Air Force organizations and have efforts focused on learning what specific AFSC duty entails. OpsAF-Brevet Lt Deployed exposes selected students to AEF concepts through deployment to a Combatant Command's AOR. This exposure is anywhere from three to six weeks in duration. Each student will understand the Expeditionary Wing contribution to the Combatant Commander's mission and will be indoctrinated into the mobility readiness and deployment line process. Select CSRP activities are substitute courses that fulfill the Mil Tng 301 OpsAF requirement.

**Mil Tng 302. Navy Programs.** First- and second-class cadets volunteer for various Navy training courses. Specific courses vary from summer to summer. Programs are two to three weeks long.

**Mil Tng 303. Army Airborne.** First- and second-class cadets volunteer for Army Airborne training courses. Training conducted at an army location by U.S. Army personnel.

**Mil Tng 304. Army Air Assault.** First- and second-class cadets volunteer for Army (Air Assault) training courses. Training conducted at an army location. Program is two weeks long.

**Mil Tng 305. Marine Bulldog.** First- and second-class cadets volunteer for Marine training. The program is two to three weeks long. Program is a prerequisite to cross commissioning to the Marine Corps.

**Mil Tng 307. BSA Philmont Ranger.** Positions at Philmont Scout Ranch in Cimarron, New Mexico, as rangers or instructors in the staff camp areas.

**Mil Tng 309. Prep School BCT Cadre.** Students serve as cadre for Academy Prep School basic training.

**Mil Tng 313. Air Force Special Tactics Orientation.** Introduces students to Special Tactics history, missions, and career field specific skills. Students are required to participate in a rigorous physical fitness program that introduces them to physical exercises that are conducted during the pipeline. Course includes the following events: running, swimming, calisthenics, weight training, sports nutrition, sports medicine, and Combat Control related skills.

**Mil Tng 315. Training Wing Operations Center (TWOC).** Staff is responsible for manning the center 24 hours a day. Duties include maintaining wing locator information, emergency procedures notification, and information dissemination.

**Mil Tng 332. Summer Seminar.** Students serve as counselors and escorts for approximately 600 high school seniors from all 50 states. During the two one-week sessions, the high school students are housed in Vandenberg Hall, attend specific workshops, tour the Academy and surrounding areas, participate in recreational sports, and attend various evening programs. Qualified students help with some of the workshops.

**Mil Tng 351. Civil Engineering Field Engineering and Readiness Laboratory (FERL) Leadership.** First-class Civil Engineering or Environmental Engineering students selected by their departments serve as Squadron Commander, Chief of Operations, Flight Commanders, and Logistics Officers for Civ Engr 351. Students lead second-class students through hands-on engineering/construction activities, a variety of team building activities, and field trips. Flight Commanders deploy with students to active duty Air Force installations on Operation Civil Engineering Air Force (OpsCEAF). Logistics Officers and leadership cadre prepare site and activities at the Field Engineering and Readiness Laboratory (FERL) for Civ Engr 351.

**Mil Tng 352. SAME/USAF Engineering and Construction Camp Cadre (CE-SAME).** First-class Civil Engineering or Environmental Engineering students selected by their departments serve as Flight Commanders for high school students during the second summer period at the Field Engineering and Readiness Laboratory (FERL) complex in Jacks Valley. Cadets lead students through a variety of team building activities/competitions, hands-on engineering/construction activities, and field trips. Cadets prepare site and activities prior to camp while leading and mentoring their students during the camp.

**Mil Tng 360. Global Engagement Cadre.** Selected cadets serve as leadership for students enrolled in GE, managing all aspects of the GE program to include: Security Forces, Services, Civil Engineering, administrative support, transportation arrangements, dormitory management, cadet accountability, and base program manager coordination.

**Mil Tng 400/402. Basic Cadet Training (BCT) Cadre.** Leadership positions as instructors, officers, or NCOs in the cadet chain of command during BCT. Some areas include: Combat Arms Training, Obstacle Course, Assault Course, Confidence Course, Self-Aid/Buddy Care, Leadership Reaction Course, and Ground Combat Familiarization Course. Mil Tng 400 refers to first BCT during second summer period. Mil Tng 402 refers to second BCT during third summer period.

**Mil Tng 401. Operation Air Force Cadet-in-Charge.** Selected students assist the Operation Air Force Program Manager with managing all aspects of the Operations Air Force program to include: administrative support, transportation arrangements, dormitory management, cadet accountability, and base program manager coordination.

**Mil Tng 403. Basic Cadet Training Group Staff.** Cadet officer and NCO group leadership positions maintaining command, control, and accountability for Basic Cadet Training.

**Mil Tng 404. Aviation Group.** Career broadening cadet officer and NCO leadership positions maintaining command, control, accountability, and providing billeting for all students involved in summer aviation courses.

**Mil Tng 405. Basic Cadet Training Preparation.** Cadets assigned to prepare facilities and resources for Basic Cadet Training.

**Mil Tng 407. Mission Support Group.** Cadet Officer and NCO leadership positions maintaining command, control, and accountability. Provide billeting for all cadets taking summer academic courses, Summer Seminar, Sports Camp, and

transient cadets using cadet area facilities.

**Mil Tng 408. Sports Camp.** Career Broadening. First-class cadets accepted by the Athletic Department program manager to work sports camps during the first summer period.

**Mil Tng 411. AETC Leadership.** Leadership positions with a Basic Military Training Squadron at Lackland AFB, TX, as assistants to Military Training Instructors and as basic airmen training instructors and counselors. Meets the requirements for a military training leadership program and for Operation Air Force. Students cannot be scheduled for Operation Air Force after completing AETC Leadership.

**Mil Tng 412. Falconry.** Train recently hatched falcons for upcoming football season performances, train falcons on hand, public relations work, and assist in renovations/repairs of mews and equipment. Only student falconers are eligible.

**Mil Tng 418. Cadet Emergency Medical Technician (EMT).** Students perform as EMTs to fulfill summer program requirements for medical first responders.

**Mil Tng 435. Cadet Wing Leadership.** Selected students perform in Cadet Wing Command functions managing all aspects of the Cadet Wing to include: Wing Commander, Deputy Commander, Superintendent, Director of Operations, and Leadership Staff.

**Mil Tng 439. Summer Research.** First-class cadets spend 38 days at a government research facility working on a project, usually in their major's area. Summer Research participants will be scheduled for a third period leadership program. Students must be selected by their major's department for this program.

**Mil Tng 441. Cadet Summer Language Immersion Program (CSLIP).** Intensive foreign language and cultural study program at an accredited foreign university or language institute. The Academy currently sends eligible students to immersion programs in China, France, Germany, Japan, Latin America, Middle East, Russia, and Spain. All third- or second-class foreign language students are eligible to apply for the program, but preference is given to Arabic, Chinese, and Russian students. Program runs for four weeks, from Graduation Week through the end of the first summer period; participation is in lieu of leave. Participation in CSLIP provides across-the-board significant improvement in language skills and cultural understanding, as well as the ability to function with confidence in international/foreign environments.

**Mil Tng 442. Olmsted Foundation Language and Cultural Immersion Program.** Provides unique cultural and language learning opportunities for Academy faculty, staff, and students to develop and submit their own proposals to study specific international issues, cultures, histories, and languages in a variety of foreign countries around the world. Like CSLIP, preference is given to proposals to travel to the China, Middle East/Africa, and Russia; each proposal must have a strong foreign culture and foreign language component as its primary focus. Approximately 7 to 10 proposals are approved from over 25 submitted each year; most travel takes place during Graduation Week through the end of the first summer period. This program is in lieu of leave.

**Mil Tng 444. Summer Leave.** No Military Training credit.

**Mil Tng 446. Special Leave.** First-, second-, and third-class students requiring leave at a certain time during the summer. Examples include: third-class football players and students requiring leave for weddings or other special occasions.

**Mil Tng 447. Medical Leave.** First-, second-, and third-class students requiring leave at a certain time for scheduled medical operations or when sent home on recuperative leave.

**Mil Tng 451. Honor Staff.** First- and second-class students who teach honor lessons to basic cadets and process honor cases during the summer.

**Mil Tng 452. Media Staff.** First- and second-class students selected for cadet-in-charge (CIC) duty for media.

**Mil Tng 492. Military Strategic Studies Application Laboratories.** Cadet Air and Space instructors use a number of educational laboratories such as available aircraft, Air Warfare Laboratory simulators, aviation flight training devices, and the Space Education Laboratory. Students interact with visiting dignitaries such as congressional delegations, high school and university counselors, and General Officers. In addition, they host the air and space application portions of Summer Seminar, conduct integrated field studies, teen aviation camp, space camp, and ROTC summer visitations.

**Mil Tng 499. Internship.** First-class cadets working special research/internships at various temporary duty locations or on the Academy. These are individual programs structured for each student enrolled. The program may be scheduled for any one of the three summer periods. Internships may be longer than three weeks. Examples are the Georgetown and Washington Internship programs.

#### **CADET MILITARY TRAINING (CPME)**

Offered by the Commandant of Cadets.

**PDP 100/101. Fourth-Class Cadet Professional Military Education (CPME).** The fall semester focuses on the development of personal leadership competencies, such as mastering primary duties, building personal awareness, honing followership skills, adopting core values, and leading their peers by example. Spring semester fourth-class CPME introduces interpersonal leadership competencies they will use and develop during their third-class year.

**PDP 200/201. Third-Class Cadet Professional Military Education (CPME).** Fall semester focuses on the further development of interpersonal leadership competencies, such as coaching others, teambuilding, a broader appreciation of Air Force culture and doctrine, effective communication, and problem solving skills. Third-class CPME in the spring semester introduces students to team leadership competencies they will use and further develop during their second-class year.

**PDP 300/301. Second-Class Cadet Professional Military Education (CPME).** Fall semester builds on the skills developed in the previous two years and exposes students to principles of leadership and management of larger groups, such as applying team dynamics, integrating individual skills in support of a task, decision making skills, focusing on organizational goals, and broadening one's mentoring role. CPME in the spring semester introduces cadets to organizational leadership competencies they will use and develop during their first-class year.

**PDP 400/401. First-Class Cadet Professional Military Education (CPME).** Fall semester continues to build on the skills developed in the previous three years and points students towards organizational leadership competencies, such as influencing element, flight, squadron, and wing policy, integrating the efforts of small units toward broader objectives, and developing the talents of others. Spring semester CPME introduces operational Air Force concepts, personnel systems and programs, base services, and principles essential to the successful transition from cadet to Air Force officer.

center for character development



“To educate a person in mind and not in morals is to educate a menace to society.”

-T. Roosevelt

The Air Force Academy defines character as: “One’s moral compass, the sum of those qualities of moral excellence which compel a person to do the right thing despite pressure or temptations to the contrary.”

The Center’s mission is to facilitate programs and activities throughout all aspects of cadet life, which help cadets develop this internal moral compass. Its objective is to graduate officers who:

- Have forthright integrity, and voluntarily decide the right thing to do and do it.
- Are selfless in service to the country, the Air Force and their subordinates.
- Are committed to excellence in the performance of their personal and professional responsibilities.
- Respect the dignity of all human beings.
- Are decisive, even facing high risk.
- Take full responsibility for their decisions.
- Have the self-discipline, stamina and courage to do their duty well under the extreme and prolonged conditions of national defense.
- Appreciate the significance of spiritual values and beliefs to their own character development and that of the community.

The Center offers programs for both cadets and staff. Staff programs are aimed at creating an overall climate of character-based education throughout all aspects of Academy life. Cadet character and leadership education follows a developmental plan, which provides fundamental knowledge early in the cadet career, followed with a variety of developmental experiences to help cadets internalize the motivation for personal character development.

The Center for Character Development is organized into three divisions:

- Honor Division
- Character and Leadership Education Division
- Excellence Division

**The Honor Division** guides the Cadet Honor Committee in administering the Cadet Honor Code. Administration of the code involves adjudicating possible violations and recommending appropriate sanctions. The Honor Committee is composed of first- and second-class cadets elected from each squadron. They form the honor instructor cadre and are responsible for guiding cadets through the system should they be charged with violating the Code. Active duty personnel in the Honor Division oversee this process and ensure the Commandant or the Superintendent is provided complete case files. Although the presumptive sanction is disenrollment, the Commandant may sanction probation for a designated period on a case-by-case basis. Factors considered in sanctioning are the cadet’s experience under the Code, nature of the violation, forthrightness, and whether the cadet admitted or denied the violation.

The bedrock of moral and character education begins with a solid understanding and internalization of the cadet honor code. Instruction on the code, system processing, and the honor probation program begin during BCT, and continue throughout a cadets’ four years at the Academy. In the first two years, instruction focuses on understanding and living under the Code, and in the final two years, emphasis is placed on cadets living an honorable life, while helping others to do the same.

**The Character and Leadership Education Division** provides a variety of classroom, seminar, workshop, and experiential-based learning programs to all cadets, beginning when they enter BCT, and continuing each year through their last semester at the Academy.

Each year, cadets experience a different aspect of character-based transformational leadership education. This education plan is built to fully compliment the Officer Development System, and presents character enrichment in a developmental fashion, beginning with personal understanding, moving to interpersonal skills development, followed by understanding of the importance of servant leadership, and culminating in organizational improvement through analyzing ethical dilemmas.

Fourth-class cadets begin this character development journey by encountering a program called VECTOR (Vital Effective Character Through Observation and Reflection). This twelve-hour, two-part (Part I in the Fall and Part II in the Spring) is an interactive seminar that focuses on personal reflection, where cadets examine their own values, purpose, vision, and influence. VECTOR illustrates to fourth-class cadets the importance of developing a strong personal foundation while

further enhancing their own leadership styles. Attendees are exposed to various leadership styles and qualities in the form of movie clips and discussions with active duty or retired officers and senior NCOs. They are then challenged to form their own opinions on how they will apply appropriate character and leadership traits, both here at the Academy and with the greater Air Force.

Third-class cadets complete the Respect and Responsibility (R&R) seminar. This eight-hour seminar/outdoor adventure program is designed to take the cadets out of their normal environment while helping them discover valuable information about themselves, others and the interpersonal interactions that foster a healthy command environment. Students attempt a graduated series of activities, involving both emotional and physical risk, designed around human relations and diversity issues. The goals and benefits of the R&R program are for participants to acknowledge differences and similarities in their own and others' leadership behaviors; appreciate the impact of respect, cooperation, and trust on problem solving, decision making, and leadership effectiveness; develop skills that foster and encourage open and honest communications; and to challenge views and biases that undermine a positive and productive work environment.

Second-class cadets will take part in the Leaders In Flight Today (LIFT) seminar. The LIFT program is an intensive eight-hour seminar for second class cadets conducted at the Association of Graduates (AOG) building. LIFT attendees focus on high performance, dynamic team building with an emphasis on becoming "Servants of the Nation." Team building topics emphasize servant leadership, trust, loyalty, moral courage, NCO perspectives, being a part of something larger than oneself, and interpersonal skills development. The seminar stresses character and leadership development using a variety of teaching tools and techniques, including experiential learning activities, case study analysis and small group facilitation with active duty and retired officers and NCOs. The day culminates with an exercise that provides cadets with an opportunity to field test LIFT's major insights within their squadron. This commitment to follow-up and follow-through encourages cadets to build their own high performance teams.

The cadets' mandatory character and leadership development journey culminates in our first-class, program—the Academy Character Enrichment Seminar (ACES). The ACES capstone program is a dynamic eight-hour offsite seminar designed to focus attendees on the character and ethical demands placed on Air Force officers. It is tied to the organization level of the ODS PITO model (personal, interpersonal, team and organizational). There is also an added focus on ensuring that cadets have a sound, fundamental process for evaluating and making moral and ethical decisions. Attendees are exposed to a myriad of discussions, issues, concepts, and experiences designed to convey the importance of character and leadership development in self and others and the difference between being an "effective" and being a "truly good" leader. Participants engage in dialogue throughout the day with active duty and retired officer and NCO facilitators, guest lecturers, and their fellow cadets that highlight examples of significant, challenging ethical dilemmas they might encounter in their first-class year and in their military careers. Finally, there is an emphasis on the critical role that first-class cadets play in teaching and developing character traits in others; particularly their subordinate three classes (i.e. fourth class, third class, and second class cadets).

The end-goal is to inspire and excite cadets about their future roles as officers and leaders in the world's best Air Force, and ensure that Academy character programs not only make a positive difference in cadet development, but contribute directly to the Air Force and Department of Defense goal of having officers of character leading our nation's military.

Our final character development program involves optional cadet participation at the Adventure Based Learning Facility (ABL). The ABL involves a series of high and low ropes course elements, which help students develop trust, solve problems, build team unity, and enhance effective communication. Participants receive a bold, discovery oriented growth opportunity that illustrates the staggering potential of collaborative effort, team-learning, and organizational synergy.

The third division is the **Excellence Division**. Its focus is to provide cadets opportunities for practical application of their character and leadership education. This is accomplished primarily through our four largest programs. The National Character and Leadership Symposium (NCLS) held in February, brings 40 speakers who have distinguished themselves in political, military, economic, or sports fields to offer their perspectives on character and leadership together with the cadet wing and visiting university students and faculty from around the globe. The purpose of NCLS is to share knowledge, expertise, and to continue a scholarly dialogue between these distinguished speakers, cadets and civilian university students. The Excellence Division also sponsors the semi-annual Falcon Heritage Forum, which links a distinguished veteran with each cadet squadron for the two-day forum. The veterans attend classes, share their military service with the cadets, and attend athletic events. Cadets are inspired to a greater commitment to integrity, service, and excellence as they are challenged by the experiences and accomplishments of these veterans. The event culminates with a formal dinner and keynote address from the veterans. Cadet Service Learning allows cadets the opportunity to take their character and leadership education into the community by participating in an on-going program like Big

Brothers/Big Sisters, serving in a downtown soup kitchen, or a one time event of painting a house or building homes for the less fortunate during an Alternative Spring Break project. The Cadet Wing donates thousands of hours annually to community service. The Excellence Division also provides Core Values education classes for Basic Cadets during BCT.

In sum, character development will be a crucial, all-encompassing part of your Academy experience. From the time you enter the Academy until graduation, you can expect to see various character development programs in every aspect of your life with the ultimate goal of imbuing you with the inner desire to put integrity first, place service before self, and strive for excellence in all you do.

## academy counseling center

The Academy Counseling Center is part of the 34th Training Wing. The primary goal of the center is to enhance the well-being and personal effectiveness of Academy cadets as they strive to become Air Force officers. The internationally accredited center combines the types of service provided at major colleges and universities with the services unique to a federal military academy in order to meet the full range of cadet needs. The Counseling Center is organized into four divisions: General Counseling Services, Human Relations, Sexual Assault Services and Substance Abuse Prevention Education. Counseling services include, but are not limited to relationship issues, biofeedback, stress, adjustment to the Academy and military life, anxiety, self-esteem, eating problems, resolving childhood abuse and surviving sexual assault experiences. The Counseling Center is also involved in a robust prevention, education and outreach program in the areas of substance abuse, sexual assault and human relations.

The Academy Counseling Center takes great pride in the availability of services to cadets. The staff is comprised of licensed social workers, psychologists, behavioral health technicians and certified alcohol abuse counselors, well versed in the developmental, personal, and military needs of the young men and women at the Academy. The staff is committed to the ethical obligation to serve the welfare of each person while preserving their dignity and respect. Thus, the Center is a capable resource whose fundamental purpose is to serve cadets and help them realize their potential.

academics



Graduates of the Air Force Academy must be intellectually prepared to assume professional and leadership roles. The academic curriculum offers a balanced sequence of required courses that develops future Air Force officers with innovative, analytical, and resourceful minds. You'll receive a broad education in the basic sciences, engineering, humanities, and the social sciences. The Air Force Academy offers 32 majors and two minors. You'll take elective courses that suit you and give you a background for possible graduate education during your career.

## brigadier general dana h. born

### Dean of the Faculty



Brigadier General Dana H. Born is the Dean of the Faculty. A graduate of the Air Force Academy, Class of 1983, the General has served in various support and command positions—including speech writer for the Secretary of the Air Force in Washington, D.C.; Executive Officer, Exchange Office with the Royal Australian Air Force in Australia; and most recently as Professor and Department Head of the Behavioral Sciences and Leadership Department at the United States Air Force Academy. General Born earned a bachelor of science degree (graduating with distinction) from the Air Force Academy, a master's degree in Experimental Psychology from Trinity University in Texas, a master's degree in Research Psychology from the University of Melbourne in Australia, and a doctoral degree in Industrial and Organizational Psychology from Pennsylvania State University. She attended Squadron Officer School, Air Command and Staff College, and the Air War College at Maxwell

Air Force Base, Alabama. General Born's decorations include the Defense Meritorious Service Medal, the Meritorious Service Medal with three oak-leaf clusters, and the Air Force Commendation Medal with one oak-leaf cluster. She assumed duties as the Dean of the Faculty in October 2004.

*"The education of America's future leaders is paramount to our mission. Our primary role as faculty is to provide instruction and experience to all cadets so they graduate with the knowledge, character, and motivation essential to leadership as career officers. Through challenging academic programs, the Academy provides the tools and opportunities to develop the reasoning, communication, and problem-solving skills necessary for our future officers. Equally important is the faculty's responsibility to help cadets develop integrity and character as we motivate them toward military service. Serving as professional role models, Academy instructors—the majority of whom are Air Force officers—combine the finest academic preparation with a wide variety of Air Force skills and specialties to enrich classroom instruction. Through highly personalized academic counseling and student assistance, our faculty and staff are dedicated to providing each cadet with the greatest opportunity for success. For those cadets who excel academically, the Academy offers many postgraduate scholarships to further enhance the young officer's professional development. The faculty is governed by three guiding principles: provide a quality education, promote trust and responsibility, and be a community of airman-scholar-citizens. With this focus, we are able to graduate knowledgeable and motivated cadets committed to integrity, excellence and selflessness."*

## semester schedule

The fall and spring semesters contain approximately 17 weeks of instruction (40 lessons) and they extend from early August to the week before Christmas and the first week in January through mid-May. Each semester includes five days for final examinations. A limited number of academic courses are offered for the third, second-, and first-class cadets during the Academy's 10-week summer term. Early in BCT, you'll take placement examinations offered by the academic departments. Your individual ability, preparation, and achievement determine what classes you'll take during your first semester.

## grading

Most courses at the Academy are graded on a grade point scale, with an "A" worth four quality points per semester hour, and an "F" worth zero. Quizzes, examinations, and class recitations determine your grades. You'll receive a pass/fail grade in other courses, particularly military training, and airmanship. You should normally spend two hours in outside preparation for each hour spent in class. You receive a computerized progress report at mid-semester and a final report at the end of the semester with your grades.

## cadet achievement

A semester 3.0 or greater grade point average (GPA) earns you a place on the Dean's List and you may wear a silver star on your uniform. A silver wreath shows you're on the Commandant's List and have earned a military performance average (MPA) of 3.0 or greater. Cadets who earn a 3.0 or greater physical education average (PEA) are awarded a silver lightning bolt by the Director of Athletics. You may be entitled to wear any two of these awards in combination. If you earn all three, you'll wear a silver star within the wreath surrounded by two lightning bolts to show you're on the Superintendent's List. If you're on any of these lists, you may be awarded additional privileges on weekends.

## post-graduate education opportunities

Graduating cadets can compete to receive scholarships to attend civilian graduate schools immediately after graduation. Up to three percent of each graduating class may be sent directly to dental, medical, or nursing school upon graduation. Graduates in the top 15 percent of their class will normally be assured of future graduate education for a master's degree, provided they have performed well as officers and the Air Force has a need for the degree program they wish to pursue. These graduates will be eligible for attendance after three years on active duty. Other graduates may also have opportunities for graduate education through the Air Force Institute of Technology (AFIT) program. Most degree-granting programs are conducted in conjunction with civilian universities. Normally during your career you'll attend one or more of the armed forces' schools for advanced professional studies. Although there is no provision for direct entry into law school immediately upon graduation, graduates may compete for law school once on active duty.

## career opportunities

Many graduates choose the Air Force as a profession and remain in the service for at least 20 years. Professionals expect monetary reward and job security, so you can count on these benefits as an Air Force officer. Added to a competitive promotion system and accompanying base salary are allowances for food, quarters, and flying or special skills, such as those for doctors. Medical, commissary, base exchange, base housing, and many other services are available to you and your dependents. Travel opportunities and a generous leave policy round out this benefits package. A sound retirement program is based on at least 20 years of military service.

As the Air Force moves into the 21st century, it faces an increasingly complex global environment. To meet the challenges ahead, we will need a number of Air Force officers with specialized language skills to operate in a multinational environment. Officers with cultural and foreign language skills interact more effectively with allies and enhance teamwork. If you are already fluent in a language other than English and have experience in a multi-national environment, you may be eligible for advanced training and assignments in the Foreign Area Officer program during your career. A career in the Air Force involves obligations as well as benefits. You'll be expected to be a professional, use the leadership skills you developed as a cadet, and serve your country with dedication.

## enrichment

Each academic department offers independent study courses for cadets to research individualized topics. You may request special topics or courses covering contemporary issues. Course content is continually updated to stay abreast of current developments. Term papers and laboratory work also offer opportunities to engage in original research.

Grades achieved in AP/IB courses are given additional weighting for admission. Scores received on AP/IB exams are not used for admission consideration. However, if you score well on the AP/IB tests, you may validate some Academy courses. Some departments administer a test to you once you arrive; earning high marks on the test may enable you to be placed in an accelerated or advanced course, or perhaps receive validation credit and substitute another course. Following is a listing of Academy departments accepting AP test scores.

Department	Course	AP Test	IB Test	Comments
Behavioral Science	Beh Sci 110	4/5 in psychology	6/7	
Biology	Bio 215	4/5	6/7	
Chemistry	Chem141/142	3/4/5		
Computer Science	Comp Sci 211	4/5		Generally required to take course if student has taken only the AP Microeconomics exam
Economics	Econ 200	4/5		
English	English 111	5 in literature/ composition or language/composition	5/6/7	IB exam transcript must show English taken at the higher level (HL)
Foreign Language	For Lang 131/132	4/5		
History	History 101	5		World History
History	History 345	5		European History
History	History 352	5		American History
Mathematics	Math 141	4/5 AP Exam		Plus adequate score on AFA Placement Exam
Mathematics	Math 142	4/5 AP BC Exam		Plus adequate score on AFA Placement Exam
Mathematics	Math 300/356	4/5 AP Exam		Plus adequate score on AFA Placement Exam
Physics	Physics 110/215	4/5 AP Physics C		

With a 3.25 GPA, you may overload courses, taking classes beyond the normal semester maximum for wider latitude in your course program planning. Upper-class cadets with a 2.60 GPA may audit a course beyond the normal semester maximum. Upper-class cadets with a 3.25 GPA may overload and audit a course. If a cadet audits a course, attendance is optional, no graded work is accomplished, and the audited course does not appear on the transcript.

Our academic core curriculum (32 three semester hour core courses) is designed to create an intentional, coherent whole organized developmentally to promote learning and growth in three main content areas:

- Culture and Global Awareness,
- Leadership and Human Behavior, and
- Science and Technology.

The complete academic curriculum (core plus majors courses) for the Classes of 2011 and beyond consists of 47 three semester hour courses for disciplinary majors and 45 three semester hour courses for divisional majors. The curriculum breaks down as follows:

- 32 core courses
- 14 major's courses for disciplinary majors, 12 major's courses for divisional majors, and
- 9 elective courses for Bachelor of Science Program (BSP)
- 1 Academy Option course
- 1 First Year Experience (FYE, 1 sem hr)
  - = 48 courses, 142 sem hrs (disciplinary)/136 sem hrs (divisional)
  - +5 sem hrs (ten ½ sem hr Physical Education courses).
  - = 147 sem hrs total (disciplinary)/141 sem hrs total (divisional)/132 sem hrs total (BSP)

Generally, cadets complete the 47 course curriculum (plus FYE) by taking 5 courses during the fall semester of their 4th class year and 6 courses during each of the subsequent 7 semesters. The majors and course descriptions are listed later in this section.

## exchange programs

Selected cadets experience the traditions and cultures of foreign countries during spring break exchange visits of 7-10 days with the air force academies of Argentina, Bolivia, Brazil, Chile, Colombia, Egypt, England, Germany, Japan, Jordan, Korea, Peru, Spain, Turkey and Ukraine, among others. Each fall semester a maximum of 24 cadets also participate in a semester exchange program with some of these countries' air force academies, where they experience more extensively the academic, military, athletic, and social activities of the host academy. The Academy's semester exchange with France's Ecole de l'air began in 1969. We began an exchange with the German Offizierschule der Luftwaffe in fall 1996, with the Chilean Escuela de Aviacion in fall 2000, with the Spanish Air Force Academy in fall 2001 and with the Canadian Air Force Academy in 2002. In future years we hope to establish exchanges with Arabic-, Chinese-, and Russian-speaking academies. Also, during the fall and spring semesters, a small group of second-class cadets trades places with their counterparts from West Point, Annapolis, and the Coast Guard Academy. This interservice exchange provides a better understanding of the other services and develops some uniformity among programs at the academies.

## study abroad

Selected cadets studying Arabic, Chinese, or Russian experience a semester-long study abroad program at foreign civilian universities. Current programs exist with Nanjing University in China, Al Akhawayn University in Morocco, and Vononezh State University in Russia. We continue to explore opportunities in other countries for other languages.

## degree paths

Several graduation paths are open to you, depending on your abilities and interests. The faculty has 20 departments offering 32 academic majors. There are 23 disciplinary, four divisional, and five interdisciplinary majors.

## graduation requirements

To graduate you must, a) demonstrate an aptitude for commissioned service and leadership, b) be satisfactory in conduct, c) be proficient in physical education and military training, d) complete the requirements for the core curriculum and for an academic major, and e) have a minimum cumulative and core GPA of 2.00.

## accreditation

The Air Force Academy is a fully accredited institution of higher learning. The Higher Learning Commission, of The North Central Association of Colleges and Schools, 30 N. LaSalle Street, Suite 2400, Chicago, Illinois 60602-2504, phone 312-263-0456, accredits the standard Bachelor of Science degree. The aeronautical engineering, astronautical engineering, civil engineering, computer engineering, electrical engineering, engineering mechanics, environmental engineering, and mechanical engineering majors are accredited by the Engineering Accreditation Commission of ABET Inc., 111 Market Place, Suite 1050, Baltimore MD 21202-4012, telephone: (410) 347-7700, composed of representatives of the major professional engineering societies. The computer science major is accredited by the Computing Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore MD 21202-4012, telephone: (410) 347-7700. The Committee on Professional Training of the American Chemical Society approves the chemistry, biochemistry and materials chemistry majors. The Association for the Advancement of Collegiate Schools of Business (AACSB) accredits the management degree.

When you complete a major's requirements, you earn the specified degree.

## instructional methods

The Academy faculty uses lectures, discussions, demonstrations, tutorials, and seminars in teaching. The small size of most classes, usually 15-20 cadets, makes the discussions practical and popular. The relaxed classroom atmosphere encourages free communication between the instructor and cadets. You may also receive extra instruction to develop your understanding of a subject and to improve your grades. Tests range from essay questions and themes to short-answer and multiple-choice items. Quizzes, graded reviews, or final examinations determine your progress.

## directorate of education

The Directorate of Education is a staff agency that includes; the Center for Educational Excellence, the Technical Assistance Center, the Air Force Institute for National Security Studies, and the Air Force Institute for Information Technology Applications. The purpose of the directorate is to enhance the quality of teaching and learning at the Academy. The Directorate of Education is the primary academic support agency for faculty development, academic assessment, institutional and programmatic accreditation, and educational technology integration.

## office of the registrar

The Office of the Registrar staff administers the entire curriculum, from conducting registration, to certifying you've met all degree and majors requirements, and coordinating the graduation ceremony.

## student academic services

The Student Academic Services Center offers courses and individualized instruction designed to increase cadet academic performance. If you want to improve your time management, general study skills, reading rate and comprehension, writing skills, or need tutoring in a specific core course, the Student Academic Services Center staff can help. Information on graduate scholarship opportunities is also available.

## visual services

Supplemental instruction is available using satellite down link, videotape, and live transmission to classrooms and dormitories. Also available are state-of-the-art interactive media for computer based instruction, video production support, digital graphic and photographic products, and self-help video origination and editing. A lending facility provides notebook computers, linear/digital projectors, course videotapes, and traditional projection/audio equipment.

## classrooms and laboratories

Most classes are in small classrooms. However, some are in the larger, tiered lecture rooms to allow plenty of interactions between students and instructors. There are also large lecture halls for assemblies. In the aeronautics laboratory, you'll use a subsonic continuous wind tunnel, a trisonic blow down tunnel, an F109 high-bypass turbofan engine, a J69 and a J85 operational turbojet engine, a rocket test cell, and internal combustion engines. The turbojet engines, which are flown in the T-37 and T-38 trainer aircraft respectively, let you operate the actual engines flown in pilot training.

The Department of Engineering Mechanics' Applied Mechanics Laboratory is one of the most modern and best-equipped undergraduate labs in the country. It provides a wide array of tools and equipment for hands-on learning for class projects and labs. Cadets are encouraged to learn how to use a variety of wood- and metal-working equipment such as a lathe, computer controlled mill, welding equipment, material testing systems, and composite material fabrication tools. In addition, a separate garage facility, complete with a full-scale chassis dynamometer, provides a unique opportunity for cadets to apply skills learned in their courses; among many other projects, cadets design and fabricate an off-road vehicle and a formula car for national intercollegiate design competitions.

Three aeronautics laboratories contain items unique to an undergraduate school. Workstations with digital and analog computers, facilities for small satellite design, fabrication, and testing, rocket design and build-up areas, and high fidelity orbital analysis software support research and classroom activities. Several courses use the Engineering Division laboratory's metal and wood shops and electronic equipment.

The foreign language learning center includes workstations using interactive videodiscs and a sophisticated local-area network. Research and teaching innovations place the Department of Foreign Languages among the national leaders in using leading-edge technologies for foreign language instruction.

Cadets also study astronomy in the Academy observatory using both 24- and 16-inch telescopes configured with state-of-the-art computer controlled drive systems. Cadets learn how astronomers explore the universe by various detectors: two CCD (Charged Coupled Device) photometers, a photoelectric photometer, a CCD spectrograph, and film.

## networked classroom laboratory

The Academy's first networked computer laboratory (NCL) was established in 1992. It supports instructors teaching in any academic area, beta testing of operating systems and application software, and hands-on training for faculty and staff. The NCL PCs are upgraded regularly to assure that they are capable of handling new and large software. The Directorate of Education opened a common use multimedia laboratory (MML) in January 2000. The lab contains desktop computers, servers, scanners, printers, a copier, a one-gun projector, a binding machine, a laminating machine, drops for laptops, a wireless access point and on-site help. This facility is open seven days a week and operates the same hours as the library. The on-site help is the biggest attraction for students and faculty. In addition to the hardware, the lab computers contain most of the software applications used by the Academy's academic and military training departments. The location, convenience, and just-in-time help are not the only advantages of the MML; it is also the perfect technology testing and research environment. It allows technology professionals and instructors to evaluate and test leading-edge educational technology in a controlled environment. The Academy opened a Distance Learning Center (DLC) during the fall 2000 semester. Using state-of-the-art video teleconferencing equipment, the DLC supports a variety of academic courses. Cadets "join" classes at other educational institutions, including other service academies, interact with guest lecturers, and participate in dialogues with students from other colleges and universities. The Center also hosts a variety of administrative meetings, saving Academy personnel both time and travel expenses.

## computers

Continually updated computer equipment means you'll use one of the finest undergraduate computer centers in existence. A local area network connects every dormitory room, faculty and staff office, classroom, and laboratory at the Academy. You'll receive a brand new, sophisticated microcomputer at the start of your fourth-class year, right after BCT. You will use your computer in virtually every class you take at the Air Force Academy. Consequently, typing skills are a necessity, not a luxury. We strongly recommend that you learn to type at least 25 words per minute accurately prior to your arrival. All hardware and software that you use must be identical, so don't buy your own microcomputer before entering the Academy. We'll bill your pay account, so once your account is paid, the system is yours.

## air force academy (mcdermott) library

The library serves your academic, research, and recreational reading needs. Professional librarians staff the library 88 hours a week. It maintains over 1.5 million items including: books, national and international journal and newspaper subscriptions, technical reports, an audio collection, and a web page with links to a number of on-line indexes, abstracts, and full-text document services. The library's integrated computer system provides access to library holdings and is accessible from all floors of the library, faculty offices, and cadet rooms. We recently added wireless capability throughout the library, so you can work online from any location you choose using a notebook computer.

The reference collection contains standard and specialized works on most subject areas. We also provide for electronic searching of selected indexes and access to on-line and CDROM databases that are available to cadets at no cost. You may use U.S. government and international agency documents in the Academy's Documents Depository. Our special collections include major works in aeronautics and military aviation history as well as other documents and papers from distinguished Air Force and military officers.

## deficiency and disenrollment

You'll be deficient in academic studies at mid-semester or the end of a semester if any of the following occur: (1) you have a grade of "F" in one or more courses, (2) you have a controllable incomplete ("I") in one or more courses, or (3) your cumulative, or semester GPA is less than 2.0.

If you're deficient, an Academic Review Committee (ARC) may recommend you repeat or take a specific course during a subsequent semester, under load one course, change academic majors, take a summer class in place of leave, be turned back to the next succeeding class, or take any other action deemed appropriate. The Superintendent will consider the committee's recommendation and make the final decision. If you are seriously deficient, you may face academic disenrollment.

You'll be deficient in military performance if you fail a Professional Competency Exam or if your MPA is below 2.0 at the end of the semester. A Military Review Committee (MRC) evaluates deficient cadets and places them on aptitude probation or starts other corrective action. The committee may recommend that the Academy Board disenroll a cadet seriously deficient in conduct or aptitude for commissioned service.

If you fail one or more items on the Physical Fitness Test (PFT) and have a total score below 250, or if your 1.5-mile aerobics run time is slower than 11:15 (men) or 13:31 (women), you'll be deficient in physical education. You'll also be deficient if you fail any of your physical education instruction. A physical education review committee considers deficient cadets after the final PFT make-up test each semester. The committee may recommend a remedial conditioning program, athletic probation, attendance at a physical education program in place of leave during the summer term, turn back to the next class, or disenrollment.

## the faculty

The Academy's faculty is composed of approximately 75 percent Air Force officers and 25 percent civilian professors. A few officers from other branches of the U.S. Armed Forces and from allied nations supplement the faculty, as do several distinguished visiting civilian professors. Unlike most institutions of higher education, the Academy has no graduate students to work as teachers or laboratory assistants. Each faculty member must possess at least a master's degree, and approximately 50 percent have doctoral degrees. Ten percent of the faculty holds the academic rank of professor; 18 percent associate professor; 44 percent assistant professor; and 28 percent instructor. Faculty members possess degrees from such outstanding colleges and universities as Harvard, Stanford, Yale, Princeton, Duke, and the Mass. Institute of Technology, as well as from foreign universities such as Kings College-University of London and Oxford University in England.

Faculty members maintain close contact with the cadets, and not just in the classroom. They sponsor extracurricular activities and athletics, and they frequently adopt squadrons and attend their special events. Many contribute to the literature and progress in their fields through research projects. All departments use the talents of their best students in their research efforts. During the summer, faculty members often serve as consultants to other Air Force installations.

## divisional and disciplinary majors outlined

We've briefly outlined each major, listing the course sequence. You can find course descriptions throughout this section. As you study these summaries, keep in mind that you must complete all the requirements to major in a subject area. You may change your major if you can meet the new requirements without excessive overloads. If you fulfill all requirements, you may earn more than one major.

# aeronautical engineering major

Successful completion of the Aeronautical Engineering major leads to the degree of Bachelor of Science in Aeronautical Engineering, and prepares cadets for a wide variety of Air Force assignments in research and development, testing, and operations in the discipline. The Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore MD 21202-4012, telephone: (410) 347-7700 accredits this degree.

Program Operational Goals define attributes and capabilities young graduates of the Academy's Aeronautical Engineering Program are expected to exhibit.

The goal of the Aeronautical Engineering program is to prepare cadets to become leaders of character who:

- Possess breadth of integrated, fundamental knowledge in engineering, basic sciences, social sciences, and the humanities; and depth of knowledge in aeronautical engineering.
- Communicate effectively.
- Work effectively on teams and grow into team leaders.
- Are independent learners, and as applicable, are successful in graduate school.
- Can apply their knowledge and skills to solve Air Force engineering problems, both well- and ill-defined.
- Know and practice their ethical, professional, and community responsibilities as embodied in the Air Force core values.

Upon successful completion of the Aeronautical Engineering program cadets will demonstrate satisfactory:

- Use of fundamental knowledge to solve aeronautical engineering problems commensurate with a Bachelor of Science degree.
- Ability to plan and execute experimental and computational investigations, and interpret and analyze data from such investigations to formulate sound conclusions.
- Development and evaluation of engineering designs that meet customer needs.
- Use of speaking and writing skills to communicate effectively.
- Ability to work effectively as a member of a multidisciplinary team.
- Skills to engage in independent learning.

In the Aeronautical Engineering major, studies in aerodynamics, flight mechanics, propulsion, aircraft structures, and experimental methods prepare cadets to succeed in either of the two-course design sequences, aircraft design or aircraft engine design.

## Suggested Course Sequence:

3rd-Class Year	2nd-Class Year	1st-Class Year
Aero Engr 315	Aero Engr 341	Academy Option A. E. Elective
Chem 200	Aero Engr 342	Aero Design Elective
Econ 201	Aero Engr 351	Aero Engr 442
El Engr 231	Aero Engr 352	Aero Engr 471
Engr Mech 220	Aero Engr 361	Aero Engr 481
Law 220	Beh Sci 310	Astro Engr 410
Math 243	English 211	Biology 315
Math 245	Engr Mech 320	English 411
MSS 200	Engr Mech 330	MSS 400
Physics 215	History 302	Philos 310
Pol Sci 211	Math 346	Soc Sci 412
Sys Opt Aero Engr 241	Math 356	Structures Elective

## AERONAUTICS (Aero Engr)

Offered by the Department of Aeronautics.

**Aero Engr 241. Aero-Thermodynamics.** Fundamentals of the 1st and 2nd laws of thermodynamics applied to systems and control volumes. Foundations in heat transfer. Control volume approaches to the equations of motion of a fluid. Applications of gas dynamics to incompressible and compressible flows through nozzles, diffusers, and turbomachinery. Isentropic flows to include Prandtl-Meyer expansions, and non-isentropic flows to include normal and oblique shocks, and flows with simple

friction and heat transfer. Foundations in engineering problem solving.

**Aero Engr 315. Fundamentals of Aeronautics.** Introduction to aircraft design, fluid mechanics, airfoil and wing aerodynamics, steady and accelerated aircraft performance, and stability and control. Interdisciplinary design synthesis, analysis and decision-making (including economic, political, and other non-technical considerations) of an aircraft to meet a contemporary requirement.

**Aero Engr 315Z. Fundamentals of Aeronautics - French language section.** Section taught in French; available for students qualified for Aero Engr 315 and having successfully completed or validated French 321; counts as a course for the French Language Minor and for a major's foreign language requirement. Requires DFF approval.

**Aero Engr 341. Aeronautical Fluid Dynamics.** Fluid properties, the basic equations of motion: the continuity equation, conservation of linear momentum, and conservation of energy (both the differential and the integral forms). Use of the integral momentum equation to experimentally determine the drag acting on a cylinder in a low-speed stream; spread-sheet computation of unsteady Poiseuille flow; spread-sheet computation of a steady, laminar boundary-layer; turbulent boundary-layer experiment. Stream functions. Potential functions.

**Aero Engr 342. Computational Aerodynamics.** This course covers the theory and application of modern computational tools used to predict fluid flows around basic and complex geometries. The course is intended to give the student the necessary knowledge to choose the relevant computational tool and perform independent computational analysis of moderately complex geometries. The course will cover grid generation, computational fluid dynamic (CFD) solvers, and post-processing using state-of-the-art tools, as well as computational potential methods such as panel codes or vortex lattice codes. The course is project-oriented and explores the important concepts of temporal and spatial resolution, stability and convergence, and flow-field analysis.

**Aero Engr 351. Aircraft Performance and Static Stability.** Aircraft force, moment and response definition in various coordinate systems. Takeoff and landing, cruise, climbs, turns and other accelerated performance by both analytic and numerical methods. Static stability and control and related aircraft design considerations. Design project.

**Aero Engr 352. Aircraft Dynamic Stability and Control.** Aircraft equations of motion. Examination of aircraft dynamic modes based on both limited and full degree of freedom models utilizing analytical and numerical methods. Aircraft design considerations. Determination and evaluation of aircraft flying qualities against military specifications. Application of control system theory to the design of aircraft stability augmentation systems and autopilots. Control system design project.

**Aero Engr 361. Propulsion I.** Introduction to Brayton and jet engine cycles. Application of aero-thermodynamics to aircraft jet engines and major engine components. Overview of the design, performance, and applications of turboprops/shafts, turbofans, turbojets, ramjets, and scramjets. Focus on preliminary cycle analysis of aircraft gas turbine engines to include mission analysis, parametric cycle analysis, and engine performance analysis. Introduction to performance and operating principles of solid and liquid rocket engines. Lab. Design project.

**Aero Engr 436. Aeroelasticity.** Aeroelastic phenomena of an aircraft in flight. Dynamic pressure, Mach and angle of attack effects on the bending and twisting of aircraft components. Aeroelastic equations and coefficients related to flight characteristics such as flutter and divergence.

**Aero Engr 442. Aerodynamics.** Analytical and numerical solution techniques applied to incompressible, compressible, transonic, and supersonic flight regimes over airfoils, wings, and bodies. Introduction to hypersonic aerodynamics. Techniques include those historically used in incompressible flow up to and including state-of-the-art supersonic solutions using high speed computers.

**Aero Engr 446. Introduction to Hypersonics.** Analysis of heat transfer and high temperature effects on hypersonic vehicles. Application to reentry and transatmospheric vehicles.

**Aero Engr 447. Advanced Applied Aerodynamics.** Advanced topics in steady and unsteady aerodynamics in all speed ranges are considered for study by analytical, experimental and computational methods.

**Aero Engr 456. Flight Test Techniques.** Fundamental flight test methods for defining performance and flying qualities characteristics of fixed wing aircraft. Patterned after the Flight Test Engineer's Course at the Air Force Test Pilot School. Students fly in designated aircraft to obtain flight test data.

**Aero Engr 456L. Flight Test Techniques Laboratory.** Application of fundamental flight test methods for defining the performance and flying qualities characteristic of high performance fixed wing aircraft. This laboratory experience serves as a final project for Aero Engr 456, Flight Test Techniques. Students receive credit for this course by participating in a field trip to Edwards AFB, a flight test sortie in a high performance aircraft, creation of a written report, and presentation of a final briefing. This course will be scheduled during the same class period as Aero Engr 456.

**Aero Engr 457. Aircraft Feedback Control Systems.** Design and analysis of aircraft stability augmentation and automatic flight control systems by classical root locus and frequency domain techniques. Introduction to digital system analysis. Analytical and numerical methods complemented with aircraft simulation.

**Aero Engr 466. Propulsion II.** Analysis of advanced aircraft engines. Preliminary aerodynamic and structural design of major engine components including inlets, compressors, combustors, turbines, mixers, afterburners, and nozzles.

**Aero Engr 471. Aeronautics Laboratory.** Introduction to experimental methods and techniques. Introduction to instrumentation and data acquisition systems. Statistical analysis of data. Selected experiments in the fields of aerodynamics, gas dynamics, propulsion, and flight mechanics.

**Aero Engr 481. Introduction to Aircraft and Propulsion System Design.** Fundamentals of aircraft and propulsion system design taught using a systems engineering approach. Aerodynamic design and drag prediction. Parameter effects on constraint analyses and preliminary weight estimation. Configuration optimization. Conceptual layout and preliminary analysis of aircraft structures. Factor and margin of safety. Material selection including strength, stiffness, weight, and cost considerations. Introduction to propulsion system design and selection criteria. Safety, reliability, maintainability, schedule and cost management concerns are addressed during the course.

**Aero Engr 482. Aircraft Design.** Design of an aircraft using a systems engineering approach to meet specifications provided. Detailed configuration optimization, aerodynamic analysis, structural layout, material selection, and structural component sizing, weight and center of gravity analysis, and stability and control analysis. Safety, reliability, maintainability, schedule, and cost management concerns are addressed during the course.

**Aero Engr 483. Aircraft Engine Design.** Preliminary design of an aircraft engine to meet specified performance requirements. Cycle selection, installation effects, and engine sizing. Determination of installed and uninstalled performance of selected and sized engine. Preliminary design of major engine components to include variable geometry inlets, fans, compressor, main burner, turbine, afterburner, and exhaust nozzles. Material selection for each component is accomplished based on criteria such as the stress and temperature environments, manufacturability, radar absorption capability, weight, and cost. Safety, reliability and maintainability concerns during the design process are addressed throughout the course. This course will include, if possible, a voluntary field trip to a government/industry design facility.

**Aero Engr 495. Special Topics.** Selected topics in aeronautical engineering.

**Aero Engr 499. Independent Study.** Individual study and research supervised by a faculty member. Topic established with the department head.

# astronautical engineering major

A major in Astronautical Engineering is the broad application of science and engineering to aerospace operations. Special emphasis is placed on astrodynamics, aerospace systems design, and control systems. Thus, the student is prepared for Air Force duty with specialization in research, design, development and analysis of space technology and aerospace avionics. Students successfully completing this major are awarded the degree of Bachelor of Science in Astronautical Engineering, which is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore MD 21202-4012, telephone: (410) 347-7700..

The goal of the Astronautical Engineering program is to prepare cadets to become leaders of character who:

- Possess a fundamental knowledge in astronautical engineering.
- Can communicate effectively.
- Work effectively with others.
- Are committed to life long learning.
- Can apply their knowledge and skills to frame and solve Air Force engineering problems, both well- and ill-defined.
- Know their ethical and professional responsibilities as embodied in the Air Force core values.

Upon successful completion of the Academy's Astronautical Engineering program students will have the ability to:

- Use fundamental knowledge of orbital mechanics, space environment, attitude control, telecommunications, space structures, and rocket propulsion to solve astronautical engineering problems.
- Plan and execute experimental studies and formulate sound conclusions, analyzing empirical data.
- Apply modern technology tools to solve astronautical engineering problems.
- Communicate effectively using oral, written, graphical and electronic formats.
- Recognize the ethical and professional responsibilities of Air Force Officership and the engineering profession.
- Work effectively as a member of a multi-disciplinary team.
- Recognize the benefits of and possess the skills needed to engage in life-long learning.
- Informatively discuss the impact of engineering on present-day societal and global contemporary issues including Air Force Aerospace capabilities and requirements.

## Suggested Course Sequence:

3rd-Class Year	2nd-Class Year	1st-Class Year
Astro Engr 201	Astro Engr 321	Acad Opt Depth Opt
Astro Engr 210	Astro Engr 331	Aero Engr 315
Chem 200	Astro Engr 351	Astro Engr 437/453
El Engr 231	Beh Sci 310	Astro Engr 445
English 211	Econ 201	Astro S E Design Opt
Engr Mech 220	Engr 341	Biology 315
Engr Mech 320	Engr 342	El Engr 447
Law 220	Engr Mech 330	English 411
Math 243	History 302	MSS 400
Math 245	Math 346	Philos 310
MSS 200	Math 356	Soc Sci 412
Physics 215	Pol Sci 211	Space Environment Opt
Sys Opt Aero Engr 241		

## **ASTRONAUTICS** (Astro Engr)

Offered by the Department of Astronautics.

**Astro Engr 201. Technology Skills for Astronautics.** Self-paced course designed to provide the programming, modeling, and simulation skills required in the various courses in the Astro Engr major. Students are introduced to the MatLab™/ Simulink® tools for programming, modeling, and simulation and to state-of-the-art 3-D computer tools for satellite analysis and visualization. A series of proficiency tasks using the various tools over the course of the semester must be completed.

**Astro Engr 210. Introduction to Astronautics.** Introduction to the history, principles, and challenges of space. Examines elements of space missions including orbits, spacecraft systems, launch vehicles, re-entry, operations, and mission management. Emphasis on understanding the underlying physical principles and the system engineering process used to select orbits, plan maneuvers, and accomplish preliminary design of spacecraft payloads/subsystems to meet mission requirements. Reinforces concepts through hands-on use of application-based analysis and visualization software and communication of learned principles through written reports. Intended for cadets who have or are considering declaring the Astronautical Engineering or Space Operations majors. Course content is identical to Astro Engr 410; but with additional emphasis placed on mathematical background of the material in preparation for students interested in pursuing those majors.

**Astro Engr 321. Intermediate Astrodynamics.** Intermediate course in orbit mechanics. Topics include orbit determination and prediction, orbit maneuvers, perturbations, rendezvous and proximity operations. Emphasizes the design and use of structured computer programs to solve real-world astrodynamics problems. Programming experience is recommended.

**Astro Engr 331. Space Systems Engineering.** Presents fundamentals of space vehicle design with an emphasis on systems engineering. Introduces system-level spacecraft design issues including reliability, environments, radiation effects, testing, materials engineering, integration, launch vehicles, and operations. Introduces and analyzes payloads, structures, propulsion, electrical power, communications and data handling, attitude determination and control, and thermal control subsystems. Includes an integrated lab experience where small teams analyze and integrate subsystems into a functioning small satellite called "EyeasSat." Teams demonstrate and document their EyeasSat at the system level as a part of the final evaluation.

**Astro Engr 351. Rocket Propulsion.** Introduces rocket propulsion and propulsion system design. Uses the basic laws of thermodynamics, thermochemistry, and conservation to determine ideal motor performance. Emphasis on describing the components and conceptual design criteria for liquid, solid, and hybrid rockets. Also studies electric, nuclear, and other advanced propulsions systems.

**Astro Engr 410. Introduction to Astronautics.** Introduces the history, principles, and challenges of space. Examines elements of space missions including orbits, spacecraft systems, launch vehicles, re-entry, operations, and mission management. Emphasizes understanding the underlying physical principles and the system engineering process used to select orbits, plan maneuvers, and accomplish preliminary design of spacecraft payloads/subsystems to meet mission requirements. Reinforces concepts through hands on use of application-based analysis and visualization software and communication of these learned principles through written reports.

**Astro Engr 422. Advanced Astrodynamics.** Continuation of Astro Engr 321, focuses on applying numerical and analytical techniques to solve realistic Air Force problems in astrodynamics and space operations. Perturbations and the associated effects on satellite orbits are examined. Applies Least Squares and Kalman filter estimation techniques to the orbital prediction problem using batch and sequential processing. Structured computer programming is used extensively in problem solutions.

**Astro Engr 423. Space Mission Design.** Basic mission design principles for Air Force and civilian launch systems are examined. Mission objectives and constraints; feasibility studies; time-line generation; launch, on-orbit, and recovery operations; and contingency planning are studied. Applies structured computer programming to analyze typical space missions.

**Astro Engr 436. Small Spacecraft Engineering I.** Introduction to small satellite systems engineering. Multi-disciplinary system design of spacecraft hardware and software to include subsystems, payloads, and ground stations. Define mission and system requirements, perform engineering trade studies, design and analyze spacecraft systems.

**Astro Engr 437. Small Spacecraft Engineering II.** A second course in small satellite systems engineering. Multi-disciplinary system design and fabrication of spacecraft hardware and software to include subsystems, payloads, and ground stations. Finalize design, fabricate, test, and fly actual spacecraft on space boosters.

**Astro Engr 445. Spacecraft Attitude Dynamics and Control.** Fundamental introduction to the problem of controlling satellite attitude. Topics include direction cosine and Euler angle attitude parameters, torque-free rigid body motion, flexible body effects and energy dissipation, spin stabilization, gravity-gradient stabilization, momentum and reaction wheel control, and reaction jet control. Projects include the development of a satellite attitude dynamics simulation and the design of a reaction wheel and reaction jet attitude control system. Includes analysis and synthesis with MATLAB™ simulation.

**Astro Engr 446. Space Navigation.** Inertial navigation including studies of the accelerometers and gyroscopes used in strap down platforms, system mechanization, navigation equation development and system error analysis. Non-inertial navigation including studies of Global Positioning System (GPS), star trackers, and other position, velocity, and attitude sensors. Aided navigation methods using least squares and optimal estimation techniques. Projects include simulation of solid state optical gyros, and development of an aided navigation algorithm. For students enrolled in both Astro Engr 445 and Astro Engr 446 the suggested sequence is Astro Engr 445 first, followed by Astro Engr 446.

**Astro Engr 452. Rocket Engineering I.** Introduces rocket systems engineering. Design, fabrication and operational testing of aerospace vehicle systems and subsystems. Students design, build, and launch a sounding rocket with instrumented payloads using systems engineering design techniques. Relies on analysis and synthesis tools and techniques developed previously in the areas of structures, dynamics, propulsion, control, instrumentation, and computer simulation.

**Astro Engr 453. Rocket Engineering II.** A second course in rocket systems engineering.

**Astro Engr 495. Special Topics.** Selected topics in astronautics.

**Astro Engr 499. Independent Study.** Individual study and research supervised by a faculty member. Topic established with the department head.

**Astro Engr 543. Methods of Optimization for Engineers.** Teaches optimization methods at graduate level. Topics include parameter optimization, optimization for dynamic systems, optimal control and numerical solutions.

## basic sciences major

The Basic Sciences major is a divisional major incorporating the basic sciences of Biology, Chemistry, Computer Science, Mathematics, and Physics. This divisional program is recommended for students wishing to major in the sciences but preferring a broad, flexible curriculum with a high degree of individual choice. This program is also a sensible alternative for students already declared in either a Basic Sciences or Engineering disciplinary major who, for a variety of reasons, find the divisional approach more suited to fulfilling graduation requirements.

Since this major lacks the structure of a disciplinary major, students wishing to go to graduate school in a science field should pay particular attention to course selection, or they will most likely be required to take additional undergraduate courses in the selected discipline prior to entering graduate school.

### **Suggested Course Sequence**

3rd-Class Year	2nd-Class Year	1st-Class Year
Bas Sci Opt 1	Aero Engr 315	Academic Div Opt
Bas Sci Opt 2	Bas Sci Opt 5	Academic Div Opt
Bas Sci Opt 3	Bas Sci Opt 6	Academic Div Opt
Bas Sci Opt 4	Bas Sci Opt 7	Academy Opt
Chem 200	Bas Sci Opt 8	Astro Engr 410
Econ 201	Beh Sci 310	Bas Sci Opt 9
English 211	Biology 315	English 411
Engr Mech 220	El Engr 315	Mgt 400
Law 220	History 302	MSS 400
MSS 200	Math 300/356/377	Soc Sci 412
Physics 215	Philos 310	
Pol Sci 211	S/T Energy Sys Opt	

# behavioral sciences major

No matter what you do in life, there is one irrefutable fact: you'll be working with other people. Therefore, your success in any field will depend largely on your understanding of yourself and others and your ability to work together. The Behavioral Sciences major lays the foundation for this understanding. Three academic tracks are offered in the major: Leadership and Organizations Track, which examines in depth the area of leadership; Human Factors and Systems Design Track, which focuses on how people interact with the machines and systems they use; and the Behavioral Sciences Track, which allows students the opportunity to choose courses of the greatest interest. Each track emphasizes understanding people, but in different contexts, and requires the completion of the core, two additional foreign language courses, plus 12 major's courses for a total of 147 semester hours.

The Behavioral Sciences Track allows students to tailor an array of courses within the behavioral sciences, from a micro to a macro level. This is a good option for cadets aspiring to medical school; psychology is one of the top majors for students entering American medical schools.

The Leadership and Organizations Track allows students an opportunity to examine in depth the area of leadership.

The Human Factors and System Design Track introduces students to the capabilities and limitations of human operators and how these characteristics affect person-machine systems.

## Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Beh Sci 231	Aero Engr 315	Academy Opt
Beh Sci Track	Beh Sci 310	Astro Engr 410
Chem 200	Beh Sci 332	Beh Sci Track
Econ 201	Beh Sci Track	Beh Sci Track
English 211	Beh Sci Track	Beh Sci Track
Engr Mech 220	Beh Sci Track	Beh Sci Track
For Lang 3	Beh Sci Track	Beh Sci Track
For Lang 4	Biology 315	English 411
Law 220	El Engr 315	Mgt 400
MSS 200	History 302	MSS 400
Physics 215	Math 300	Soc Sci 412
Pol Sci 211	Philos 310	Sys Opt

## BEHAVIORAL SCIENCES (Beh Sci)

Offered by the Department of Behavioral Sciences and Leadership.

**Beh Sci 110. Introduction to Behavioral Sciences.** Provides an introduction to the scientific study of behavior and mental processes across diverse levels of analyses. Covers psychological principles that can be applied in and out of the military. Critical thinking, leadership, and respect for human dignity will be emphasized through the study of subjects such as perception, cognition, learning, memory, social interactions, mental health issues, and the biological basis of behavior. In addition, students will be exposed to subjects closely related to psychology such as sociology, cultural anthropology, leadership, and human factors engineering.

**Beh Sci 231. Basic Research Methods and Statistical Tools.** Introduces the integrated approach to statistics and empirical research. Topics include basic research design, APA statistical reporting, SPSS data analysis, descriptive measures, inferential statistics, and hypothesis testing.

**Beh Sci 310. Foundations for Leadership Development.** Explores leadership development as a scientific study. Specifically, it examines principles that will set students on a lifelong path of becoming leaders of character who treats others with respect and dignity. Combines the academic study of leadership development with experiential exercises, case studies, and student projects designed to facilitate a deeper understanding of leadership styles and behaviors.

**Beh Sci 320. Lifespan Development.** Examines how people develop physically, psychologically, socially, and cognitively from birth to death. Explores universal and unique changes that are unique to specific individuals. Developmental theories explaining these changes are presented. Focuses on the social context of development: “What is the impact of income, education, ethnicity, race, sex, culture, and historical time period on developmental outcomes?”

**Beh Sci 330. Abnormal Psychology.** Examines the development, nature, and treatment of psychological disorders within a biopsychosocial context. Special consideration is given toward leadership and military applications.

**Beh Sci 332. Advanced Research Methods and Statistical Tools.** Continues the integrated approach to statistical and experimental psychology, extending cadet experience into practical experimental design; methodological procedures are learned and applied in psychology and human factors experiments.

**Beh Sci 335. Learning and Memory.** How does experience affect performance? This is the central question that has confronted learning theorists for several millennia; it is a question that dominated psychology for most of its first century. This course examines learning and memory from a variety of historical theoretical perspectives. In the laboratory students will test learning and memory notions using rats and then report their experimental findings.

**Beh Sci 340. Marriage and Family.** Examines courtship, marriage, and family in a diverse American culture. Emphasis on the strains inherent in the dynamic interaction of gender, work, and family roles with special attention paid to the situation of military families and possible impacts on mission. Uses lecture/discussion, films, student reports, and visiting experts. Practically, this is an important step in preparing the graduates for their own marriages as well as providing some understanding of the effect of family factors on the productivity of military members.

**Beh Sci 350. Social Change: Cultural Anthropology and Sociology Perspectives.** Introduces anthropological methods and examines a major question addressed by sociology, “How is human organization achieved, maintained, disrupted, or changed?” Specifically addresses social construction of identity and reality, social control, social agency, structure, and conflict. Accordingly, it looks at human development from past and present to understand the practices of diverse groups of people and the theories used to explain the maintenance and change of such practices. This comparative theoretical approach emphasizes the interdependence of physical environment, social environment, and intentional efforts toward social change.

**Beh Sci 352. Social Psychology.** Provides an introduction to social psychology and Behavioral Sciences. Social psychologists seek to understand the nature and causes of individual behavior in social situations. In other words, social psychology explains how the average person reacts to various social pressures. Topics covered include social perception, attitudes, prejudice and discrimination, interpersonal attraction, social influence, pro-social behavior, aggression, groups, and personality. From a practical standpoint, this course explains how and why people react to the world and other people as they do. Leadership implications are discussed.

**Beh Sci 355. Biopsychology.** Examines the biological and neurophysiological foundations of human and animal behavior. Emphasizes central nervous system mechanisms, which mediate processes such as learning and memory, language, intelligence, sleep and arousal, reward and punishment, and human mental disorders. Gives special consideration to sensation and perception and topics that impact human factors design concerns.

**Beh Sci 360. Sociology.** The systematic study of human social behavior and groups. Racism, sexism, social stratification, bureaucracy, religion, education, and socialization are but a few of the topics covered. Classroom discussions and interaction with others are stressed throughout the course. Practically, this course teaches students how to examine what is “really” going on around them.

**Beh Sci 370. Cognitive Psychology.** Familiarizes students with the cognitive approach to understanding human behavior that argues that human behavior can best be understood and predicted through a scientific understanding of mental activity. Topics include: perception, attention, memory, decision-making, consciousness, and other processes related to thinking.

**Beh Sci 371. Aviation Psychology.** Provides students with an historical overview of aerospace human factors, especially with regard to aircrew and maintainer performance in the unique flight environment. Cockpit and maintainability issues are discussed, tracing their evolution from the earliest Wright Flyer military aircraft through today’s highly automated weapon systems. Reviews human capabilities and limitations affecting performance in the context of aviation human-system integration and system design. Covers in detail human factors involvement in aviation safety, particularly air and space mishap investigation, and the various means of aiding in mishap prevention.

**Beh Sci 373. Introduction to Human Factors.** Examines the process, principles, and guidelines of human factors as they impact the design of systems used by people and provides an introduction to the Human Factors and Systems Design option. Emphasizes interactions between human capabilities and limitations, the task, and the environment, as they relate to performance.

**Beh Sci 375. Human Factors in Systems Failure.** Provides a basic understanding of the criticality of human factors consideration in the design of systems. Includes an examination of historical case studies of complex systems failures due to human error and human factors engineering design shortcomings. Case studies include civil and military systems failures. Focuses on human factors causes cited in systems failures, analysis of human factors theory and systems theory applying to the cited causes, and student-designed systemic corrections directed toward the prevention of similar failures in subsequent system designs.

**Beh Sci 377. Industrial-Organizational Psychology.** Using concepts from several disciplines of psychology, this course provides a systematic study of job related behavior and an overview of the behavior of individuals at work by exploring work behaviors and related variables as part of a complex open system. Topics in personnel (industrial) psychology include analyzing jobs, matching individuals to jobs via selection or socialization, and training and performance evaluation. The second half of the course concentrates on the social context of work, and investigates motivation, job satisfaction, leadership, organization theory, personality, stress, and absenteeism and turnover.

**Beh Sci 380. Theories of Personality.** Examines major psychological theories of personality including analytic, humanistic, cognitive, and learning approaches. Considers other non-traditional approaches which explain personality development from the socio-cultural perspective. Examines theoretical concepts to understand individual personality development, relevant current and historical issues, and application to military leadership.

**Beh Sci 390. Sensation and Perception.** Provides an introduction to the way the outside world is perceived through our senses and how our brain makes sense of all the sensory inputs. How our body experiences the world and what we perceive of the world are two interrelated, but different entities. This is an important topic for Air Force officers, because our perceptions do not always accurately represent the outside world. For example, pilots with inaccurate perceptions of their aircraft attitude (e.g., spatial disorientation) could lead to loss of control of their aircraft. Through lectures, labs, demonstrations and discussions, this course introduces the basic anatomy of the sensory systems, as well as, how these structures are used to “make sense” out of what we are experiencing so that we can do such things as understand speech, perceive color, see motion and depth, and recognize faces.

**Beh Sci 410. Advanced Topics in Leadership.** Capstone seminar course in Leadership and Organizations option. This advanced course explores the current trends and theories in leadership and leadership development from a scientific perspective, centering on the concepts of transformational leadership, values-based leadership, servant leadership, and emotional intelligence, among others. Case studies, facilitated and student-led round-table discussions, projects, and experiential exercises allows students to gain an in depth understanding of leadership and its application across a variety of situations and contexts.

**Beh Sci 430. Tests and Measurement.** Provides a basic understanding of the field of testing and measurement. Discusses the terminology, procedures, and basic psychometric properties inherent in assessment procedures. Introduces various types of assessment instruments. Focuses on understanding individual and organizational assessment through an overview of measurement principles, the assessment process, test construction and development, and the use of evaluation results. Presents students the opportunity to learn and apply test construction through the development of assessment instruments. As this is an overview course, students will not gain proficiency in administering clinical assessment instruments.

**Beh Sci 460. Advanced Topics in Sociology and Anthropology.** An advanced course exploring specialized topics in sociology and anthropology on a rotational basis with the intent of creating a deeper and more robust understanding of the specific discipline. Particular course content and emphasis varies from year to year based on new and emerging research in the selected field of study. Designed primarily for the advanced student and is conducted through a seminar/discussion model.

**Beh Sci 470. Advanced Topics in Cognitive and Bio-Psychology.** Advanced course designed to explore specialized topics in cognitive and bio-psychology on a rotational basis with the intent of creating a deeper and more robust understanding of the specific discipline. Particular course content and emphasis varies from year to year based on new and emerging research in the selected field of study. Designed primarily for the advanced student and is conducted through a seminar/discussion model.

**Beh Sci 471. Engineering Psychology.** Advanced course examining cognitive and human performance theories and their applications to human-machine integration in systems design. Special attention is given to the way humans perceive, understand and respond to the information. Application of course content includes the development of an experimental setting to test an applied research question.

**Beh Sci 472. Human-Computer Interaction.** Surveys human-computer interaction concepts, theory, and practice. Implements an interdisciplinary approach with emphasis on usability methods and the user-interaction-development process. Covers iterative development of user interaction design including user requirements gathering, task analysis, design, prototyping, and evaluation. Emphasizes communications between users and system developers. Iterative hands-on development activities are practiced in the context of several team projects.

**Beh Sci 473. Human Factors in Systems Design.** This capstone course emphasizes the role and responsibilities of the human factors engineer in the design and evaluation of systems. Uses a combination of group, individual, and in-class design projects to explore the system design process. Gives particular attention to human characteristics and their effects on system performance.

**Beh Sci 480. Advanced Topics in Personality and Social Psychology.** Advanced course designed to explore specialized topics in personality and social psychology on a rotational basis with the intent of creating a deeper and more robust understanding of the specific discipline. Particular course content and emphasis varies from year to year based on new and emerging research in the selected field of study. Designed primarily for the advanced student and is conducted through a seminar/discussion model.

**Beh Sci 490. Counseling Theory and Skills For Leaders.** Integrates material learned in other behavioral sciences courses and covers relevant counseling theories and models. Emphasizes techniques relevant to military leadership counseling applications, such as: crisis intervention skills, solution-focused treatment, combat stress approaches, and critical incident stress debriefing methods.

**Beh Sci 495. Special Topics.** Selected topics in the Behavioral Sciences.

**Beh Sci 499. Independent Study.** Research or practicum in a specific area of behavioral science. Conducted on a tutorial basis.

# biology major

Are you interested in what makes your body function? Are you fascinated by the vast diversity of living organisms on this planet? Does the idea of decoding a strand of DNA interest you? If so, then the Biology major is for you. This major is designed to promote the development of the cadet's natural scientific talents through a carefully planned program of academic instruction, practical laboratory experience, and individual research projects.

The Biology major provides a multidisciplinary approach to the study of human performance in air and space, exercise, biomechanics, environmental sciences, and cutting-edge cell and genetic engineering. Some students pursue specialized areas of interest such as aviation and flight, human factors in aviation and space, athletics and sports performance, ecology, cell and molecular biology, or professional or advanced degree preparation.

The Biology major is also very flexible, students are not limited to a specific area of study and are free to tailor a program to meet their own interests. The Biology major can complement many careers in the Air Force, or prepare you for a career in the health professions (such as medicine or dentistry) or in the Biomedical Sciences Corps (including aerospace physiology, bioenvironmental engineering, and physical therapy).

## Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Biology 210	Aero Engr 315	Academy Opt
Chem 200	Beh Sci 310	Astro Engr 410
Chem 230	Biology 330	Biology 380
Econ 201	Biology 331	Biology 480
English 211	Biology 332	Biology Opt 2
Engr Mech 220	Biology 360	Biology Opt 3
Law 220	Biology 363	English 411
Math 356	Biology Opt 1	Human Phys Opt
MSS 200	El Engr 315	Mgt 400
Physics 215	History 302	MSS 400
Pol Sci 211	Philos 310	Sci Breadth Opt 2
S/T Energy Sys Opt	Sci Breadth Opt 1	Soc Sci 412

## BIOLOGY (Biology)

Offered by the Department of Biology.

**Biology 210. Foundations of Biology with Laboratory.** Establishes a foundation for further study in the biological sciences. It is required for biology majors, and recommended for those pursuing advanced courses in biology (e.g., cadets pursuing careers in the Medical, Dental, Nursing, and Biomedical Sciences Corps). Biology 210 serves as a core substitute for Biology 315. Presents the concepts essential for understanding modern biology. Course content includes: cell biology, metabolism, genetics, biotechnology, and evolution. Discussions address application of the scientific method, ethical issues of modern biology, and the influence of biological factors on Air Force planning and operations. Laboratories reinforce concepts, promote critical thinking, and introduce essential laboratory skills.

**Biology 315. Introductory Biology with Laboratory.** Provides an overview of biological systems, their structure and function, covering concepts essential to understanding key issues in biology today. Students learn how biological systems are organized and operate throughout the biological hierarchy. Decision-making based on an understanding of biological systems is applied to Air Force operations, and to the health and fitness of the Air Force officer. Concepts are reinforced through critical thinking exercises, hands-on activities, and laboratory experiences.

**Biology 320. Biomechanics.** Studies the physical, anatomical, mechanical, and physiological basis for motion focused on the human. Explores joint and muscle physiology as a basis for functional activities. Applies physics and mechanical engineering concepts to describe, investigate, and compare the ways we initiate and control movement. Students learn the effects musculoskeletal injury may have on normal motion.

**Biology 330. Zoology.** Integrated study of the principles of invertebrate and vertebrate zoology presented with a phylogenetic approach. Examines the behavior, ecology, morphology, physiology, reproductive biology, classification, and evolutionary relationships of animals. Functional aspects of respiration, circulation, osmoregulation, excretion, metabolism, and thermoregulation are highlighted through comparisons within and among animal groups. Through laboratory exercises students will learn and recognize structural, physiological, and evolutionary features of selected animals.

**Biology 331. Botany.** Integrated study of the biology of plants is presented from molecular to community levels of organization. Course content is organized into five units of the study: the plant system, plant anatomy and morphology, plant physiological ecology, plant reproductive biology, and plant evolution and classification. Although the focus is primarily on seed plants, other organisms such as fungi, algae, and lichens are explored. The study of plants is important because of their relevance to nutrition, drugs, celebration, and objects from daily life such as paper products, clothing, furniture, and flowers. A botanical perspective enriches an understanding of the natural world. Laboratory and fieldwork is required.

**Biology 332. Microbial Diversity.** Microscopic organisms are intimately involved in our daily lives, where they produce many familiar foods and medicines, impact health, and play important roles in natural and engineered systems. This course will survey microbial groups that include algae, bacteria, fungi, protozoa, viruses, viroids, prions, and selected invertebrates. Each group will be considered in terms of structure, classification, biochemistry, ecology, and economic and medical significance. Relevance to the Air Force mission, such as deployment health issues and biowarfare defense, is reinforced throughout the course. Includes integrated labs and demonstrations.

**Biology 345. Aerospace Physiology.** Provides in-depth knowledge as to how human performance relates to the warrior and aircrew member. Specifically, it includes a survey of the physiological stresses associated with the aerospace environment. Topics include: effects of pressure changes with altitude, hyperbaric environments, respiratory and circulatory physiology, hypoxia and hyperventilation, pressurization and aircraft decompression, effects of "G" forces, self-imposed stresses, thermal stresses, human factors, crash dynamics and escape systems, sensory physiology, spatial disorientation, and space physiology. Suitable for cadets majoring in any academic discipline, including the divisional majors or other programs.

**Biology 360. Cell and Molecular Biology.** Comprehensive examination of the cell, the fundamental unit of life. Emphasis on eukaryotic cells, cellular organization and processes, and how cell structure and activity ultimately determine structures and functions at the organismal level. Lesson topics include biomolecules, organelles, membrane structure and transport, cellular respiration, photosynthesis, intercellular connections and communication, cell division, fertilization, and development. Fundamental cellular concepts will be illustrated and reinforced through discussions of gamete formation, specialized cells (e.g., muscle and nerve cells), eukaryotic-cell evolution, immunology, natural and man-made drugs and toxins (e.g., caffeine, cocaine, spider venoms, nerve gases), and various human pathologies (e.g., cancer, AIDS, multiple sclerosis, cystic fibrosis).

**Biology 363. Genetics.** Comprehensive study of the inheritance patterns of individuals and populations, including the mechanisms by which these patterns are expressed and changed. Additional emphasis is on current technologies, including genetic engineering, their role in exploring the nature of life, and the ethical burden this has placed on society. Laboratory work stresses an understanding of classical and molecular aspects of genetics. Optional field trip.

**Biology 370. Human Nutrition.** Provides a comprehensive, thoroughly updated account of nutrition principles and their application. Furnishes students with accurate nutrition information and teaches them how to use a critical-thinking approach in making important daily decisions about their own diet. Focuses on the fundamentals of nutrition such as defining the roles of carbohydrates, fats, proteins, vitamins, and minerals in metabolism; examining eating practices through individual dietary analysis, exploring the importance of nutrition in the prevention of disease; and discussing the interplay of diet options with various body systems for athletic performance, daily fitness, and overall health.

**Biology 380. Principles of Ecology.** Fundamental interrelationships between organisms and their environments, emphasizing energy flow through ecosystems, biogeochemical cycling, population dynamics, and community interactions. Emphasis on how human activities affect the quality of life and the natural world. Case studies include the impact of environmental concerns on regional and global Air Force operations.

**Biology 410. Anatomy and Physiology: Sensory and Motor Integration.** Introduction to human sensory and locomotory systems via experimentation and dissection of the human cadaver, with dissection emphasized. Focuses on feedback mechanisms and the integration of organ systems for homeostasis and voluntary control.

**Biology 430. Vertebrate Zoology.** Studies evolutionary origins, adaptations, characteristics, natural history, and classification of five major vertebrate groups: Fishes, Reptiles, Amphibians, Mammals, and Birds.

**Biology 431. Microbiology.** Studies classical microbiology to include: environmental, industrial, and medical applications. Laboratory studies to complement lectures. Systematics and classification of bacteria and viruses; the structure, function, and metabolic pathways of groups of bacteria. Microbial ecology of humans; disease processes, and defense. Microbiology of waste disposal, waste treatment, environmental microbiology, and industrial microbiology, biowarfare, and bioterrorism.

**Biology 440. Anatomy and Physiology: Visceral Systems Integration.** Introduction to systems physiology via experimentation and dissection of the human cadaver, with experimentation emphasized. Focuses on neural and endocrine feedback mechanisms for involuntary control and maintenance of homeostasis.

**Biology 459. Principles of Evolution.** Examines the principles, patterns, mechanisms, and processes of biological evolution. The course format is comprised of traditional lectures, student-led discussions, guest speakers, practical exercises, video programs, and selected readings. The course draws on examples from botany, zoology, human anatomy, cell and molecular biology, ecology, and genetics to provide a fuller understanding of evolution in terms of evidence, processes, and outcomes. Through the study of evolutionary biology, students gain an appreciation of evolution as a unifying theme in biology, and acquire a more complete understanding of the origins, diversity, interrelationships, geographical distributions, and adaptations of living organisms.

**Biology 464. Molecular Biology Methods.** Practical study of the methods and techniques used in the modern molecular biology and genetic engineering laboratory. Instructor-assisted laboratory exercises with complementary lectures focus on bacterial genetics, preparation, and analysis of nucleic acids, recombinant DNA construction, bacterial transformation, analysis of cloned gene products, chromatographic separation of biomolecules and polymerase chain reaction applications. Selected methods used in cancer, immunology, and animal development research are included.

**Biology 480. Biology Capstone Seminar.** The Biology Capstone Seminar emphasizes student participation in exploring a variety of current biological issues. Students are challenged to develop a deep, reflective understanding of a wide range of biological concepts as they evaluate evidence, analyze issues, clarify assumptions, and consider different perspectives. They communicate clear logical, scientific thinking through reading, listening, speaking, and writing.

**Biology 481. Applied Ecology.** Lecture and laboratories addressing ecology and field biology. Lecture includes biotic and abiotic inputs and controls of various ecosystems. Laboratory exercises introduce survey techniques used in field studies. Classroom and laboratory work emphasizes environmental issues that are of special interest to Air Force personnel. Includes field studies conducted on the Academy grounds.

**Biology 486. Principles of Chemical, Biological, Radiological, and Nuclear (CBRN) Warfare Defense.** Covers the historical and contemporary use of CBRN weapons in state-sponsored warfare and terrorism. Mechanisms and biological effects of CBRN agents/weapons will be discussed. Topics include various employment considerations for use of CBRN warfare agents and weapons, from state-sponsored to terrorist use, and examine methods used for CBRN detection and identification. The current state of the CBRN defense community, including warfighters, first responders, medical responders, and the intelligence community are also evaluated.

**Biology 495. Special Topics.** Selected topics in the biological sciences.

**Biology 499. Independent Study.** Individual research or tutorial study in the biological sciences under the direction of a faculty member. Emphasis is on using pertinent biological literature and conducting laboratory research.

## chemistry major

From developing the materials employed in the F-22 to understanding space sensor and satellite technology to analyzing chemical and biological warfare data, chemistry is at the forefront of Air Force research. The majors in chemistry are recommended for those who are interested in chemical or biochemical research or applications. They provide fundamental knowledge in analytical, biological, inorganic, organic, and physical chemistry and allow the student to select a specialized degree track for in-depth study. The majors in chemistry emphasize the use of the laboratory methods for reinforcement of lecture material and individual research projects. All three majors prepare students for a junior officer position in research, development, or graduate training. A junior officer may be assigned to Air Force Labs such as the High Explosive Research and Development Facility (HERD) or the Directed Energy Lab. Additionally, students graduating with one of the chemistry majors are very competitive for medical school, dental school, bioenvironmental engineering, pilot, navigator, aircraft maintenance, intelligence, and a host of other operational and support career fields.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 222 (All)	Aero Engr 315 (All)	Academy Opt Chem 492 (BioChem)
Chem 236 (All)	Beh Sci 310 (All)	Academy Opt Chem 499 (Chem/Mat)
Econ 201 (All)	Biology 315 (All)	Astro Engr 410 (All)
English 211 (All)	Biology Opt 1 (BioChem)	Biology Opt 2 (BioChem)
Engr Mech 220 (All)	Chem 333 (All)	Chem 431 (All)
Law 220 (All)	Chem 334 (All)	Chem 434 (Chem/Mat)
Math 243 (All)	Chem 343 (All)	Chem 445 (All)
MSS 200 (All)	Chem 344 (Chem/BioChem)	Chem 465 (Mat)
Physics 110 (All)	Chem 440 (Mat)	Chem 481 (BioChem)
Physics 215 (All)	Chem Conc 1 (Chem)	Chem 482 (BioChem)
Pol Sci 211 (All)	El Engr 315 (All)	Chem 491 (BioChem)
S/T E/S Opt Chem 235 (All)	Engr Mech 340 (Mat)	Chem Conc 2 (Chem)
	History 302 (All)	Chem Conc 3 (Chem)
	Math 300/356 (All)	Chem Conc 4 (Chem)
	Philos 310 (All)	Chem Concentration (Mat)
		English 411 (All)
		Engr Mech 440 (Mat)
		Mgt 400 (All)
		MSS 400 (All)
		Soc Sci 412 (All)

### CHEMISTRY (Chem)

Offered by the Department of Chemistry.

**Chem 100. Applications of Chemistry I.** Fundamental chemistry with emphasis on concepts underlying Air Force and other practical applications. Provides a foundation in inquiry-based learning to facilitate the development of critical thinking skills, data driven decision-making and technical writing skills. Topics include atomic and molecular structure, electronic structure, oxidation-reduction reactions, stoichiometry, chemical bonding and structure, chemical analysis, environmental chemistry, and special topics. Laboratories emphasize both quantitative and qualitative analysis with computer interface for data collection and analysis. Highly recommended that technical majors take Chem 100 in their fourth-class fall. It must be taken in the fourth-class fall by those interested in medical career field or science majors – including Chemistry, Biochemistry, Material Chemistry, and Biology – as it allows proper sequencing for Chem 110 in the fourth-class spring semester.

**Chem 110. Applications of Chemistry II.** Continuation of Chem 100 for chemistry advance placed fourth-class students, or those considering the Chemistry, Biochemistry, Materials Chemistry, or Biology majors or interested in any Pre-Med program. The application of the principles of science in the development of analysis, synthesis, and evaluation skills while integrating foundational knowledge to comprehend the capabilities and limitations of air power in the 21st century. Topics may include gas laws, thermodynamics, acids and bases, electrochemistry, kinetics, chemical equilibrium, biochemistry and special topics. Chemical principles are taught within the framework of Air Force and other practical applications. Laboratories emphasize both quantitative and qualitative analysis with computer interface for data collection and analysis. This course must be taken during the fourth-class year by the above-mentioned students to meet major, accreditation, and medical school application timelines.

**Chem 200. Applications of Chemistry II.** Continuation of Chem 100. The application of the principles of science in the development of analysis, synthesis, and evaluation skills while integrating foundational knowledge to comprehend the capabilities and limitations of air power in the 21st century. Topics may include gas laws, thermodynamics, acids and bases, electrochemistry, kinetics, chemical equilibrium, biochemistry and special topics. Chemical principles are taught within the framework of Air Force and other practical applications. Labs emphasize both quantitative and qualitative analysis with computer interface for data collection and analysis.

**Chem 222. Analytical Chemistry.** Lecture and laboratory experience in quantitative analysis using both classical wet techniques and modern instrumentation with a focus on statistical analysis. Topics include wet chemical methods, chromatography, spectroscopy, electrochemistry, and other advanced techniques. Emphasizes precision of measurement, statistical treatment of data during analysis and collection, and graphical techniques.

**Chem 230. Introductory Organic Chemistry.** Introduces fundamentals of organic chemistry. Topics include: nomenclature of organic compounds; stereochemistry; reaction mechanisms; structure and function of organic functional groups; introduction to carbohydrates, lipids, amino acids and proteins, and nucleic acids; basic aspects of polymer chemistry. This is a service course primarily designed for Biology and Basic Sciences majors. Chemistry majors and those students desiring to apply for medical school will not take this course in lieu of Chem 333 and 334.

**Chem 235. Physical Chemistry I.** Integrated lecture/laboratory course explores the fundamentals of chemical thermodynamics and equilibria involving gases, liquids, and solutions, the analysis of phase equilibria, electrochemistry, and chemical kinetics.

**Chem 236. Physical Chemistry II.** Integrated lecture/laboratory continuation of Chem 235; includes the fundamentals of quantum chemistry, including computational applications, spectroscopy, statistical mechanics, properties of solids and liquids, transport properties, and surface chemistry.

**Chem 325. Space Chemistry.** Examines the integral role chemistry plays in our efforts to effectively utilize space. Topics may include the chemical derivation of the elements found in the universe, materials science, propulsion chemistry, how the Air Force exploits the space environment to accomplish the mission, and other subjects of current interest.

**Chem 333. Organic Chemistry I.** Scientific study of the structure, properties, composition, reactions, and preparation of organic compounds. Topics include classification and naming of organic compounds, stereochemistry and conformational analysis, reaction and synthesis of alcohols, alkyl halides, alkenes, and alkynes; conjugated systems; spectroscopy and structure determination. Concurrent enrollment in Chem 343 is recommended but is optional for non-chemistry majors.

**Chem 334. Organic Chemistry II.** Continuation of Chem 333. Topics include mechanisms and reactions of aromatic compounds, organometallics, alcohols, ethers, and carbonyl-containing functional groups to include enolate chemistry. Multi-step syntheses integrating the knowledge of multiple functional groups is emphasized. Other topics such as carbohydrates, polynuclear aromatics, heterocyclic compounds, amino acids, and proteins may be introduced.

**Chem 343. Organic Chemistry Laboratory.** Experiments in the preparation, purification and identification of representative organic compounds. Designed to illustrate the principles discussed in Chem 333 and develop techniques needed for the isolation, purification, and characterization of organic materials. Sample preparation techniques include recrystallization, distillation, melting point determination, including sample preparation of IR, NMR, GC, and GC/MS, as well as instrument operation and data interpretation.

**Chem 344. Instrumental Organic Chemistry.** Continuation of Chem 343. Techniques studied include applications of infrared, proton magnetic resonance, mass spectra, and chromatographic analysis of organic materials synthesized in the laboratory. The principles of organic chemistry are tied together at the end of the semester in a special project designed to familiarize the student with library research, independent lab work, and illustrate the chemical principles studied in Chem 333 and Chem 334.

**Chem 350. Chemistry of Weapons.** Primary focus is on the chemistry associated with weapons, from construction to delivery to by-products and detection as a result of delivery or destruction. Topics covered include conventional explosives, propellants, chemical weapons, biochemical effects, munitions design, and current topics. Emphasis is on understanding the chemical principles and thermodynamic processes involved in a variety of current and future weapon systems.

**Chem 353. Theory of Instrumental Methods of Chemical Analysis.** Basic theory and real-world examples of modern analytical methods of chemical analysis. Topics include ultraviolet, visible, infrared absorption, Raman and emission spectroscopies; mass spectrometry, nuclear magnetic resonance and electron paramagnetic resonance spectroscopy; chromatography; thermal methods, and other methods as appropriate. Applied numeric methods will also be discussed, with an emphasis on error analysis and determination of signal-to-noise ratio. Focus is placed on theory of methods currently applied in advanced courses offered in the Academy's Department of Chemistry.

**Chem 381. Chemistry of the Environment.** Discussion of the chemistry and alteration of the environment due to human impacts. Areas of study include atmospheric, soil, water, and industrial chemistry, environmental contaminant properties, hazardous materials, waste disposal, toxicology, and environmental analytical techniques. Special topics of current or regional interest may be included. Emphasis on understanding the chemical principles, phenomena, and basic chemistry associated with protecting and improving our environment.

**Chem 399. Independent Study Techniques.** Methods and strategies for proposing, planning, and executing independent research. A useful lead-in to Chem 499. Knowledge and skills gained facilitate the initiation of research projects and improve efficiency of the research process. Exercises in searching the chemical literature, reading journal articles, and preparation of proposals. With departmental permission, course may be combined with Chem 499B for three semester hours of independent study credit.

**Chem 431. Theoretical Inorganic Chemistry.** Theoretical approach to atomic structure, covalent bonding and molecular structures. Topics include ionic compounds; a general survey of the periodic table, coordination chemistry, organometallics, transition metal chemistry, bio-inorganic chemistry, and inorganic synthesis. Departmental permission required for enrollment in the spring semester.

**Chem 432. Systematic Inorganic Chemistry.** Applications of Chem 431 with emphasis on a systematic study of the behavior of chemical elements and theoretical inorganic compounds. Lecture topics include chemistry of transition metals, organometallics, boron, bio-inorganic, fluxional molecules, kinetics and mechanisms of inorganic reactions and special topics. Laboratories provide hands-on experience in inorganic fundamentals and the reaction and characterization of metallic compounds.

**Chem 433. Advanced Organic Chemistry.** Advanced studies of chemical bonding and molecular structure; molecular orbital theory, aromaticity, structure-reactivity relationships, kinetics, mechanisms, and linear free energy relationships. Topics include concerted reactions; conservation of orbital symmetry, frontier molecular orbitals, photochemistry, selected synthetic methods; nucleophilic carbon species, carbonyl compounds, principles of stereochemistry; asymmetric synthesis. Laboratories provide hands-on experience in advanced organic chemistry concepts and the synthesis and characterization of organic compounds.

**Chem 434. Biochemistry.** Chemistry of the life processes. Topics covered include the chemistry of biomolecules (carbohydrates, lipids, proteins, and nucleotides); energetics and metabolic control; enzymes; mechanisms and kinetics; intermediary metabolism, biosynthesis and function of macromolecules including DNA, RNA, and proteins; introduction to biotechnology and recombinant DNA techniques. Laboratories provide hands-on experience in biochemistry fundamentals, the interface between molecules and materials, and the characterization of biomolecules.

**Chem 435. Advanced Physical Chemistry.** Development of molecular quantum mechanics and its application to molecular spectroscopy and chemical reaction dynamics. Topics include rotational, vibrational, and electronic spectroscopy; chemical reaction dynamics with emphasis on theoretical calculations for reactions, and advanced theoretical chemical methods. Laboratories provide hands-on experience in advanced physical chemistry concepts and characterization of the physical world.

**Chem 440. Polymer Chemistry.** Introduction to polymer chemistry. Lecture topics include discussions on the interrelations between molecular and gross physical properties; polymer structure; methods of polymerization; polymer development; and Air Force applications for polymers. Laboratories provide hands-on experience in synthesis of polymeric materials.

**Chem 445. Advanced Laboratory Techniques.** Designed to enhance students' experience in advanced laboratory techniques in inorganic, organic, analytical, and physical chemistry. Experiments include preparation, purification, identification, and analysis of representative organometallic and inorganic compounds.

**Chem 453. Instrumental Methods of Chemical Analysis.** Advanced theory and application of modern analytical instruments for chemical analysis. Experiments include ultraviolet, visible, infrared absorption and emission spectroscopies; nuclear magnetic resonance and electron paramagnetic resonance spectroscopy; chromatography; thermal methods; and electrochemical techniques. Emphasizes hands-on experience with modern instrumentation, applications to real-world and Air Force problems, computational data analysis, and modeling.

**Chem 465. Chemistry of Advanced Materials.** Chemical studies in modern and high-tech materials emphasizing physical chemistry fundamentals, the interface between molecules and materials, and the development of these materials. Topics include chemical computational models, materials for energy storage, electronics, structures, optics, and glasses. Laboratories provide hands-on experience in synthesis and characterization of materials.

**Chem 481. Biochemistry I.** Chemistry of living organisms emphasizing the roles played by biomacromolecules and macromolecular assemblies. Topics covered include an introduction to primary literature in biomedical research, cells and organelles, amino acids, nucleic acids, protein structures and enzymes, sugars and polysaccharides, lipids and membranes, and an introduction to metabolism.

**Chem 482. Biochemistry II.** Chemistry of living organisms emphasizing the central metabolic processes and the transmission of genetic information. Topics covered include glycolysis and other pathways of carbohydrate metabolism, the citric acid cycle, lipid and amino acid metabolism, signal transduction, DNA replication, transcription of DNA and RNA, and translation of mRNA into protein.

**Chem 491. Biochemistry Laboratory.** Experiments to manipulate DNA, RNA, and proteins. Techniques covered include agarose and acrylamide gel electrophoresis, recombinant DNA techniques, microbial culture and transformation, cell culture, and production and purification of recombinant proteins. Lab is designed to illustrate the conceptual principles presented in Chem 481.

**Chem 492. Advanced Biochemistry Laboratory.** Continuation of Chem 491 which supplements material covered in Chem 482. Emphasizes advanced laboratory techniques in biochemistry. Includes the use of advanced chemical instrumentation (including selections from the following: infrared spectroscopy, UV/vis spectroscopy, NMR and EPR spectrometry, differential scanning calorimetry, fluorescence spectroscopy) to problems in the life science arena. Techniques learned in Chem 482 will be applied to current problems in the biochemistry literature.

**Chem 495. Special Topics.** Selected topics in chemistry.

**Chem 499. Independent Study.** Capstone course for all chemistry majors. A hands-on laboratory experience applying the culminated knowledge and skills gained in the major towards a novel research project. Individual research using state-of-the-art equipment under the direction of a faculty member. Includes use of chemical literature.

## civil engineering major

Civil engineering is one of the broadest of the engineering disciplines, encompassing many interdependent technical specialties. As a civil engineer, you plan, design, and supervise the construction of a wide variety of facilities, such as space stations and launching facilities, offshore structures, bridges, buildings, tunnels, highways, transit systems, dams, airports, irrigation projects, distribution facilities for water, and collection and treatment facilities for wastewater and hazardous wastes.

You will use technology's newest applications. Civil engineers are leading users of state-of-the-art computer methods in design, construction, project scheduling and cost control. Civil engineers are problem solvers, meeting the challenges of pollution, a deteriorating infrastructure, traffic congestion, energy needs, floods, earthquakes, urban development and community planning. As you develop your skills, you can move into engineering management, oversee the completion of entire projects, and work closely with architects, owners, contractors, government officials and others involved in all aspects of construction.

Like the civil engineering profession, the Air Force civil engineering career field is also broad, including architects, electrical engineers, and mechanical engineers, as well as civil engineers. Typically, an Air Force civil engineering officer can expect to work at both base and command level jobs. The civil engineer at base level is responsible for the construction and maintenance of all facilities; mechanical, electrical, and waste disposal systems; hazardous waste management, runways and roads. Accordingly, Air Force civil engineering requires many specialties. Your tasks may include technical design, project planning and programming, and possibly managing the maintenance work force of civilian and military personnel. At the command level, your expertise is required to plan, manage, and direct the civil engineering efforts on a command-wide basis.

If you like science and mathematics and are curious about how things work, then perhaps civil engineering is the major for you. The program is accredited by the Engineering Accreditation Commission of ABET, Inc.. Upon graduation you earn a Bachelor of Science in Civil Engineering, a BSCE. A graduate with a Civil Engineering degree is eligible for a civil engineer, general engineer, bioenvironmental engineer, developmental engineer or flying Air Force Specialty Code.

The goal of the Civil Engineering program is to prepare cadets to become leaders of character who:

- Possess breadth of integrated, fundamental knowledge in the basic sciences, engineering, the humanities, and social sciences; and depth of knowledge in civil engineering and broad knowledge in environmental engineering.
- Can communicate effectively.
- Demonstrate leadership and can work effectively with others.
- Are independent, lifelong learners.
- Can apply their knowledge and skills to frame and solve Air Force civil and environmental engineering problems.
- Understand their ethical and professional responsibilities as embodied in the Air Force Core Values.
- Can function effectively in contingency operations.

Upon successful completion of the Academy's Civil Engineering program cadets will successfully demonstrate:

- Application of the fundamental concepts of civil engineering to solve engineering problems.
- Laboratory techniques including design of experiments, procedures, recording, and analysis.
- Engineering skills, including construction processes.
- Use of contemporary civil engineering analysis, design, and test tools.
- Written and oral communication skills.
- Knowledge of ethical and professional responsibilities.
- Depth of knowledge and skills in civil engineering and breadth of knowledge and skills in environmental engineering, computers, mathematics, and other disciplines to effectively identify and solve the types of complex, multidisciplinary problems they will face as Air Force environmental and civil engineers.
- Knowledge of the benefits and the skills needed to engage in life-long learning.
- Ability to be effective multidisciplinary team members.
- Skills to be independent learners while knowing when to seek help.
- Knowledge of the role of Air Force engineering officers in our global society.
- Knowledge of contemporary social, economic, political, military, and engineering issues.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy/Design Opt
Civ Engr 330	Beh Sci 310	Astro Engr 410
Civ Engr 362	Biology 315	Bas Sci Opt
Econ 201	Civ Engr 361	Civ Engr 351 (Summer)
English 211	Civ Engr 372	Civ Engr 474
Engr Mech 220	Civ Engr 373	Civ Engr 480
Law 220	Civ Engr 390	Civ Engr 488
Math 243	El Engr 231	Design Opt
Math 245	Engineering Opt	English 411
MSS 200	History 302	MSS 400
Physics 215	Math 356	Philos 310
Pol Sci 211	Sys Opt Engr 311	Soc Sci 412

### CIVIL ENGINEERING (Civ Engr)

Offered by the Department of Civil and Environmental Engineering.

**Civ Engr 215. Computer Applications for Civil Engineers.** Application of commercially available computer-based tools for solving common types of Civil Engineering problems. Mechanical drawing, using state-of-the-art computer-aided design (CAD) software, including presentation and working drawings. Use of spreadsheet and relational database software for the solution of simultaneous equations and linear programming with an emphasis on information input, data handling, and professional output. Project management concepts and project planning using MS Project software. Introduction to GeoBase and geospatial mapping capabilities using GIS technologies.

**Civ Engr 330. Elementary Structural Analysis.** Static analysis of determinate structures. Stresses and deformations in beams, trusses, and frames.

**Civ Engr 351. Civil Engineering Practices - Field Engineering.** This two-phase course includes Operation Civil Engineering Air Force (OpsCEAF) and a three-week field experience at the Academy Field Engineering and Readiness Laboratory (FERL). Second-class cadets spend first period at a government facility working on a project in the civil engineering field. Participants will be scheduled for a second or third summer period leadership program. The three-week field experience introduces surveying, construction materials, design of concrete mixes, and hands-on construction using metal, timber, asphalt and concrete, and working knowledge of environmental systems. Students construct various projects that they will design in later civil and environmental engineering courses. OpsCEAF is in lieu of Operation Air Force (Mil Tng 301). OpsCEAF credit is Pass/Fail. Civ Engr 351 is graded.

**Civ Engr 352. Lightweight Concrete Design, Analysis, and Construction.** The design and construction of the concrete canoe is an integration of several course experiences and acts as a test of the understanding of fundamental concepts in concrete, structural design, hydraulics, and computer applications. It allows cadets to learn new skills in project management, design, concrete technology, material testing, and physical construction. Cadets use AutoCAD to complete three-dimensional modeling, MS Project to develop and track the progress of the project, Excel to design the concrete mix, and other structural analysis packages to determine forces within the canoe. Extensive time will be spent in the laboratory testing the properties of the concrete mix design and the strength of the reinforcing materials. In addition, hull designs will be tested in the open channel flow tank using scaled models. Cadets are responsible for the construction and procurement of materials for the canoe upon completion of the design.

**Civ Engr 361. Fundamental Hydraulics.** Application of the principles of incompressible fluid mechanics. Topics include: fluid properties, manometry, forces on submerged bodies, open channel flow, and conduit flow. Impulse-momentum, energy methods, Hardy-Cross method for balancing flows in distribution systems and sewer design are also covered.

**Civ Engr 362. Introduction to Environmental Engineering.** Fundamental theory and principles and preliminary design of unit operations in environmental engineering. Topics include air and water pollution, municipal and hazardous waste treatment, water chemistry, microbiology, mass balance, reactor theory and kinetics, and physical process theory.

**Civ Engr 368. Ground and Surface Water Hydrology and Contaminant Transport.** A comprehensive introduction to groundwater and surface water hydrology. Contaminant transport of hazardous chemicals in groundwater is also covered. Topics include: hazardous chemicals, environmental regulations, groundwater flow, well hydraulics, transport of contaminants in the subsurface environment, hydrologic cycle, surface water hydrology, hydrographs, rational method for storm water runoff, and storm water collection system design.

**Civ Engr 369. Introduction to Air Pollution.** An in-depth introduction into air pollution covering such topics as the causes, sources and effects of air pollution. Topics include: legislative standards (ambient and source) for pollutants, regional and global air pollution issues, environmental health, indoor air pollution, noise, air pollution instrumentation and gas flow measurements, basic meteorology, and dispersion modeling. The course work involves several laboratory exercises.

**Civ Engr 372. Behavior and Analysis of Structures.** Behavior and analysis of statically determinate and indeterminate beams, frames and trusses. Displacement calculations using virtual work. Analysis of indeterminate structures by consistent displacements and moment distribution. Introduction to general stiffness method. Computer analysis projects.

**Civ Engr 373. Behavior and Design of Steel Members.** Behavior of structural steel beams, columns, connections, and frames; using the Load and Resistance Factor Design method. Design for tension, flexure, shear, compression, and combined loads. Design of bolted and welded steel connections. Design project.

**Civ Engr 390. Introduction to Soil Mechanics.** Engineering properties of soils, soil classification, permeability, consolidation, compaction, shear strength and applications to engineering design. Soils laboratories and reports.

**Civ Engr 405. Civil Engineering Seminar.** A course designed to give Civil Engineering majors the opportunity to synthesize and apply the concepts they have learned throughout their undergraduate education. Topics discussed include engineering ethics and those that cadets may encounter in the Air Force after graduation.

**Civ Engr 463. Wastewater Treatment Plant Design.** Design of facilities for physical, chemical, and biological treatment of wastewater; and treatment and disposal of sludge. Coverage of advanced wastewater treatment and land treatment systems. Laboratory exercises analyze raw sewage with data being used for the design processes. Final design project consists of a complete municipal wastewater treatment plant design.

**Civ Engr 464. Architectural Design.** Design of a single-family residence. Uses computer-aided-design and drafting (CADD) software in developing design: site plan, functional layout, framing, energy and electrical planning, aesthetic design, landscaping, and mechanical planning. Produces set of design working drawings by end of course.

**Civ Engr 467. Water Treatment Principles and Design.** Design of unit operations for coagulation, sedimentation, filtration and disinfection for treatment of drinking water. Introduces the chemistry of drinking water treatment processes. Uses unit operations to design treatment solutions to contemporary environmental problems. Topics include design of ion exchange, reverse osmosis, chemical precipitation, and selected hazardous waste disposal problems. Includes two complete design exercises.

**Civ Engr 468. Solid and Hazardous Waste Facilities Design.** Design and analysis of solid and hazardous waste management systems including collection, transport, processing, resource recovery, and disposal. Hazardous waste regulations, treatment and site cleanup are addressed. Final design project consists of a complete landfill design.

**Civ Engr 469. Design of Air Pollution Controls.** Modeling and predicting the effects of air pollution, and the design of the facilities for air pollution control. The design of electrostatic precipitators, cyclones, bag houses and other methods for the control of air contaminants are addressed.

**Civ Engr 473. Structural Design.** Design of a multi-story steel and reinforced concrete building, including structural frame, floor and roof system, and foundation. Computer-aided analysis and design.

**Civ Engr 474. Behavior and Design of Concrete Members.** Properties of reinforced concrete. Behavior and ultimate strength design of reinforced concrete beams, slabs, columns, and footings. Design for flexure, shear, compression, bond, and anchorage. Design project.

**Civ Engr 480. Project Management and Contract Administration.** Final course in the civil and environmental engineering capstone sequence. First-class students integrate discipline-specific design work from previous courses through a semester project. Students take an owner's project requirements through stages of scope definition, budgeting and planning, conceptual design, scheduling and construction contract administration. Students apply engineering standards and consider realistic issues including engineering economics, constructability, environmental requirements, sustainability, and safety. The course addresses and applies management topics and concepts of planning, organizing, leading, and controlling in the context of a capstone engineering project. Course concludes with a project competition involving construction industry professionals. Serves as a core replacement for Mgt 400 for Civ Engr and Env Engr majors.

**Civ Engr 485. Construction Project Management.** Emphasizes the methods and materials of construction as well as the management practices required to run a successful construction project. Topics include construction materials, project planning, scheduling, cost estimating, and field engineering. A semester project, in the form of a detailed study of a major construction project, complements the classroom experience.

**Civ Engr 488. Pavement Design and Transportation.** Fundamental theory and design principles of both flexible and rigid pavements. Theory and practice in transportation systems to include airfield and highway design, traffic analyses, horizontal and vertical roadway alignment, pavement evaluation and maintenance, strengthening techniques, and repair.

**Civ Engr 491. Foundation Engineering.** Site investigation, analyses of excavation support, dewatering, bearing capacity and settlement, design of shallow and deep foundations.

**Civ Engr 492. Earth Structures: Embankments, Slopes, and Buried Structures.** Analyses of lateral earth pressures, slope stability, and stresses on buried structures, design of cantilever retaining walls, mechanically stabilized earth walls, sheet piling, and slurry walls.

**Civ Engr 495. Special Topics.** Selected topics in civil engineering.

**Civ Engr 499. Independent Study.** Individual study and research in an advanced civil engineering topic approved by the department head.

## computer engineering major

Computer systems are an integral part of every aspect of Air Force operations. These systems range from embedded devices that perform a specific function in a weapon system to massively-parallel supercomputers used to simulate an air campaign. Because today's computing systems are so sophisticated a new field of engineering, computer engineering, has evolved. Computer engineers take a true "systems" view toward computing design, combining the algorithm-design skills of a computer scientist with the hardware-design talents of an electrical engineer. Computer Engineering majors at the Academy acquire these skills through an interdisciplinary approach that intermingles courses from Computer Science with offerings from Electrical and Computer Engineering. This course mix provides the broad, varied background an engineer needs to succeed in this dynamic field.

Students who successfully complete the Computer Engineering major are awarded a Bachelor of Science in Computer Engineering degree that is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore MD 21202-4012, telephone: (410) 347-7700. Computer Engineering is an excellent choice if you are interested in an advanced degree. As a computer engineer, your knowledge and skill will be in high demand in the Air Force and in society as a whole.

The goal of the Computer Engineering program is to graduate leaders of character who:

- Possess breadth of integrated, fundamental knowledge in the basic sciences, engineering, the humanities, and social sciences; and depth of knowledge in Computer Engineering.
- Can communicate effectively.
- Can work effectively with others.
- Are independent thinkers and learners.
- Can apply their knowledge and skills to solve Air Force engineering problems, both well- and ill-defined.
- Know and practice their ethical and professional responsibilities as embodied in the Air Force Core Values.

Upon completion of the Computer Engineering program each graduate shall demonstrate satisfactory:

- Application of the fundamental concepts of computer engineering to solve engineering problems.
- Laboratory techniques including procedures, recording, and analysis.
- Design, fabrication, and test techniques.
- Use of contemporary computer engineering analysis, design, and test tools.
- Written and oral communication skills.
- Knowledge of ethical and professional responsibilities.
- Breadth and depth of knowledge and skills in computer engineering, computer science, electrical engineering, mathematics, and other disciplines necessary to effectively identify and solve the types of complex, multidisciplinary problems they will face as Air Force engineers.
- Knowledge of the benefits and skills needed to engage in life-long learning.
- Ability to be effective multidisciplinary team members.
- Skills to be independent learners while knowing when to seek assistance.
- Knowledge of the role of Air Force engineering officers in our global society.
- Knowledge of contemporary social, political, military, and engineering issues.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy/Comp Engr Opt
Comp Sci 210	Beh Sci 310	Astro Engr 410
Comp Sci 220	Biology 315	Comp Engr 463
Econ 201	Comp Engr 373	Comp Engr 464
El Engr 231	El Engr 321	Comp Sci 467
El Engr 281	El Engr 382	Comp Sci 483
El Engr 332	El Engr 383	El Engr 485
Engr Mech 220	English 211	English 411
Math 245	Law 220	History 302
MSS 200	Math 340	MSS 400
Physics 215	Math 356	Philos 310
Pol Sci 211	Sys Opt Engr 311	Soc Sci 412

## **COMPUTER ENGINEERING** (Comp Engr)

Offered by the Departments of Electrical and Computer Engineering, and Computer Science.

**Comp Engr 373. Digital VLSI Circuits.** Continuation of the study of electronics for Computer Engineering majors. Applies diode and field effect transistor concepts to the design and implementation of Very Large Scale Integrated (VLSI) circuits. Applies VHDL descriptions in concert with logic synthesis tools to generate mask level implementations of physical VLSI circuit design.

**Comp Engr 463. Capstone Design Project I.** First course in the two-semester capstone design sequence for Computer Engineering majors. Presents contemporary methods essential to design, planning, and execution of complex electrical and computer engineering projects. Includes instruction in contemporary Air Force project management methods and tools, organization of requirements, software and hardware specification and design, hardware fabrication, quality assurance, and testing. Planning and prototyping the semester-long design project is completed in this course.

**Comp Engr 464. Capstone Design Project II.** Second course in the two-semester project design sequence for Electrical and Computer Engineering majors. Continues study of the system software and hardware lifecycle. Emphasis is placed on system design, appropriate implementation in hardware and software, analysis, testing and evaluation, quality assurance, and documentation. Uses a design project to emphasize Air Force applications.

## computer science major

Successful completion of the Computer Science major leads to the degree of Bachelor of Science in Computer Science and prepares cadets to be leaders in an information-based and network-centric Air Force. The Computer Science program is accredited by the Computing Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore MD 21202-4012, telephone: (410) 347-7700.

The goal of the Computer Science program is to produce leaders of character who:

- Apply a broad and deep understanding of the field of computer science.
- Can specify, design, implement, test, debug and maintain computer-based systems.
- Are fluent in at least one general-purpose programming language.
- Independently learn new programming languages and applications.
- Write and speak effectively on technical subjects.
- Are committed to the highest ethical standards in the use of computers.
- Work well with others.
- Excel in graduate study.

Upon completion of the Computer Science program each graduate shall demonstrate satisfactory:

- Ability to apply knowledge of computing and mathematics appropriate to the discipline.
- Ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
- Ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
- Ability to function effectively on teams to accomplish a common goal.
- Understanding of professional, ethical, legal, security and social issues and responsibilities in computing and the Air Force.
- Ability to communicate effectively with a range of audiences.
- Ability to analyze the local and global impact of computing on individuals, organizations, and society.
- Recognition of the need for and an ability to engage in continuing professional development, both in computing and the Air Force.
- Ability to use current techniques, skills, and tools necessary for computing practice.
- Ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- Ability to apply design and development principles in the construction of software systems of varying complexity.

The Computer Science major offers both great challenges and great rewards. Most courses in the major involve computer programming, so successful majors enjoy programming and working with computers. Strong quantitative and analytical skills as well as determination and creativity are very useful for success in the major. Prior programming experience is not required for success in the major.

Most graduating Computer Science majors either enter a rated career field or the Communications and Information career field. Computer Science majors successfully completing the Cyber Warfare option enter the Air Force as highly skilled information warriors.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy/Comp Sci Opt
Comp Sci 210	Beh Sci 310	Astro Engr 410
Comp Sci 220	Biology 315	Comp Sci 380
Comp Sci 351	Comp Sci 359	Comp Sci 426
Econ 201	Comp Sci 364	Comp Sci 454
El Engr 281	Comp Sci 467	Comp Sci Opt
English 211	Comp Sci 483	English 411
Engr Mech 220	El Engr 315	Math Opt
Law 220	History 302	Mgt 400
MSS 200	Math 340	MSS 400
Physics 215	Math 356	Soc Sci 412
Pol Sci 211	Philos 310	Sys Opt Comp Sci 453

## **COMPUTER SCIENCE** (Comp Sci)

Offered by the Department of Computer Science.

**Comp Sci 110. Introduction to Computing.** Introduction to principles, applications, capabilities, and limitations of computer systems. Topics include computer hardware, algorithms, information representation, networks, computer security, computers and society, system and application software, and computer programming. Students will learn how to use their own computers more effectively.

**Comp Sci 210. Introduction to Programming.** Introduces the fundamentals of software development as a foundation for a more advanced study of computer science. Topics include programming constructs, problem-solving strategies, algorithms, data structures, recursion, and object-oriented concepts. Considerable attention is devoted to developing effective software engineering practices, emphasizing design, decomposition, encapsulation, procedural abstraction, testing, debugging, and software reuse.

**Comp Sci 211. Introduction to Programming for Scientists and Engineers.** Introduces the fundamentals of software development as a foundation for solving scientific and engineering problems using computers. Topics include programming constructs, problem-solving strategies, algorithms, and data structures. Considerable attention is devoted to developing effective software engineering practices, emphasizing design, decomposition, encapsulation, modularity, testing, debugging, and software reuse. Students learn a programming language and development environment that is widely used within the engineering discipline.

**Comp Sci 220. Data Abstraction.** Continues the introduction of software development, with a particular focus on the ideas of data abstraction, object-oriented programming, and fundamental data structures. Topics include recursion, computational complexity, event-driven programming, graphical user interface design and implementation, and fundamental computing algorithms.

**Comp Sci 310. Information Technology.** Provides the necessary computing skills for students to solve a wide variety of problems using a computer and application software. Topics include the World Wide Web, hardware and software selection, desktop publishing, spreadsheet analysis, information storage and retrieval, information visualization, computer security, and telecommunications. Suitable for students in any academic major, including divisional majors.

**Comp Sci 315. Web Design and Construction.** Provides students experience in designing and building web-based applications. Topics include web page design, web development tools, browser capabilities, HTML, XML, client-side scripting, server-side scripting, and web security issues.

**Comp Sci 351. Computer Organization and Architecture.** Expands on basic computer logic systems from prerequisite courses by introducing and contrasting major types of computing system organizations and introducing machine and assembly language programming. Topics include performance analysis, computer arithmetic, data path and control, pipelining, virtual memory, I/O, device drivers, and parallel processing.

**Comp Sci 359. Programming Paradigms.** Applied course studying four different programming paradigms. Imperative, Object-Oriented, Functional and Logic programming paradigms are covered. Programming languages and specific language constructs supporting the four paradigms are covered, but the emphasis is on how to think about programming in each paradigm. At least one programming project is assigned for each of the four paradigms.

**Comp Sci 362. Computer Simulation.** Introduction to computer simulation and modeling of real-world systems. Topics include system analysis and modeling; principles of computer simulation methodologies; data collection and analysis; selecting distributions; simulation programs using general purpose languages; simulation using special simulation languages; analysis of results; and selecting alternative systems. The course includes the preparation of several computer programs using general and special purpose simulation languages and a group project involving the analysis of a real world system.

**Comp Sci 364. Information Storage and Retrieval.** Introduction to the basic concepts of database and information storage systems. Topics include data models, database design theory, database performance, transaction processing, web-database interaction, techniques for handling large volumes of data, and contemporary database issues. Hands-on projects emphasize basic database and information storage and retrieval techniques.

**Comp Sci 380. Design and Analysis of Algorithms.** Advanced design and analysis of algorithms used in modern computing systems. Topics include analysis of algorithms, basic structures, advanced abstract data types, recursion, computability and complexity. Problem solving and analytical skills are improved by examining the application of abstract data types to several problem domains with an emphasis on the impact of design decisions on algorithm performance. Concepts are reinforced by several programming exercises.

**Comp Sci 405. Computer Science Seminar.** Designed to give Computer Science majors the opportunity to discuss topics cadets may encounter in the Air Force upon graduation, including computer ethics. Leaders from around the Air Force are invited to speak in the classroom, offering their view of what it takes to be successful in the Air Force and the impact of technology in our career field. Meets once per week. Open only to Computer Science majors.

**Comp Sci 426. Languages and Machines.** Students learn the theoretical foundations of computer science and apply these concepts to appropriate stages in compiler implementation. Topics include finite automata, formal language theory, grammars, scanners, parsing techniques, code generation, symbol tables, and run-time storage allocation. Students design and implement a syntax-directed compiler for a high-order programming language.

**Comp Sci 431. Cryptography.** Introduces the principles of cryptography and number theory. Topics include: primes, random numbers, modular arithmetic and discrete logarithms, symmetric encryption, public key encryption, key management, hash functions, digital signatures, authentication protocols and protocols for secure electronic commerce. Elliptic curves and quantum cryptography will also be introduced.

**Comp Sci 438. Computer Security and Information Warfare.** Introduction to the technical aspects of Information Warfare. Emphasis is on how computer systems and networks are secured in order to protect them from an Information Warfare attack. Topics include Viruses, Worms, Hacking, Phreaking, authentication, access and flow controls, security models, encryption, intrusion detection, and firewalls.

**Comp Sci 453. Software Engineering I.** First course of a two-semester capstone sequence for Computer Science majors. Students learn about issues related to developing large software systems. Topics include software development process lifecycles, software project management, configuration management, quality assurance management, requirements elicitation, system analysis, specification, software architecture, high-level design, and testing. Students begin work on a two-semester software development project for a real customer.

**Comp Sci 454. Software Engineering II.** Second course of a two-semester capstone sequence for Computer Science majors. Students learn about issues related to developing large software systems. Topics include detailed design, implementation, maintenance, and contemporary software engineering issues. Students complete work on a two-semester software development project for a real customer.

**Comp Sci 467. Computer Networks.** Examination of modern data communications systems and related security issues. Topics include the TCP/IP reference model, data transmission theory, network design issues, internetworking, routing, network protocols, implementation of networks, web application architecture, communications security, and cryptography.

**Comp Sci 468. Network Security.** Focuses on the design and analysis of secure TCP/IP networks. Includes significant hands-on implementation of current network security models and theory in an advanced, multi-operating system lab. Topics include: secure network design principles, advanced TCP/IP security issues, packet filtering, stateful and proxy firewalls, network perimeters, threat and vulnerability assessment, host hardening honey nets, network intrusion detection, and computer forensics. Course culminates in an exercise where students design, configure, and secure a live network that is attacked by "Red Teams."

**Comp Sci 471. Artificial Intelligence.** Introduction to major subjects and research areas in artificial intelligence (AI). Topics include: problem solving techniques, knowledge representation, machine learning, heuristic programming, AI languages, expert systems, natural language understanding, computer vision, pattern recognition, robotics, and societal impacts. Also explores current and projected uses of AI in the Air Force.

**Comp Sci 474. Computer Graphics.** Basic concepts of interactive computer graphics including both vector and raster graphics. Topics include mathematics of 2-dimensional and 3-dimensional geometric transformations, interactive techniques, graphics hardware architectures, graphic algorithms, and realism in computer-generated images. Includes several computer projects.

**Comp Sci 483. Operating Systems.** Examines the design and implementation of programs that manage hardware resources and provide abstract interfaces for hardware control. Topics include resource allocation, synchronization primitives, virtual memory, information protection, performance measurement, I/O sub-subsystems, and distributed computing.

**Comp Sci 495. Special Topics.** Selected topics in computer science.

**Comp Sci 496. Computer Science Seminar.** Advanced topics in computer science. Students participate in and lead discussions on significant issues in current computer science research as well as key historical developments.

**Comp Sci 499. Independent Study.** Individual study and research supervised by a faculty member. Topic established with the department head.

## economics major

Economics is the scientific study of how individuals and institutions use their limited resources to satisfy their unlimited wants. The discipline begins with a sequence of core economic courses and then branches outward allowing cadets to focus on the international arena, public policy and finance, or quantitative economics. The major is designed to help students develop analytical skills which can be applied in a variety of circumstances. Cadets acquire the tools necessary to solve a wide range of problems such as allocating military personnel, analyzing a company's production efficiency, and evaluating the effect of government regulations. The economics major develops problem solving techniques which have been proven effective in today's changing Air Force environment and is widely recognized as a solid background for careers in business, government, law, and teaching.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Biology 315	Aero Engr 315	Academy Opt
Chem 200	Beh Sci 310	Astro Engr 410
Econ 201	Econ 332	Econ 450
Econ 240	Econ 333	Econ 465
English 211	Econ 355	Econ 478
Engr Mech 220	Econ 356	Econ Elective
History 302	Econ 365	Econ Elective
Law 220	Econ Elective	Econ Elective
MSS 200	El Engr 315	English 411
Physics 215	Math 356	Mgt 400
Pol Sci 211	Mgt 341	MSS 400
Sys Opt Ops Rsch 310	Philos 310	Soc Sci 412

### ECONOMICS (Econ)

Offered by the Department of Economics and Geosciences.

**Econ 201. Introduction to Economics.** Introduces the economic way of thinking so that graduates can understand the world around them in economic terms and apply economic concepts to the challenges they will face as Air Force officers. Focus in on using economic analysis to improve students' critical thinking, decision-making, and quantitative literacy skills to make them more effective leaders. Graduates can apply these skills to analyze economic policy, defense economics, engineering economics, and personal finance issues. Graduates also develop literacy in the national and international economic environment in order to understand contemporary issues and public policy.

**Econ 240. Development of Economic Thought.** Modern economic theory developed in response to a variety of economic forces beginning with the Industrial Revolution through the Great Depression and into today's globalization of the world's economy. Course links these forces with some of the great economic thinkers of the past such as Adam Smith, Karl Marx, Alfred Marshall, and John Maynard Keynes. Upon completion of this course, the student will have gained an appreciation of how today's economic theories have been influenced by the economic conditions that their originators experienced.

**Econ 301. Macroeconomic Principles for the U.S. and the World.** Foundations of key macroeconomic principles for non-econ majors. Examination of a nation's economy at the aggregate level. Analytical models are developed and applied to real-world events explaining the functioning of the macroeconomy. Focus is on developing tools that can be used to analyze the macroeconomic goals and performance of economies around the world. Topics include growth, national income, inflation and deflation, unemployment, fiscal policy, monetary policy, debt, deficits, currency, exchange rates, trade and international finance.

**Econ 332. Microeconomic Theory I.** First course in a calculus-based treatment of microeconomic theory. In-depth analysis of market supply and demand, utility theory, consumer optimization, demand functions, income/substitution effects, and elasticity. Includes a treatment of choice under uncertainty, markets with asymmetric information, externalities, public goods, and other related topics.

**Econ 333. Microeconomic Theory II.** Second course in a calculus-based treatment of microeconomic theory. In-depth analysis of production functions, long-run and short-run cost functions, and profit maximization. Also includes a study of market structures, game theory, and other related topics.

**Econ 347. Quantitative Economic Methods.** Analysis of economic problems through statistical and mathematical methods and the use of quantitative models.

**Econ 351. Comparative Economic Systems.** Examines the world's major economic systems including capitalism, market socialism, and planned socialism. These systems are examined through a critical analysis of the theoretical literature and case studies. Areas of study include the United States, the European Union, China, the Middle East, and parts of the developing world. Both economic and non-economic aspects of these countries' systems are examined to come to an understanding of how these countries work and why countries experience different results despite similarities in their systems.

**Econ 355. Principles of Macroeconomics.** Foundations of key macroeconomic principles. Analysis of the macroeconomics of a nation at an aggregate level. Analytical models are developed and used to analyze the impacts of alternative government economic policies. Topics include inflation, unemployment, national income, the banking system, fiscal and monetary policy, debt, deficits, and international finance and trade (including exchange rates and barriers to trade). Focuses on domestic and global economic environments of organizations and discusses current and historical issues in the macroeconomy relating to real-world events. Discusses the impact of macroeconomic policies on the defense sectors.

**Econ 356. Macroeconomic Theory.** Analysis of national income, employment, price level determination, monetary, and fiscal policies. Contemporary macroeconomic issues are explored through the Economic Report of the President.

**Econ 365. Analysis of Economic Data.** Survey of economic data series available from the Economic Report of the President, Commerce Department, Bureau of Labor Statistics, Federal Reserve, and financial data. Develops familiarity with macro, micro, and financial data series, what the series measure, accessing series via the internet, and basic analysis to include the use of software.

**Econ 374. Survey of International Economic Issues.** Examination of current issues in the commercial relations among nations, including international trade, international finance, economic development, and the multinational enterprise. Designed for those students not majoring in economics.

**Econ 377. Financial Markets.** Introduction to and analysis of how the financial markets allocate personal and corporate resources in a modern capitalistic economy. Specific emphasis on the characteristics, valuations, and functions of the various financial instruments traded in the financial markets. Also covered in some depth are the operational mechanisms of the financial markets, the relationship of government fiscal and monetary policies to finance market activity, the individual and corporate investment decision, and the understanding of financial press information.

**Econ 391. Industrial Organization.** Focuses on the structure and performance of markets and their regulation. Investigates the observed behavior of firms engaging in both legal and illegal marketplace competition. Examines the evolution of antitrust law in the United States and the impact these laws have on the market. Topics covered include predatory pricing, price discrimination, bundling and tie-ins, tacit collusion, mergers, and acquisitions.

**Econ 411. Introduction to Game Theory.** Introduces the concepts required to analyze strategic situations, or situations in which a player's payoff depends on his choices and those of the other players. Topics include zero-sum and nonzero-sum games, normal and extensive form games, the implications of informational asymmetries on these strategic situations, auctions, and bargaining models. Developing the ability to think strategically is valuable to everyone, but this course is especially important for those studying any of the social sciences.

**Econ 422. Labor Economics.** This course examines how people make decisions regarding their participation in the labor market. Included in this course is the examination of government policies (such as social security, minimum wage, etc.) and their impacts on the supply and demand of labor. Wage determination for women and minorities will be discussed in light of the supply and demand forces in the influence of the human capital decisions made by individuals.

**Econ 450. International Economics.** Economic aspects of international relations, international trade, relationships among national currencies, international monetary systems, the balance of payments, and commercial policy.

**Econ 454. Economics of Transition and Development.** Studies the transition of centrally planned or state-run economies to market based economies, as well as the problem of sustaining accelerated economic growth in less developed countries. Focus is on price liberalization, stabilization efforts, and the economic restructuring necessary to move a centrally planned economy to a market based economy. Additionally, covers economic growth, population growth, income inequality, trade, and investment. Case studies from Eastern Europe, Latin and South America, Asia, and Africa may be included.

**Econ 457. Economies of Asia.** Analyzes the major issues defining Asian economies today. Major topics include internal and external balance, growth and development strategies, currency regimes, economic integration, trade and globalization, among others. The role of Asia in the world economy is analyzed. The 'Asian Miracle' and the 'Asian Crisis' are examined as they pertain to the current economic situation.

**Econ 459. Economics of Latin America.** A broad overview of the major economic issues affecting U.S. relations with Latin America, including trade liberalization, foreign investment, economic integration, external debt problems, environmental protection and the impact of drug production and trafficking. Provides an appreciation of the rising importance of Latin American countries as trading partners of the United States and analysis of the region's unique economic and social problems. Pays special attention to the prospects for further regional economic integration under NAFTA and other regional trade groups.

**Econ 465. Introduction to Econometrics.** Application of statistical tools to economic data, concentrating on methodology, econometric model building, and statistical inference.

**Econ 466. Forecasting and Model Building.** Continues development of econometric techniques, with emphasis on time series forecasting procedures and on methods to make optimal use of sparse or deficient data in statistical model estimation. Recommended for those students planning to pursue graduate study.

**Econ 473. Public Finance.** Economics of the government sector, with emphasis on public goods, taxation, fiscal policy, and government regulation.

**Econ 475. Money, Banking and Financial Institutions.** Advanced treatment of money and its role in the economy. Critical analysis of financial structure and institutions, the Federal Reserve System and the increasing importance of the global financial arena. Special emphasis on financial events and policy issues.

**Econ 478. Seminar in Defense Economics.** Applies macroeconomic and microeconomic theories to analyze a variety of defense policy issues. Examples of topics typically covered include: defense alliances, military personnel system and pay, the defense industrial base and acquisition.

**Econ 495. Special Topics.** Selected topics in economics of either an advanced treatment or general interest orientation.

**Econ 499. Independent Study.** Tutorial investigation of a specific area of economics.

# electrical engineering major

The battlefield of the 21st century is increasingly an electronic one; electrical engineers (EEs) are leading the way in creating the technology that dominates. Without EEs, modern computers, control systems, or even high-fidelity sound systems would not be possible. Indeed, the modern military would not have its current capabilities without electronics and electrical engineers. Electronic systems are everywhere: sophisticated sensors detect and locate targets, “smart” computer guided munitions attack targets with amazing accuracy, aircraft fly “by wire,” advanced radios provide reliable communications in high jamming environments, and aircrews depend on terrain following radar. All these systems are critical to the success of today’s Air Force; the Air Force’s future depends heavily on continued progress in these areas. The Electrical Engineering major covers the basic principles behind these systems and provides graduates with valuable insight into their operation. Officers who understand the technology and can use it to their advantage will have the “combat edge” over the opponent. If you want to help the Air Force find new and better ways to accomplish its mission, this major may be for you.

Students successfully completing the Electrical Engineering major are awarded a Bachelor of Science in Electrical Engineering degree that is accredited by the Engineering Accreditation Commission of ABET, Inc. The Electrical Engineering major is an excellent choice if you are interested in an advanced degree. As an electrical engineer, your knowledge and skill will be in high demand both in the Air Force and in society as a whole.

The goal of the Electrical Engineering program is to graduate leaders of character who:

- Possess breadth of integrated, fundamental knowledge in the basic sciences, engineering, the humanities, and social sciences; and depth of knowledge in Electrical Engineering.
- Can communicate effectively.
- Can work effectively with others.
- Are independent thinkers and learners.
- Can apply their knowledge and skills to solve Air Force engineering problems, both well- and ill-defined.
- Know and practice their ethical and professional responsibilities as embodied in the Air Force core values.

Upon completion of the Electrical Engineering program each graduate shall demonstrate satisfactory:

- Application of the fundamental concepts of electrical engineering to solve engineering problems.
- Laboratory techniques including procedures, recording, and analysis.
- Design, fabrication, and test techniques.
- Use of contemporary electrical engineering analysis, design, and test tools.
- Written and oral communication skills.
- Knowledge of ethical and professional responsibilities.
- Breadth and depth of knowledge and skills in electrical engineering, computer science, mathematics, and other disciplines necessary to effectively identify and solve the types of complex, multidisciplinary problems they will face as Air Force engineers.
- Knowledge of the benefits and the skills needed to engage in life-long learning.
- Ability to be effective multidisciplinary team members.
- Skills to be independent learners while knowing when to seek assistance.
- Knowledge of the role of Air Force engineering officers in our global society.
- Knowledge of contemporary social, political, military, and engineering issues.

The major has four different suggested areas of study: electronics, communications, computer systems, and controls. There is also a universal area that allows you to take any two electrical engineering options.

**Electronics**—This area of study provides a general foundation in all areas of electrical engineering. The emphasis is on electronic design, components, and applications. It is well suited to those who want to retain the flexibility to work and/or do graduate studies in electrical engineering, physics, medicine, or other technical fields.

**Communications**—Classes in this area of study are the basis for understanding modern radar and communication systems. Topics include fiber optics, modulation techniques, radio components and antennas. Study in this area leads to a better understanding of satellite communications and systems, telephones, stealth technology, and advanced radar systems.

**Computer Systems**—In this area of study, the fundamentals and advanced concepts of computer design are explored. Topics include microcomputers, system design and interfacing, and computer architecture. Classes in this area of study lead to a better understanding of modern computer systems and digital hardware design.

**Controls**—This area of study consists of two courses taught by the Department of Astronautics. The analysis and design of automatic control systems is emphasized. Control systems are integral components of modern society, from a simple thermostat to space vehicles.

**Universal Area**—You are free to choose two classes from the approved “Elective Options” list to fulfill the electrical engineering major’s elective. These electives provide the opportunity to “pick and choose” classes that interest you.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy/El Engr Opt
Econ 201	Beh Sci 310	Astro Engr 410
El Engr 231	Biology 315	El Engr 434
El Engr 281	El Engr 321	El Engr 447
El Engr 332	El Engr 322	El Engr 463
English 211	El Engr 333	El Engr 464
Engr Mech 220	El Engr 343	El Engr Opt
Math 243	El Engr 382	English 411
Math 245	Law 220	History 302
MSS 200	Math 346	MSS 400
Physics 215	Math 356	Philos 310
Pol Sci 211	Sys Opt Engr 311	Soc Sci 412

### ELECTRICAL ENGINEERING (El Engr)

Offered by the Department of Electrical and Computer Engineering.

**El Engr 231. Electrical Circuits and Systems I.** Introduction to circuit analysis and system design. Topics include: circuit models and simulations of electrical devices and systems, nodal and mesh analysis, Thévenin and Norton equivalent circuits, dependent sources, operational amplifier circuits, transient and frequency response of first-order circuits, sinusoidal steady state response, and military and civilian applications.

**El Engr 281. Introductory Digital Systems.** Introduction to the fundamental principles of logic design. Topics include: Boolean algebra, combinational and sequential logic networks with basic design and analysis techniques, very high speed design languages (VHDL), field programmable gate assemblies (FPGA), and an introduction to digital processing systems. Laboratory projects include the design of digital systems and the analysis of computer architecture.

**El Engr 315. Principles of Air Force Electronic Systems.** Introduction to electrical and computer engineering principles applied to Air Force electronic systems through signal analysis and electronic system design and evaluation. Topics include signal representation, the realization of digital and analog systems using electronic functions, and their application to Air Force systems.

**El Engr 321. Electronics I.** Introduction to semiconductor electronics. Covers qualitative and quantitative analysis of semiconductor devices with emphasis on the diode and field effect transistor. Includes modeling, analysis and design of related circuits, including combinational and sequential digital logic.

**El Engr 322. Electronics II.** Continuation of El Engr 321 for Electrical Engineering majors. Extends basic semiconductor concepts to the bipolar junction transistor. Extends modeling and circuit analysis processes to circuits containing multiple transistors including differential/operational/power amplifiers, frequency response, feedback, and stability.

**El Engr 332. Electrical Circuits and Systems II.** Continuation of circuit analysis and system design. Topics include transient response of second order circuits, mutual inductance, Laplace transform techniques in circuit analysis, analog filter design, and two-port networks.

**El Engr 333. Continuous-Time Signals and Linear Systems.** Introduction to analog signal processing by linear, time invariant systems. Topics include signal characterization, convolution, Fourier analysis methods, and state variable techniques.

**El Engr 343. Electromagnetics.** Study of Maxwell’s Equations, plane waves, transmission, and radiating systems. Topics include wave propagation, transmission lines, waveguides, and antennas.

**El Engr 360. Instrumentation Systems.** Principles and design of modern data acquisition and instrumentation systems for non-electrical engineering majors. Includes measurement techniques, transducers, analog and digital data processing systems and displays.

**El Engr 382. Microcomputer Programming.** Provides a broad base understanding of microcontroller systems. The microcontroller principles presented provide a foundation that can be used in other courses to simplify projects (in some cases, substantially). Includes design, application, interfacing, assembly language, and microcontroller hardware. Lab projects emphasize applications and interfacing.

**El Engr 383. Microcomputer System Design I.** Course in the design of digital systems using microprocessors. Topics include structured system design, microprocessor instruction sets, support software, and system timing. Also covered are input/output, peripherals, and hardware-software interfacing techniques.

**El Engr 387. Introduction to Robotic Systems.** Provides fundamental knowledge on robotic systems. Topics include kinematics, dynamics, motion control, controller design, and trajectory planning of robot manipulators. Introduces basic computer vision techniques.

**El Engr 434. Discrete-Time Signals and Systems.** Introduction to digital signal processing. Topics include classical solutions to linear difference equations, the z-transform, digital filter design, quantization effects of Analog-to-Digital and Digital-to-Analog converters, frequency analysis of decimation and interpolation, discrete Fourier transform, and the fast Fourier transform.

**El Engr 444. Applied Field Theory.** Topics include antennas, fiber optics, scattering, Fourier optics, radio wave propagation, radar cross-section, and numerical methods. Analysis and design of practical systems are emphasized. A few lessons are reserved for current state-of-the-art topics, such as stealth technology, adaptive antennas, and holography.

**El Engr 447. Communications Systems.** Introduction to modern electrical communications. The performance of various modulation and detection methods for both analog and digital systems are analyzed. Coverage includes theory of operation, effects of random noise, bandwidth and other communication design constraints.

**El Engr 448. Wireless Communications.** Follow-on course to El Engr 447 that applies the knowledge of random processes and spectral analysis to the performance of wireless communication corrupted by noise. Advanced topics that vary from semester to semester include satellite communications, image processing, data communications, and fiber optics.

**El Engr 463. Capstone Design Project I.** First course in the two-semester capstone design sequence for Electrical Engineering majors. Presents contemporary methods essential to design, planning, and execution of complex electrical and computer engineering projects. Includes instruction in contemporary Air Force project management methods and tools, organization of requirements, software and hardware specification and design, hardware fabrication, quality assurance, and testing. Planning and prototyping the semester-long design project is completed in this course.

**El Engr 464. Capstone Design Project II.** Second course in the two-semester project design sequence for Electrical and Computer Engineering majors. Continues study of the system software and hardware lifecycle. Emphasizes system design, appropriate implementation in hardware and software, analysis, testing and evaluation, quality assurance, and documentation. Uses a design project to emphasize Air Force applications.

**El Engr 472. Instrumentation System Fundamentals.** Introduction to instrumentation components. Analysis and design of advanced operational amplifier circuits, including Schmitt trigger, waveform generators, instrumentation amplifiers, and active filters. Discussion and practical design of transducer circuits to instrument various processes.

**El Engr 473. Introduction to CMOS VLSI Circuit Design.** Introduction to design of Very Large Scale Integrated (VLSI) circuits in silicon Complementary Metal Oxide Semiconductor (CMOS) technology. Includes discussions of CMOS fabrication technology, combinational and sequential logic structures, analog circuit structures, computer aided layout and simulation techniques, load/timing analysis and integrated systems design techniques/considerations.

**El Engr 484. Microcomputer System Design II.** Culmination of the Computer Systems area of study design sequence using microprocessors. Students investigate advanced peripheral interfacing techniques, advanced memory systems, advanced bus features, coprocessors, serial communications, cross-compilers, and digital-to-analog conversion. This is accomplished through a series of laboratory design exercises.

**El Engr 485. Computer Architecture.** Final course in the Computer Systems area of study quantitatively examines tradeoffs in the design of high-performance computer systems. Topics include price/performance, instruction sets, hardwired control versus microprogramming, memory hierarchy, cache memory, virtual memory, pipelining, Reduced Instruction Set Computers (RISC), input/output, and parallel processing. Final project examines state-of-the-art processors and computers.

**El Engr 495. Special Topics.** Selected topics in electrical engineering. Typical subjects include audio power amplifier design, laser optics and weapons, advanced signal and image processing, and advanced electronics circuits.

**El Engr 499. Independent Study.** Individual study and research in an engineering design topic approved by the department head.

## engineering mechanics major

Engineering mechanics is considered the foundation engineering discipline with roots tracing back to Archimedes, Leonardo da Vinci, Galileo, and Sir Isaac Newton. Engineering mechanics deals with forces acting on bodies (such as satellites, missiles, and aircraft) and how bodies dynamically respond to those forces. Nearly all more specialized engineering disciplines begin with one or more courses in engineering mechanics. The Engineering Mechanics degree is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore MD 21202-4012, telephone: (410) 347-7700.

If you want to design and build things, then you should consider majoring in engineering mechanics. If understanding, building, and using state-of-the-art materials such as composites and ceramics intrigues you, this challenging major may be right for you. If you aren't sure what engineering discipline to pursue right now and you want to keep your options open, this broad based foundational major may be perfect for you.

The Goal of the Department of Engineering Mechanics is to "Educate Engineers for the Military Profession." The Engineering Mechanics program is specifically designed with the goal of generating leaders of character who:

- Possess breadth of integrated, fundamental knowledge in engineering, the basic sciences, social sciences, and the humanities; and depth of knowledge in engineering mechanics.
- Communicate effectively.
- Work effectively on teams and grow into team leaders.
- Are independent learners, and as applicable, are successful in graduate school.
- Can apply their knowledge and skills to solve Air Force engineering problems, both well- and ill-defined.
- Know and practice their ethical, professional, and community responsibilities as embodied in the Air Force core values.

Upon completion of the Engineering Mechanics program each graduate shall demonstrate satisfactory:

- Application of the fundamental analysis concepts of engineering mechanics to solve engineering problems.
- Modeling, design, and fabrication techniques of systems with solid and fluid components under real-world conditions.
- Use of contemporary engineering mechanics analysis, design, and test tools.
- Experimental techniques to include test design, execution, data analysis and interpretation.
- Written and oral communications skills.
- Knowledge of ethical and professional responsibilities.
- Breadth and depth of engineering knowledge and skills to effectively identify and solve the types of complex interdisciplinary problems they will encounter as Air Force engineers.
- Ability to be effective interdisciplinary team members and leaders.
- Skills to be independent life-long learners while knowing when to seek help.
- Knowledge of contemporary social, political, military, and engineering issues, as well as the role of Air Force engineering officers and citizens in our global society.

With a degree in engineering mechanics you can get an Air Force assignment as an aeronautical engineer, civil engineer, astronautical engineer, mechanical engineer, or project engineer. The engineering mechanics degree also satisfies the educational requirements for Air Force Test Pilot, Flight Test Navigator, and Flight Test Engineer duties. Additional specialties are Scientific Analyst and Acquisition Project Officer.

If you are a top performer in the Engineering Mechanics major, graduate school can be an option as a first Air Force assignment, either by winning a prestigious national scholarship (Guggenheim, Hertz, Rhodes, etc.) or through direct departmental sponsorship. The Engineering Mechanics major gives you the flexibility to pursue either a more specialized degree in graduate school or to continue your broad-based study in engineering mechanics. Whether you ultimately choose a graduate program in aeronautical engineering, mechanical engineering, astronautical engineering, materials engineering, or engineering mechanics, your decision will be an informed one.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy/Engr Opt 2
Econ 201	Beh Sci 310	Astro Engr 410
El Engr 231	Biology 315	English 411
English 211	Engr Mech 305	Engr Mech 350
Engr Mech 220	Engr Mech 320	Engr Mech 460
Engr Mech 330	Engr Mech 332	Engr Mech Opt 1
Law 220	Engr Mech 340	Engr Mech Opt 2
Math 243	History 302	Engr Opt 1
Math 245	Math 346	Mech Engr 491
MSS 200	Math 356	Mech Engr 492
Physics 215	Mech Engr 341	MSS 400
Pol Sci 211	Philos 310	Soc Sci 412
	Sys Opt Mech Engr 312	

### ENGINEERING MECHANICS (Engr Mech)

Offered by the Department of Engineering Mechanics.

**Engr Mech 220. Fundamentals of Mechanics.** Introduction to the fundamental principles of statics and mechanics of materials applied to aerospace systems. Topics include: force and moment equilibrium using free body diagrams and vector algebra; stress, strain, and deformation response of deformable bodies to axial, torsional, flexural, and combined loadings; material properties and selection criteria; and failure modes of materials and structures.

**Engr Mech 305. Engineering Tools Seminar.** A junior-level seminar course designed to help Engr Mech and Mech Engr majors transition into the degree-granting program. Content includes essential skills required for success in the Engr Mech and Mech Engr programs. Emphasis is on safe operation of critical lab equipment and hands-on engineering tools with in-class practice using related hardware, software, and program-specific techniques. No homework or outside preparation required.

**Engr Mech 320. Dynamics.** Course covers the analysis of kinematics and kinetic motions of particles and rigid bodies as well as an introduction to mechanical vibrations of simple systems. Topics include kinematics with absolute and relative motions in Cartesian, path, and polar coordinates; kinetics using force-mass acceleration, work-energy, and impulse-momentum methods; and vibration equation-of-motion generation and analysis. Methods emphasize vector solutions.

**Engr Mech 330. Mechanics of Deformable Bodies.** Axial loading. Statically indeterminate structures. Beam theory: shear and moment diagrams, stress, and deflection. Transformation of stress and strain. Mohr's circle. Introduction to failure theories. Introduction to classical lamination theory. Euler buckling. Stress concentrations. Introduction to energy methods and Castigliano's theorems.

**Engr Mech 332. Aerospace Structures.** Analysis and design of lightweight, thin-walled and semimonocoque structures. Margin of safety. Material selection including strength, stiffness, and weight.

**Engr Mech 340. Materials Science for Engineers.** Survey of engineering applications of non-ferrous and ferrous alloys, polymers, ceramics and composites. Basic crystallographic notation and molecular structure of common engineering materials. Principles of metallurgical thermodynamics and kinetics applied to phase transformations and strengthening mechanisms.

**Engr Mech 350. Mechanical Behavior of Materials.** Behavior of materials under simple axial, biaxial and triaxial states of stress. Micromechanisms of elastic and inelastic deformation and strengthening mechanisms. Introduction to linear elastic fracture mechanics. Fatigue failure theories and fatigue crack growth analysis. Applications to design of aerospace vehicles and structures.

**Engr Mech 421. Vibrations.** Free and forced vibrations of discrete systems. Effect of viscous and other types of damping considered. Matrix methods used to analyze multi-degree-of-freedom systems. Dynamic analysis of continuous systems.

**Engr Mech 431. Introduction to Finite Element Analysis.** Analysis and design of truss, frame, shell, and solid structures using the direct stiffness and energy formulation methods. Topics include: theoretical development of elementary finite elements and models, thermal and dynamic structural analysis, and computer-aided design and analysis projects using commercial, professional software.

**Engr Mech 432. Finite Element Analysis.** Analysis and design of complex structural components using the finite element method. Theoretical development of two-dimensional finite elements for static, vibration, and heat transfer analyses. Special topics in solving Laplace's equation. Computer-aided design and analysis projects using commercial finite element software.

**Engr Mech 440. Physical Metallurgy.** Physical metallurgy related to properties of engineering metals. Study of crystal structure and imperfections, diffusion, thermodynamics, phases and phase transformations, and material processing and how each alters material properties. Discussion of specific metals/alloy systems and design philosophies for new alloys. Thermomechanical strengthening design project and semester-long knife design and construction project.

**Engr Mech 445. Failure Analysis and Prevention.** Failure analysis and prevention is a technical discipline that integrates mechanical engineering, materials engineering, and structural analysis into component analysis and design. Laboratory techniques including scanning electron microscopy, metallography, x-ray analysis, ultrasonic inspection, and mechanical testing will be used to determine the causes of failures of mechanical components. Re-designs may include changes in geometry, materials selection, or operation to preclude failure.

**Engr Mech 450. Aerospace Composite Materials.** Introduction to select advanced aerospace materials. Topics include: mechanical behavior, design and analysis, processing, testing, inspection and repair of resin-matrix composite materials, and processing and application of metal-matrix and ceramic-matrix composites. Topics emphasized through hands-on project in design, fabrication, and testing of a composite structure.

**Engr Mech 460. Experimental Mechanics.** Introduction to experimental measurements and their role in the mechanical design process. Includes theory and application of static and dynamic instrumentation to include: strain, vibration, temperature and pressure transducers. Hands-on laboratory experience constitutes one-half of the course. Laboratory sessions involve analysis, design, test plans, calibration and testing.

**Engr Mech 495. Special Topics.** Selected topics in mechanics.

**Engr Mech 499. Independent Study.** Individual study, research or design on a topic established with permission of the department head.

## english major

You study at the Air Force Academy to become a leader in our nation's military. Outstanding leadership starts with effective communication. That's exactly what you'll learn as an English major. Leaders throughout history have used their skills as readers, thinkers, and communicators to change the world. This is the essence of the English major. You'll focus on literature, imagination, and communication as deliberate human endeavors. You'll explore the most perplexing questions of the human condition: What does it mean to be human? What is the source of our greatness and our depravity, our nobility and our pathos? For what ideals and against what forces must we fight? How will you persuade others, especially those you lead? How will you help them understand? The ultimate goal of the warrior-scholar is wisdom—a vision that transcends the ephemeral and the superfluous. The study of literature and communication offers the wisdom of generations to a new generation of leaders: you.

The courses you study as an English major reflect a combination of the rigorous traditions of the discipline and your personal interests. The program is extremely flexible, allowing you to explore the literature and ideas that excite your curiosity. You'll be able to pattern a curriculum suited to your desires—one that's sure to enrich your intellectual life. For those students who show outstanding potential, research grants for work at civilian institutions are available, as well as opportunities to present papers at professional conferences and to have research published.

If you enjoy reading, thinking, and communicating, the English major is for you. Your studies as an English major will give you practical training in leadership. Great literature provides examples of human value systems and human relations—occasions for you to experience and appreciate the art of dealing with people before you receive your commission in the Air Force.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy Opt
Econ 201	Beh Sci 310	Astro Engr 410
English 341	Biology 315	English 353
English Opt 1	El Engr 315	English 370
Engr Mech 220	English 390	English 470
For Lang 3	English 461	English 490
For Lang 4	English 462	English Opt 4
Law 220	English Opt 2	English Opt 5
MSS 200	English Opt 3	English Opt 6
Physics 215	History 302	Mgt 400
Pol Sci 211	Math 300	MSS 400
Sys Opt Geo 310	Philos 310	Soc Sci 412

### ENGLISH (English)

Offered by the Department of English and Fine Arts.

**English 109. Academic Communication for English as a Second Language Students.** Introduction to academic reading and writing for English as a Second Language (ESL) students. Frequent writing assignments emphasize writing for the various academic communities. Emphasis on the rhetorical, syntactical, and grammatical conventions of written English.

**English 111. Introductory Composition and Research.** Emphasizes the fundamental uses of language, concentrating on sound academic writing and the rhetoric of argument. Introduces the student to basic methods and resources for academic research, and provides instruction and practice in the presentation, integration, and documentation of researched material. Establishes the foundation for analytical thinking through frequent writing assignments that derive from and reinforce a wide range of readings.

**English 211. Literature and Intermediate Composition.** Refines the analytical and critical reading skills introduced in English 111 through the examination of significant literary texts. Course objectives include acquiring skills in analytical and argumentative writing, research methods and documentation, critical reading, and effective oral communication. Written assignments and oral presentations incorporate literary analysis and research, and provide a foundation for communication skills advanced in English 411. Midterm explication paper and final research essay. All fourth-class cadets who have validated or received transfer credit for English 111 should enroll in English 211 at their earliest opportunity.

**English 330. Communication in the Information Age.** Examines the writing and presentation skills essential for Air Force leaders in the information age. Considers how computers and hypertext affect communication and how today's leaders use and present technical information to accomplish the mission. Labs, discussions, and workshops, develop the necessary skills to communicate effectively in cyberspace (via the Web and e-mail).

**English 341. Literary Criticism.** Introduces the theory and practice of literary criticism. Concentrates on major critical approaches, applying them to representative literature and showing how they lead the reader to deeper understanding and satisfaction from the work of art.

**English 353. Shakespeare.** Intensive study of Shakespeare's poetry and major plays within the cultural and historical perspectives of Renaissance England. Students attend a stage production of one play when available. Designed for students in any major.

**English 360. Classical Masterpieces.** Studies influential genres of the Classical tradition, including epic, drama, and history. Authors have included Homer, Sophocles, Aristophanes, Thucydides, Virgil, Tacitus, and Dante. Key concepts to be studied include the role of the hero, the nature of political institutions, and the relationship between humans and the divine—in short, the foundations in Greek, Roman and Medieval European culture.

**English 365. Television News: Production and Performance.** Examines and uses the fundamentals of television production including: directing, writing, and operating the various pieces of equipment necessary for producing television programs. Students produce, write, direct, and perform in the weekly "Blue Tube" program broadcast via closed-circuit television to the Academy community. Lab work stresses understanding basic television production fundamentals, public speaking skills, and how to use electronic technology to communicate to a mass audience. Additionally, students hone critical analysis skills by completing a 4-6 page paper examining their motivation for entering the profession of arms.

**English 370. Speech Communication. Theory and Practice.** Considers selected topics in advanced speech communication through informative and persuasive speaking. Frequent speaking assignments.

**English 380. Topics in Race, Gender, Class, and Culture.** Topics in literature, communication theory, linguistics, and rhetoric. The course explores issues relating to class, gender, and culture, including international and interdisciplinary topics. Emphasis changes for each offering, but may focus on the literature of women, the rhetoric of class, the impact of culture on linguistics, minority writers in the Americas, or African-American influence on American culture. Seminar approach.

**English 383. Literature and Science.** Considers the interrelationships among science, technology, and literature—nonspeculative and speculative, science fact and science fiction. Eclectic in topical coverage, the course examines both the impact of science on literature and the impact of literature on science.

**English 390. Junior English Seminar.** A focused survey course, taught seminar style, covering a literary period, literary genre, or major author. The course rotates periods over a four semester cycle. The periods will be fixed as: Medieval and/or Renaissance; Restoration and/or Eighteenth Century; Nineteenth Century; and Twentieth Century. In addition, courses alternate between British, American, and Communications/Rhetoric/Linguistics. Representative examples are "Medieval Literature," "The Nineteenth-Century American Novel," "Restoration and Eighteenth-Century Literature," "History of English Language," or "Modernism." Examples of literary genre may include satire, short story, novel, lyric poetry, epic poetry, drama, political essay, creative non-fiction, biography, or memoir.

**English 411. Language, Literature and Leadership: Advanced Writing and Speaking.** Building on English 111 and English 211, this capstone course focuses on the moral and intellectual aspects of war as expressed in the literature of our profession: biographical, autobiographical, and fictional accounts, along with the oratory of prominent public figures in times of national crisis. Rigorous written and oral assignments give students the opportunity to reflect on the inviolable bond that unites successful command with its moral, intellectual, and emotional foundations. The text list comprises major canonical works of fiction, memoir, and oratory that address the concreteness and complexity of war as well as the ethical issues of leadership.

**English 411FX Language, Literature and Leadership: Advanced Writing and Speaking for French Language Exchange Cadets.** Building on English 111 and English 211, this capstone course focuses on the moral and intellectual aspects of war as expressed in the literature of our profession: biographical, autobiographical, and fictional accounts, along with the oratory of prominent public figures in times of national crisis. Rigorous written and oral assignments give students the opportunity to reflect on the inviolable bond that unites successful command with its moral, intellectual, and emotional foundations. Designed for participants in the exchange programs in France and Canada. Texts are from major canonical works of fiction, memoir, and oratory that address the concreteness and complexity of war and the ethical issues of leadership, as well as the language of diplomacy and international relations.

**English 461. British Literature I: Beginnings to Romanticism.** Surveys English poetry, drama, and prose of such authors as Chaucer, Spenser, Shakespeare, Milton, Pope, Swift, Fielding, and Johnson.

**English 462. British Literature II: Romanticism to the Present.** Surveys later English literature focusing on Romantic poetry, Victorian prose and poetry, and the Modern novels. Works are by such authors as Byron, Shelley, Austen, Bronte, Dickens, Hardy, Conrad, Tennyson, Browning, Yeats, Lawrence, and Fowles.

**English 470. American Literature: Introduction.** Introduces American fiction, poetry, drama, and prose. Representative authors might include Bradstreet, Melville, Dickinson, Douglass, Twain, Faulkner, Hemingway, and Morrison.

**English 475. Creative Writing.** Examines techniques of creative writing. In a workshop atmosphere, students experiment with writing, focusing generally on a specific form such as the short story or poetry. The student's own work becomes the focus of discussion and attention.

**English 484. Literature of War.** Explores the treatment of war and issues related to military conflict in literature and other arts. Typical approaches are topical (The Warrior as Hero), cultural (American War Literature), or historical (Literature of the Vietnam War).

**English 485. Contemporary Literature.** Studies literature written within the last twenty years—within the lifetimes of students enrolled in the course. Several genres are offered, depending upon the semester, and change for each offering. Emphasis is on American and British literature, but other cultures, such as Russian, Central American, and Third World, may also be represented. Examples of contemporary writers whose works might be included are Sam Shepard, August Wilson, Marsha Norman, David Mamet, William Carpenter, Stephen Dobyns, Ann Beattie, Toni Morrison, Richard Ford, John Updike and Jay McInerney. Students study at least three genres (for example: novels, short fiction, and poetry; or plays, essays, and criticism).

**English 490. Senior English Seminar.** Intensive seminar covering a literary period, literary genre, or major author. Representative examples are "Coleridge and His Contemporaries," "The Victorian Age," and "American Literature Between the World Wars." Examples of literary genre include satire, short story novel, lyric poem, and drama. Representative examples of major authors are Milton, Chaucer, Hawthorne, Hemingway, Hurston, and O'Brien.

**English 495. Special Topics.** Selected topics in English. Previous topics have included Afro-American Literature, Literature by Women, Detective Fiction, Science Fiction and The Roots of Fantasy, Film Studies, Introduction to Linguistics, and Myth and the Hero.

**English 499. Independent Study.** Study and research in literature, composition, or creative writing for students who have demonstrated their ability for advanced study in regularly offered enrichment courses and for whom an appropriate enrichment course does not exist. Topics and meetings arranged with the instructor.

## environmental engineering major

Contaminated water, dirty air, bulging landfills, hazardous waste disposal and contamination clean-up are environmental concerns which are growing in importance each day. The entire country is recognizing the importance of cleaning up past environmental contamination and preventing future pollution from occurring. The Environmental Engineering major offers cadets a broad environmental engineering education. Cadets in this major will get an understanding of the significant environmental problems facing this country and the Air Force. Course work will include how current environmental problems were created, the impacts of existing problems, how to correct existing contamination and how to prevent future contamination from occurring.

If you like science and mathematics and are interested in improving and maintaining our environment, then perhaps environmental engineering is the major for you. The curriculum at the Academy provides a well-balanced program stressing the fundamentals of the environmental engineering profession. Our Environmental Engineering major is one of a handful of programs accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore MD 21202-4012, telephone: (410) 347-7700. Upon graduation you earn a Bachelor of Science in Environmental Engineering.

The Environmental Engineering major prepares cadets to be future Air Force leaders committed to improving and maintaining our environment. The degree has direct applications to Air Force career fields. A cadet with an Environmental Engineering degree is eligible for a civil engineer, general engineer, bioenvironmental engineer, research engineer, or flying Air Force Specialty Code.

The goal of the Environmental Engineering program is to prepare cadets to become leaders of character who:

- Possess breadth of integrated, fundamental knowledge in the basic sciences, engineering, the humanities, and social sciences; and broad knowledge in civil engineering.
- Can communicate effectively.
- Demonstrate leadership and can work effectively with others.
- Are independent, lifelong learners.
- Can apply their knowledge and skills to frame and solve Air Force civil and environmental engineering problems.
- Understand their ethical and professional responsibilities as embodied in the Air Force Core Values.
- Can function effectively in contingency operations.

Upon completion of the Environmental Engineering program each graduate shall demonstrate satisfactory:

- Application of the fundamental concepts of environmental engineering to solve engineering problems.
- Laboratory techniques including design of experiments, procedures, recording, and analysis.
- Engineering design skills, including construction processes.
- Use of contemporary civil engineering analysis, design, and test tools.
- Written and oral communication skills.
- Knowledge of ethical and professional responsibilities.
- Depth of knowledge and skills in environmental engineering and breadth of knowledge and skills in civil engineering, computers, mathematics, and other disciplines to effectively identify and solve the types of complex, multidisciplinary problems they will face as Air Force environmental and civil engineers.
- Knowledge of the benefits and the skills needed to engage in life-long learning.
- Ability to be effective multidisciplinary team members.
- Skills to be independent learners while knowing when to seek help.
- Knowledge of the role of Air Force engineering officers in our global society.
- Knowledge of contemporary social, economic, political, military, and engineering issues.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Academy/BasSci Opt	Astro Engr 410
Civ Engr 330	Aero Engr 315	Civ Engr 351 (Summer)
Civ Engr 362	Beh Sci 310	Civ Engr 369
Econ 201	Biology 315	Civ Engr 463
English 211	Civ Engr 361	Civ Engr 467
Engr Mech 220	Civ Engr 368	Civ Engr 468
Law 220	Civ Engr 390	Civ Engr 469
Math 243	El Engr 231	Civ Engr 480
Math 245	Engineering Opt	English 411
MSS 200	History 302	MSS 400
Physics 215	Math 356	Philos 310
Pol Sci 211	Sys Opt Engr 311	Soc Sci 412

### ENVIRONMENTAL ENGINEERING (Civ Engr)

Offered by the Department of Civil and Environmental Engineering.

**Civ Engr 330. Elementary Structural Analysis.** Static analysis of determinate structures: stresses and deformations in beams, trusses, and frames.

**Civ Engr 351. Civil Engineering Practices - Field Engineering.** This two-phase course includes Operation Civil Engineering Air Force (OpsCEAF) and a three-week field experience at the Academy Field Engineering and Readiness Laboratory (FERL). Second-class cadets spend first period at a government facility working on a project in the civil engineering field. Participants will be scheduled for a second or third period summer leadership program. The three-week field experience introduces surveying, construction materials, design of concrete mixes, and hands-on construction using metal, timber, asphalt and concrete and working knowledge of environmental systems. Students will construct various projects that they will design in later civil and environmental engineering courses. OpsCEAF is in lieu of Operation Air Force (Mil Tng 301).

**Civ Engr 361. Fundamental Hydraulics.** Application of the principles of incompressible fluid mechanics. Topics include: fluid properties, manometry, forces on submerged bodies, open channel flow, and conduit flow. Impulse momentum, energy methods, Hardy-Cross method for balancing flows in distribution systems and sewer design are also covered.

**Civ Engr 362. Introduction to Environmental Engineering.** Fundamental theory, principles and preliminary design of unit operations in environmental engineering. Topics include air and water pollution, municipal and hazardous waste treatment, water chemistry, microbiology, mass balance, reactor theory and kinetics, and physical process theory.

**Civ Engr 368. Ground and Surface Water Hydrology and Contaminant Transport.** Comprehensive introduction to groundwater and surface water hydrology. Contaminant transport of hazardous chemicals in groundwater is also covered. Topics include: hazardous chemicals, environmental regulations, groundwater flow, well hydraulics, transport of contaminants in the subsurface environment, hydrologic cycle, surface water hydrology, hydrographs, rational method for storm water runoff, and storm water collection system design.

**Civ Engr 369. Introduction to Air Pollution.** In-depth introduction into air pollution covering such topics as the causes, sources and effects of air pollution. Topics include: legislative standards (ambient and source) for pollutants, regional and global air pollution issues, environmental health, indoor air pollution, noise, air pollution instrumentation and gas flow measurements, basic meteorology, and dispersion modeling. The course work involves several laboratory exercises.

**Civ Engr 390. Introduction to Soil Mechanics.** Engineering properties of soils, soil classification, permeability, consolidation, compaction and shear strength and applications to engineering design. Soils laboratories and reports.

**Civ Engr 405. Civil Engineering Seminar.** Designed to give civil engineering majors the opportunity to synthesize and apply the concepts they have learned throughout their undergraduate education. Topics discussed include engineering ethics and those that cadets may encounter in the Air Force after graduation.

**Civ Engr 463. Wastewater Treatment Plant Design.** Design of facilities for physical, chemical, and biological treatment of wastewater, and treatment and disposal of sludge. Coverage of advanced wastewater treatment and land treatment systems. Laboratory exercises analyzing raw sewage with data being used for the design processes.

**Civ Engr 467. Water Treatment Principles and Design.** Design of unit operations for coagulation, sedimentation, filtration and disinfection for treatment of drinking water. Introduces the chemistry of drinking water treatment processes. Use of unit operations to design treatment solutions to contemporary environmental problems. Topics include the design of ion exchange, reverse osmosis, chemical precipitation, and selected hazardous waste disposal problems.

**Civ Engr 468. Solid and Hazardous Waste Facilities Design.** Design and analysis of solid and hazardous waste management systems including collection, transport, processing, resource recovery, and disposal. Hazardous waste regulations, treatment and site cleanup are addressed.

**Civ Engr 469. Design of Air Pollution Controls.** Modeling and predicting the effects of air pollution, and the design of the facilities for air pollution control. The designs of electrostatic precipitators, cyclones, bag houses and other methods for the control of air contaminants are addressed.

**Civ Engr 480. Project Management and Contract Administration.** This is the final course in the civil and environmental engineering capstone sequence. First-class cadets integrate discipline-specific design work from previous courses through a semester project. Students take an owner's project requirements through stages of scope definition, budgeting and planning, conceptual design, scheduling and construction contract administration. Students apply engineering standards and consider realistic issues including engineering economics, constructability, environmental requirements, sustainability, and safety. Addresses and applies management topics and concepts of planning, organizing, leading, and controlling in the context of a capstone engineering project. Concludes with a project competition involving construction industry professionals.

**Civ Engr 499. Independent Study.** Individual study and research in an advanced civil engineering topic approved by the department head.

## foreign area studies major

Foreign area studies is the interdisciplinary study of one of six geo-cultural regions of the globe. Each program centers on foreign language, history, political science, economics, geospatial science, and cultural coursework in a region of specialization, as well as a comparative framework for understanding cross-cultural dynamics. The academic program leads to a Bachelor of Science Degree in Foreign Area Studies; coursework focuses on either African, Asian, European, Latin American, Middle Eastern, or Slavic Area Studies. Foreign Area Studies majors will select a disciplinary emphasis (Economics, History, Geospatial Science, or Political Science) which will determine which methods course, capstone course, and electives they take. In addition, foreign area studies majors may earn an academic minor in a foreign language.

U.S. national security strategy, since the end of the Cold War, has shifted from a policy of bi-polar containment to strategies of global engagement, partnership, expanded mutual international security responsibilities, and a war on terrorism. The Air Force's strategies entail a variety of new roles and missions aimed at promoting regional stability, rendering humanitarian assistance, encouraging emerging democracies, gathering intelligence, and projecting and applying air power when necessary. Today's officers, from all Air Force career fields and specialties will find themselves globally engaged, and such global engagement requires global skills. The Foreign Area Studies major is designed to give future officers broad-based, foreign area-related skills for worldwide service commitments.

Several other programs augment and strengthen foreign area studies at the Academy. Each Spring Break cadet delegations visit another international air force academy. Participant selection is very competitive with priority going to the most serious students. In turn, the Academy hosts the reciprocal visits of cadet delegations from the foreign academies for a week. This Cadet Foreign Exchange Visits program not only bolsters our cadets' understanding of foreign cultures but also contributes to cooperative air force-to-air force ties. The Academy's semester exchange with France's Ecole de l'air began in 1969. We began an exchange with the German Offizierschule der Luftwaffe in fall 1999, with the Chilean Escuela de Aviacion in fall 2000, with the Spanish Air Force Academy in fall 2001 and with the Canadian Air Force Academy in 2002. A Cadet Summer Foreign Language Immersion Program sends our most promising language students for a month to overseas schools for intensive language study.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem. 200	Aero Engr 315	Academy Opt
Econ 201	Beh Sci 310	Astro Engr 410
English 211	Biology 315	Econ 301
Engr Mech 220	El Engr 315	English 411
For Lang 3	For Lang 5	Integrating Experience
For Lang 4	For Lang 6	Mgt 400
History 302	Math 300	MSS 400
Law 220	Philos 310	Regional Econ
MSS 200	Pol Sci 394	Regional Pol Sci
Physics 215	Regional History 1	Regional/Comp Econ
Pol Sci 211	Regional History 2	Soc Sci 412
Regional Geo	Research Methods	Sys Opt

### FOREIGN AREA STUDIES (For Ar Stu)

Offered by the Departments of Economics and Geosciences, Foreign Languages, History, and Political Sciences.

**For Ar Stu 400. Summer Foreign Language Immersion.** Intensive foreign language and culture study at an accredited foreign university or language institute. Students must take the Defense Foreign Language Proficiency Test (DLPT) prior to departure and within sixty days after program completion. Course counts toward the Foreign Language Minor.

**For Ar Stu 410. Model Arab League (MAL).** Interdepartmental, interdisciplinary seminar on contemporary issues on the Middle East, preparing Foreign Area Studies majors for regional or national level competitions of the MAL. Specialists from various departments introduce historical, geographical, political, socioeconomic, cultural, linguistic and literary factors to enhance understanding of a specific region or nation of the Middle East. In addition, enrollees will learn parliamentary and forensic procedures. Portions of the course may be taught in Arabic.

**For Ar Stu 415. Advanced Model Arab League (AMAL).** Advanced interdepartmental, interdisciplinary seminar on contemporary issues on the Middle East, preparing students for regional or national-level competitions of the MAL. Specialists from various departments introduce historical, geographical, political, socioeconomic, linguistic and literary factors to enhance understanding of a specific region or nation of the Middle East. In addition, enrollees will serve as class leaders and mentors for first-time students of For Ar Stu 410, Basic Model Arab League. Enrollees of For Ar Stu 415 will serve as focal points during the drafting and presentation of point papers and resolutions during the model competitions.

**For Ar Stu 420. Model Organization of American States (MOAS).** Interdepartmental, interdisciplinary seminar on contemporary issues in Latin America, preparing Foreign Area Studies majors for regional or national-level competitions of the MOAS. Specialists from various departments introduce historical, geographical, political, socioeconomic, cultural, linguistic and literary factors to enhance understanding of a specific region or country in Latin America. In addition, enrollees will learn parliamentary and forensic procedures. Portions of the course may be taught in Spanish.

**For Ar Stu 425. Advanced Model Organization of American States (AMOAS).** Advanced interdepartmental, interdisciplinary seminar on contemporary issues in Latin America, preparing students for regional or national-level competitions of the MOAS. Specialists from various departments introduce historical, geographical, political, socioeconomic, linguistic and literary factors to enhance understanding of a specific region or nation of Latin America. In addition, enrollees will serve as class leaders and mentors for first-time students of For Ar Stu 420, Basic Model Organization of American States. Enrollees of For Ar Stu 425 will serve as focal points during the drafting and presentation of point papers and resolutions during the model competitions.

**For Ar Stu 430. Model African Union (MAU).** Interdepartmental, interdisciplinary seminar on contemporary issues in Africa, preparing Foreign Area Studies majors for regional or national-level competitions of the MAU. Specialists from various departments introduce historical, geographical, political, socioeconomic, cultural, linguistic and literary factors to enhance understanding of a specific region or country in Africa. In addition, enrollees will learn parliamentary and forensic procedures.

**For Ar Stu 435. Advanced Model African Union (AMAU).** Advanced interdepartmental, interdisciplinary seminar on contemporary issues in Africa, preparing students for regional or national-level competitions of the MOAU. Specialists from various departments introduce historical, geographical, political, socioeconomic, linguistic and literary factors to enhance understanding of a specific region or nation of Africa. In addition, enrollees will serve as class leaders and mentors for first-time students of For Ar Stu 430, Model African Union. Enrollees of For Ar Stu 435 will serve as focal points during the drafting and presentation of point papers and resolutions during the model competitions.

**For Ar Stu 440. Model European Organization.** Interdepartmental, interdisciplinary seminar on contemporary issues in Europe. Prepares cadets for regional or national-level competitions of the Model NATO and/or Model EU. Specialists from various departments introduce historical, geographical, political, socioeconomic, cultural and civil-military factors to enhance understanding of a specific country or countries in Western Europe. In addition, enrollees will learn parliamentary and forensic procedures.

**For Ar Stu 445. Advanced Model North Atlantic Treaty Organization (AMNATO).** Advanced interdepartmental, interdisciplinary seminar on contemporary North American and West European issues, preparing students for regional or national-level competitions of the MNATO. Specialists from various departments introduce historical, geographical, political, socioeconomic, linguistic and literary factors to enhance understanding of a specific region or nation of Europe. In addition, enrollees will serve as class leaders and mentors for first-time students of For Ar Stu 440, Basic Model North Atlantic Treaty Organization. Enrollees of For Ar Stu 445 will serve as focal points during the drafting and presentation of point papers and resolutions during the model competitions.

**For Ar Stu 470. France in the Twentieth Century.** Interdisciplinary course taught primarily in French, designed to give Foreign Area Studies majors with a focus on West European and French language studies a better understanding of twentieth century France. It combines expertise from the Foreign Language, Political Science, Geospatial Science, and History departments to present major factors in the history, politics, and culture of modern France and its unique position in the current international system.

**For Ar Stu 495. Special Topics in Foreign Area Studies.** Interdisciplinary course for Foreign Area Studies majors (the following suffixes indicating geo-cultural region of specialization apply: "A"=Asia "E"=Eastern Europe "F"=Africa "L"=Latin America "M"=Middle East "S"=Russia or Slavic regions "W"=Western Europe.) Cultural, literary, linguistic, historical, political, social, economic, geographical, and other pertinent factors bearing on an understanding of the particular region involved are treated by specialists from relevant departments. Portions of the course may be taught in the relevant foreign language.

## foreign language minor

You may study Arabic, Chinese, French, German, Japanese, Portuguese, Russian, or Spanish—eight of the most important languages in the world. Within each language there is a broad spectrum of courses. The 100-200 level courses For Lang 321 and For Lang 322 are primarily skills development courses. The remaining courses are regarded as enhancement courses and are designed to develop a broader based appreciation of a particular culture, history, and literature. These courses also provide additional opportunities to develop and refine your language skills.

Students majoring in any academic division or discipline may earn a Foreign Language minor provided they complete four language courses beyond the 100-level, in residence, in the same language with a grade of 'C' or better, complete the requirements for their major, and take the Defense Language Proficiency Test (DLPT) no later than two months prior to graduation. ForArStu 400 also fills a course requirement for the minor

Beyond helping to understand culture and broadening your worldview, studying a foreign language can influence your military career. Our ever-expanding global Air Force mission not only demands increasing foreign language capability to support national security strategies, but also provides challenging assignment opportunities for those looking for experience and diversification. Moreover, someday you may want to return to the Academy as a language instructor, a position that is both rewarding and career enhancing while providing the opportunity to influence other cadets toward becoming language-qualified Air Force officers. By speaking a foreign language, you become an "ambassador" helping to shape the opinions that others will have of our country and its armed forces... a crucial role in our increasingly interdependent world.

Learning a foreign language opens up an entirely new world. The study of languages helps further our understanding of other peoples, ourselves, and of our own culture. This understanding is of even greater importance for the military leader than for the public at large.

### **FOREIGN LANGUAGES** (For Lang)

Offered by the Department of Foreign Languages.

**For Lang 131-132. Basic Sequence.** Basic foreign language study. Introduction to the Language, Culture, and Civilization. Language Learning Center (LLC) supplements classroom instruction. Students are placed in the course on the basis of no prior language background or low placement examination scores. Must be taken sequentially. Students successfully completing For Lang 132 will enroll next in For Lang 221. (Arabic, Chinese, French, German, Japanese, Portuguese, Russian, and Spanish)

**For Lang 141-142. Accelerated Basic Sequence.** Accelerated basic foreign language study. Foundational Language, Culture, and Civilization. LLC supplements classroom instruction. Students are placed in the course on the basis of placement examination scores. Must be taken sequentially. Students successfully completing For Lang 142 will enroll next in For Lang 221. (Arabic, Chinese, French, German, Japanese, Portuguese, Russian, and Spanish)

**For Lang 221. Refinement of Communication in The Target Language.** Intensification of aural and reading comprehension. Student presentations and classroom discussions based on selected readings/topics in culture and civilization of language studied. LLC may supplement classroom instruction. (Arabic, Chinese, French, German, Japanese, Portuguese, Russian, and Spanish)

**For Lang 222. Continued refinement of target language.** Emphasis on conversational practice and aural comprehension of contemporary spoken language. Student presentations and classroom discussions based on culture and civilization readings/topics in target language. LLC may supplement classroom instruction. (Arabic, Chinese, French, German, Japanese, Portuguese, Russian, and Spanish)

**For Lang 321. A capstone communication course.** Designed to enhance the student's ability in the language and culture. (Arabic, Chinese, French, German, Japanese, Portuguese, Russian, and Spanish)

**For Lang 322.** A follow-on capstone communication course to For Lang 321. Designed to further hone the students' ability in the language and culture. (Arabic, Chinese, French, German, Japanese, Portuguese, Russian, and Spanish)

**For Lang 365.** Oral discussion of civilization, culture, and contemporary issues (military, political, economic) of the country or countries concerned. Discussion is in the target language and is based on selected readings in that language. (Arabic, Chinese, French, German, Japanese, Portuguese, Russian, and Spanish)

**For Lang 376.** Survey of important writers, their works, and influences on their societies. Students are provided cultural insights through literature. Discussions are conducted in the target language and based on selected literary works ranging from early times to contemporary periods. (Arabic, Chinese, French, German, Japanese, Portuguese, Russian, and Spanish)

**For Lang 491.** Language program with primary emphasis on the development of advanced foreign language reading skills via a variety of media. All classes are conducted in the target language and all assignments must be completed in the target language. (Arabic, Chinese, French, German, Japanese, Portuguese, Russian, and Spanish)

**For Lang 495. Special Topics.** Selected topics in foreign languages.

**For Lang 499. Independent Study.** Individual study or research conducted on a tutorial basis. Study may be in any of the eight languages offered by the department. Topic or area of study/research must be approved by the department head.

### Language Specific Courses

**French 372. Francophone Cultures.** Taught in French on the Francophone movement and the cultures of selected French-speaking countries/regions other than France. In combination with faculty presentations and guidance, cadets will cooperatively research and discuss various French-speaking countries. Francophone Africa will figure prominently. Focuses on French influence over the historical, political, and cultural aspects of those countries and the status of that influence today in relation to other regional and global systems.

**French 492. French Air Force Academy Preparation.** Language program with primary emphasis on the development of specific/required language skills and an examination of current cultural, military and political issues. All classes are conducted in French.

**German 370. Three Hundred Years of German Immigration to America.** More than seven million Germans have come to our shores through the centuries, and today some 60 million Americans—one in four—trace their heritage back to German ancestry. This course investigates the reasons why they came and where they settled; and how they were able to endure tremendous hardship only to succeed. Last, but not least, the course explores the economic, social, scientific, cultural, and political contributions that these immigrants have made to the growth and success of the United States of America. All activities are conducted in German.

**German 492. German Air Force Academy Preparation.** Language program with primary emphasis on the development of specific/required language skills and an examination of current cultural, military and political issues. All classes are conducted in German and all assignments must be completed in German.

**Japanese 372. Japanese Society and Culture.** The purpose of this course is to gain a basic knowledge of Japanese society and culture with particular attention to the areas of governmental organization, diplomatic relations, national defense policy and the constitution. Discussions are conducted in Japanese and based on selected readings in Japanese and/or English. Students learn about Japanese government and its constitution. Students compare what they have learned in other Japanese courses, as well as in courses covering the history, politics, and law of other cultures, in order to gain a better understanding of human civilization as a whole. Class is "team taught" with an exchange officer from the Japan Air Self Defense Force. All activities are conducted in Japanese.

**Japanese 492. Japanese Air Force Academy Preparation.** Language program with primary emphasis on the development of specific/required language skills and an examination of current cultural, military, and political issues. All classes are conducted in Japanese and all assignments must be completed in Japanese.

**Spanish 220. Basic Spanish II.** Follow-on course for cadets starting in Spanish 131 and Spanish 132. Language Learning Center may supplement classroom instruction. Cadets who successfully complete Spanish 220 will enroll next in Spanish 221 the following fall.

**Spanish 371. Current Events in the Spanish-Speaking World.** Students experience a semester-long survey of significant current events in the Spanish-speaking world. They study and research the cultural, political, economic and historic factors that affect current reality. The course uses available press, television, radio broadcasts and other means such as the World Wide Web to carry out its objectives. Most of the activities of this course are in seminar format, and emphasis is placed in on oral discussions and written production. All activities are conducted in Spanish.

**Spanish 377. Introduction to Literature in Latin America.** Primary focus is a survey of important Latin American writers, their works, and influences on their societies. Students are provided cultural insights through literature. Discussion and classes are conducted in Spanish and are based on literary works ranging from early times to contemporary periods. All assignments are conducted in Spanish.

**Spanish 492A. Spanish Air Force Academy Preparation.** Language program with primary emphasis on the development of specific/required language skills and an examination of current cultural, military and political issues. All classes are conducted in Spanish and all assignments must be completed in Spanish.

**Spanish 492B. Chilean Air Force Academy Preparation.** Language program with primary emphasis on the development of specific/required language skills and an examination of current cultural, military and political issues. All classes are conducted in the target language and all assignments must be completed in the target language.

## general engineering major

The General Engineering major is a divisional major incorporating the engineering disciplines of Aeronautical, Astronautical, Civil, Electrical, and Environmental Engineering, along with Engineering Mechanics and Systems Engineering. This divisional program is recommended for students who wish to major in engineering but prefer a broad, flexible curriculum with a high degree of individual choice. This program is an alternative for cadets already declared in an Engineering disciplinary major who for a variety of reasons, find the divisional approach more suited to fulfilling graduation requirements.

The Academy's general engineering curriculum will not immediately prepare graduates to pursue an advanced degree in a specific engineering discipline. The general engineer may first be required to obtain an undergraduate degree from another university. Most universities require at least one year academic residence before granting a degree from their institutions. Some universities do not require an accredited undergraduate degree, but additional undergraduate work is necessary before acceptance into a graduate program.

The Academy's curriculum provides cadets the maximum flexibility to selectively structure their academic program to individual preferences. The program, however, is not accredited under Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore MD 21202-4012, telephone: (410) 347-7700. A Bachelor of Science degree in General Engineering is awarded upon completion of all requirements.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy Opt
Econ 201	Beh Sci 310	Astro Engr 410
English 211	Biology 315	English 411
Engr Mech 220	El Engr 231	Engr/Bas Sci Opt 2
Engr Opt 1	Engr Opt 3	Engr Opt 6
Engr Opt 2	Engr Opt 4	Engr Opt 7
Law 220	Engr Opt 5	Engr Opt 8
Math 243	Engr/Bas Sci Opt 1	Mgt 400
Math 245	History 302	MSS 400
MSS 200	Math 356	Soc Sci 412
Physics 215	Philos 310	
Pol Sci 211	S/T Energy Sys Opt	

### ENGINEERING (Engr)

Offered by various departments within the Engineering Divisions.

**Engr 101. Introduction to Air Force Engineering.** Introduces the Academy engineering disciplines in the context of the engineering design process. Students work in teams, guided by the engineering method (an integrated decision-making process) and the system-design approach, to create solutions to real Air Force problems. They will employ modern computational tools to explore design alternatives and communicate their design solutions. Course will be first offered in fall 2008 for the Class of 2012.

**Engr 311. Electrical Power Systems.** Applications of the principles of energy conversion to electrical power systems. Generation, transmission, distribution and use of electrical energy in ground- and aircraft-based systems. Topics include single- and three-phase AC power, single- and three-phase AC motors, transformers, transmission line modeling, AC to DC power conversion and DC motors.

**Engr 341. Linear Systems Analysis and Design.** Analysis and design of linear systems. Includes modeling of electrical and mechanical systems; characterization of physical systems using linear, constant-coefficient differential equations; and state-space models; convolution using Laplace and Fourier Transform techniques; identification of system response using frequency response and Bode plots; specification of design criteria in the s-domain; and modification of system parameters to satisfy design requirements. MatLab™/Simulink® are introduced as simulation tools and as a computer interface for analysis and design.

**Engr 342. Linear Control System Analysis and Design.** Formulation and analysis of the linear control problem by transform methods. Synthesis of linear control systems emphasizing the root locus and Bode methods. Includes laboratory analysis and synthesis with real hardware and/or MATLAB™ simulation.

**Engr 400. Divisional Seminar.** Interdisciplinary study of engineering concepts, with emphasis on applications of fundamental principles. Includes case study, research, preparation and presentation of at least one major paper.

**Engr 402. Professional Engineering Development.** Review of mathematics, chemistry, mechanics of materials, statics, dynamics, electrical circuits, thermodynamics, heat transfer, fluid mechanics, engineering economics in preparation for the national Engineer-in-Training exam administered at the end of the course by the State of Colorado. A fee must be paid by the student to take the exam; therefore, taking the exam is not required.

**Engr 443. Advanced Control Theory and Design.** Introduction to advanced control techniques. Topics include state-space fundamentals, state feedback control, optimal control methods, estimation theory, and non-linear controls topics. Methods are applied to the design of control systems for aircraft and spacecraft. MatLab™/Simulink® will be employed in three design projects.

**Engr 495. Special Topics in Engineering.** Selected topics in engineering, administered by various Engineering departments.

# geospatial science major

The Geospatial Science program emphasizes learning about diverse cultures, physical landscapes, and geospatial tools that expeditionary Air Force officers use. This major offers a diverse and challenging program focusing on contemporary world issues. A flexible curriculum has been carefully designed to permit either an in-depth or cross-disciplinary approach to the study of geospatial science, maximizing a student's ability to design his/her academic program beyond the core disciplinary requirements. Course offerings within the discipline represent a broad cross-section of the key geospatial science sub-fields including physical, human, and regional geography, as well as state-of-the-art geographic information processing methods such as digital image processing and geographic information systems. Furthermore, cadets who wish to complement their major in Geospatial Science with a foreign language minor will be able to achieve both without carrying an academic course overload.

The Geospatial Science major provides excellent preparation for any assignment in the Expeditionary Air Force. The major also helps cadets develop international insight and cultural understanding of the battle space. Most Geospatial Science majors become pilots or intelligence officers. Many intelligence officers progress to become Foreign Area Officers or International Affairs Specialists.

The goal of the Geospatial Science program is to produce leaders of character who:

- Effectively communicate spatial information.
- Analyze the Earth's physical form, processes, and biota.
- Synthesize the spatial characteristics, distribution, cultural differences, and interactions of human populations.
- Synthesize how relationships between humans and the physical environment impact the battle space.
- Solve ill-defined geospatial problems.

Cadets who excel in this program are eligible to compete for scholarships to graduate school. These include not only the prestigious national scholarships, such as the Rhodes, Fulbright, and Marshall, but the USAFA Graduate Scholarship Program, in which graduates are sponsored by the Air Force Institute of Technology to earn their master's degree from a civilian institution.

## Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Advanced Literacy Opt	Academy Opt
Econ 201	Aero Engr 315	Advanced Literacy Opt
English 211	Beh Sci 310	Astro Engr 410
Engr Mech 220	Biology 315	Cognate Elective
For Lang 3	El Engr 315	Cognate Elective
For Lang 4	Geo 351	Cognate Elective
Geo 310	Geo 370	English 411
Geo 350	Geo 382	Geo 490
Law 220	History 302	Geo 498
MSS 200	Math 300	Mgt 400
Physics 215	Philos 310	MSS 400
Pol Sci 211	Soc Sci Div Opt	Soc Sci 412

## GEOSPATIAL SCIENCE (Geo)

Offered by the Department of Economics and Geosciences.

**Geo 310. Geospatial Information Analysis.** Prepares cadets with the basic tools necessary to make decisions with geographic (geospatial) information. It introduces data sources and collection techniques (e.g. use of remote sensing and GPS). Students learn methods to transform data into geospatial intelligence appropriate for decision making. Military and civilian applications of Geographic Information Systems (GIS) technology are examined in case studies and students complete projects to demonstrate the ability to solve an ill-defined spatial problem and make recommendations to a decision maker.

**Geo 350. Human Geography.** Designed to acquaint students with geography in general and its human aspects in particular. Students will broaden their understanding of the complex relationships between humans and the environment and specifically human movement, language, religion, race, economic activities and urban development. Each student is encouraged to develop a strong appreciation and comprehension of the never-ending and dynamic processes that are continually operating on the Earth and its human occupants.

**Geo 351. Introduction to Physical Geography.** Study of the Earth System (atmosphere, hydrosphere, biosphere, and lithosphere). Focuses on the spatial distributions within the system, the use of maps to explain the distributions, origins and processes shaping the Earth's surface, and the influence of humans on the Earth System.

**Geo 353. Geomorphology.** Analysis of dynamic processes, distribution and structure of the Earth's physical features. Focuses on fundamental concepts of physical geology, climate, soils and vegetation.

**Geo 355. Field Methods in Geography.** Students learn design and execution of geographic field research. Phase I is classroom instruction on the physical, environmental, cultural, and geological aspects of a study site and instruction on specific tools to be used in a field of study. Phase II is a week-long field laboratory where students apply their skills in the natural environment. Phase III returns to the classroom where students learn various methods of analysis and discuss results.

**Geo 360. Environmental Geography.** Focuses on problems of population growth, planet sustainability and environmental change. Also examines geographic aspects of resource management, conservation, and land use. Environmental issues unique to Colorado are discussed.

**Geo 370. Military Geography.** Analysis of the significant influence geography exerts on military operations, war, and national security. Examines how the physical, cultural, political, and economic dimensions of geography and meteorology affect the planning and execution of today's military operations.

**Geo 382. Remote Sensing and Imagery Analysis.** Introduction to photogrammetry using both vertical and oblique imagery. Mechanisms for exploiting the electromagnetic radiation spectrum are investigated using particle and wave theory equations. Digital image processing techniques are presented and applied using the Applied Geography Laboratory facilities and raster data from commercial space borne sensing systems.

**Geo 410. Advanced Geospatial Analysis.** Equips students with advanced analytical skills to understand and resolve complex geospatial problems. Discussion and projects integrate advanced geospatial analysis techniques with real world data to address problems similar to those officers may encounter in the operational Air Force. Building on knowledge and expertise learned in Geospatial Information Analysis (Geo 310) and Remote Sensing and Imagery Analysis (Geo 382), students integrate theoretical geoscience concepts with data analysis and information-extraction techniques.

**Geo 470. Geography of Europe and Russia.** Geographical analysis of the physical and cultural landscapes of Western and Central Europe, Russia, as well as former Soviet states in Europe. Topical analyses include demography, language, religion, industry, and geopolitics.

**Geo 471. Geography of the Americas.** Geographical analysis of the physical and cultural landscapes of North, Middle, and South America. Focuses on the regional distribution of resources and land uses, economic structure, industrial development, settlement patterns, demographics and other population characteristics.

**Geo 475. Geography of Asia.** Geographical analysis of the physical and cultural landscapes of East, Central, and Southeast Asia. Focuses on the regional distribution of resources, economic structure, industrial strength, settlement patterns, and patterns of population growth.

**Geo 480. Geography of the Middle East and Africa.** Geographical analysis of the physical, cultural, economic and political diversity of the Middle East and Africa. Topical analyses include resources, demography, language, religion, industry, and geopolitics.

**Geo 490. Global Cultural Awareness.** Introduces students to major ideas, institutions, and events that shape human cultures and societies. Uses a comparative approach to the study of cultures around the world, focusing particularly on religions, languages, traditions, ways of life, and perceptions. The major objective is for students to be able to compare and appreciate global cultures in a spatial context. Enables students to interact more sensitively and effectively with people from other cultures in today's Expeditionary Air Force.

**Geo 495. Special Topics.** Selected topics in geospatial science.

**Geo 498. Geographic Interpretation, Analysis, and Integration.** Capstone course in Geospatial Science. Using field experiences and case studies, the course is designed to assess the student's ability to integrate and synthesize geoscience knowledge, analytical techniques, and research methods in geospatial science and cognate disciplines as they apply to the support of the battle space.

**Geo 499. Independent Study.** Independent research under the direction of a faculty member.

# history major

An understanding of history is a critical component to the training of capable, educated officers. The knowledge gained and the perspective developed are important to the education of the professional Air Force officer. The study of history involves critical thinking, analysis, writing, and oral presentations—all essential skills for any Air Force officer. In addition, the study of foreign cultures, evolution of technology and military heritage can directly relate to many duty situations. History also provides a natural forum for discussion of great leaders, past and present, and these insights are invaluable to any future Air Force officer.

The History major provides an exceptional degree of flexibility allowing you to plan a diverse study of history or establish a particular academic niche.

Those students who take at least four courses of Military History (in addition to the core) or at least four courses of American History (beyond History 351 and 352) may apply through the Department of History for these respective designations before the registration deadline in the fall semester of their first-class year.

## Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy Opt
Econ 201	Aerospace History Opt	Astro Engr 410
English 211	Area History Opt	English 411
Engr Mech 220	Beh Sci 310	History Capstone
For Lang 3	Biology 315	History Opt 2
For Lang 4	El Engr 315	History Opt 3
History 302	Geo 310	History Opt 4
History 351	History 330	History Opt 5
Law 220	History 352	Mgt 400
MSS 200	History Opt 1	MSS 400
Physics 215	Math 300	Open Academic Opt
Pol Sci 211	Philos 310	Soc Sci 412

## HISTORY (History)

Offered by the Department of History.

**History 101. Modern World History.** Surveys major pre-modern civilizations and the development and diffusion of modern cultures throughout the world. Examines the interaction of traditional and modern cultures culminating with the turbulent twentieth century and highlights the global impact of political, religious, ideological, military, economic, and social developments.

**History 302. Introduction to Military History.** Surveys the history of Western warfare from the age of gunpowder to the present. Concentrates on the evolving methods and theories of warfare in Europe and the U.S., and emphasizes how political, social, economic, and technological factors have combined to shape various changes and continuities in the nature of Western warfare.

**History 320. History of Technology and Warfare.** Examines the relationship of technology to warfare on land, at sea and in the air from antiquity to the present. Investigates the roots of weapons technology in the social, political, and engineering context. Affords special treatment to the impact of engineering and the industrial revolution on the development of technology and subsequent impacts on warfare. The interrelationship of technology, tactics, and strategy provides the thematic framework. Devotes several lessons to case studies of battles and campaigns that illustrate significant developments.

**History 325. History of Christianity.** Surveys the history of the Christian church from its ancient Jewish roots to the modern period. Examines the significant changes and continuities of Christianity since its founding. Topics include the ancient Jewish kingdoms, the Church's beginning under Jesus and the Apostles, the Age of Martyrs, the writings of the Church Fathers, the Christianization of the Roman Empire, the medieval civilization of Christendom, the Crusades, the Reformation, the effects of the Enlightenment, and the global spread of Christianity.

**History 330. Historiography and Methodology.** A history practicum that is the “how to” course for history majors. The course begins with a survey of historiography, or “the history of historical writing.” Most of the course is devoted to practicing historical methodology (historical “detective work,” critical analysis of evidence, asking and answering historical questions, and oral and written presentation skills). Each student will write and present a major research paper on a topic of their choosing.

**History 332. History of U.S. Foreign Policy.** Examines major developments in U.S. foreign policy from colonial times to the present, with particular emphasis on the twentieth century. Focuses on the motives behind the conceptualization of diplomatic goals, the search for appropriate tactics to achieve policy objectives, and the consequences of U.S. foreign policy at home and abroad. Coursework centers on classroom lecture and discussion, and extensive analysis of interpretive essays and primary documents.

**History 335. History of the American West.** Examines the special contributions of the American West to the evolution of the United States. Throughout their history Americans have been intrigued and fascinated by their vast frontier. The American frontier served as a granary and a safety valve while helping to shape the American character. The course explores the validity of Frederick Jackson Turner’s frontier thesis and the events and ideas that made the West unique.

**History 336. History of the American South.** Examines the special contributions of the South to the evolution of the U.S., and analyzes the major themes of Southern history in the eighteenth, nineteenth, and twentieth centuries. Emphasis is placed on understanding ideas and values, especially as the people of the South have perceived them and their role in Southern society. Focuses on how Southern society evolved differently from the rest of the U.S., and seemingly over a century and a half merged with mainstream America while maintaining a unique identity.

**History 338. Colonial Warfare.** Comprehensively examines the competition and conflicts that resulted from European explorations and conquests of the fifteenth, sixteenth, and seventeenth centuries that erupted into serial warfare in the eighteenth century. These conflicts exposed all sides to different modes of warfare that shaped future combat. Examines the causes for these wars (with an emphasis on the conflicts in North America), the changes in tactics and strategy that resulted from the clash of cultures, and the ideologies that sprang from colonization.

**History 339. The American Civil War.** Multidimensional examination of the causes, conduct, and legacy of the American Civil War. In-depth analysis of Southern sectionalism precedes a comprehensive discussion of all aspects of the war itself: military, economic, cultural, social, political, technological, and ideological. A description of the short-and long-term effects of the war on the American military establishment concludes the course.

**History 340. History of Colonial Latin America.** Examines the Native American, Iberian, and African origins of colonial civilization, with special emphasis on the colonial society that evolved after the Spanish and Portuguese conquests. Examines the nature of pre-Columbian societies, colonial government, labor systems, landholding patterns, the role of the Church in society, and the Latin American wars of independence.

**History 341. History of Modern Latin America.** Examines the post-1825 period of Latin American history. Explains aftermath of the wars of independence, the formation of nation-states, and the emergence of Latin American identities throughout the nineteenth century. Treats major issues of the twentieth century, including political change, industrialization, foreign influence, military institutions, social and demographic pressures and the U.S. role in different national contexts.

**History 342. History of Traditional Asia.** Surveys the major political, economic, and sociocultural developments in Asia (primarily China, India, Japan, and Southeast Asia) from prehistoric times to the arrival of the Europeans in the sixteenth century. Explores the major themes of the traditional foundations of Asia, change and continuity, the structure of the traditional Asian world order, and the impact of contact with the European maritime powers.

**History 343. History of Modern Asia.** Surveys the major political, economic, and sociocultural developments in Asia (primarily China, India, Japan, and Southeast Asia) from roughly the sixteenth century to the present day. Explores the major themes of the traditional foundations of Asia, the impact of Western imperialism in Asia, the impact of Western ideologies on Asian thought, the importance of technological change, and the significance of political, economic, and cultural leaders.

**History 344. Foundations of European History.** How did the European continent rise from being a cultural and intellectual backwater to become a political and military powerhouse that eventually extended its influence across the globe? What powerful connections link the ancient world with the present government, religion, and culture of the West? Through this survey of European history from Antiquity to 1789, discover how the continent was transformed. Analyzes major aspects of European development, including ancient Greece, the Roman Republic and Roman Empire, the advent of Christianity, feudalism, the Renaissance, the Reformation, the rise of the nation-state, and the Enlightenment.

**History 345. Modern European History.** Surveys the political, social, and cultural history of modern Europe, beginning with the French Revolution, and continuing through both world wars to contemporary Europe. Major themes include Napoleonic Europe, the industrial revolutions, the European nationalist movements, World War I, the inter-war Years, World War II, the decline of the European empires, the Cold War, and the demise of monolithic regimes. Concludes with a study of the legacies of the Cold War and the advent of the European Union.

**History 346. History of Russia.** Surveys Russian domestic and foreign affairs from the ninth century to 1861. Emphasizes the ways in which Eastern, Western, and native influences promoted continuity within the Tsarist Russian state, to include: autocracy, church-state relations, imperialism, great power status, foreign power intervention, and modernization.

**History 347. History of Modern Russia.** Surveys domestic and foreign affairs from 1861 to the present. Focuses on the dynamics of Russian society and government from the Great Reforms through the Bolshevik seizure of power. Reviews Communist attempts and the final failure to develop a legitimate Soviet state. Gives special attention to the unique synthesis of military and economic power leading to “superpower” status and its eventual demise.

**History 351. The Foundations of Modern America.** Examines the political, intellectual, social, and economic origins and development of the U.S. from the first settlements through Reconstruction (1865-1877). Emphasizes the importance of the colonial experience, the Revolution, the national period, the growth of democracy, westward expansion, and the Civil War and Reconstruction in shaping modern America.

**History 352. The History of Modern America.** Continues examining the political, intellectual, social, and economic development of the U.S. from the late nineteenth century to the present. Concentrates on the growth of the U.S. as a major economic and political power. Gives special attention to the impact of industrialization, urbanization, immigration, reform movements, mass culture, domestic economic fluctuations, governmental expansion, and military involvements during the twentieth century.

**History 363. Unconventional Warfare.** Surveys the evolution, theory, and practice of insurgent and revolutionary warfare throughout the world from the seventeenth century to the present. Special attention is given to the twentieth century. Examines counterinsurgency operations in various areas and circumstances.

**History 367. Ancient, Medieval, and Early Modern Warfare.** A broad survey providing a deeper background for the understanding of modern war. The course begins with the rise of organized warfare in the Near East, focusing on the Assyrian and Persian military systems, traces the development and operations of the Greek and Roman military systems, and then moves to the evolution of feudal warfare and its eventual metamorphosis into the earliest forms of modern war, culminating in the Thirty Years War. Moslem, Byzantine, Chinese, and Japanese forms of warfare are also addressed to complete a general survey of the roots of modern warfare.

**History 368. World War II.** Studies the largest conflict in human history. Includes a detailed analysis of the causes, ideologies, strategies, technologies, and campaigns of the war. Examines the economic and social implications of the war on various nation states. Major themes include the role of military and political leadership, the nature of coalition warfare, and the role of the modern officer in combat.

**History 369. Limited War in the Twentieth Century: Korea and Vietnam.** America's wars in Korea and Vietnam established new patterns of limited warfare. Within the contexts of the superpower system and a nuclear arms race, the U.S. tried to fight wars that would achieve limited aims with limited means. Examines the Korean and Vietnam Wars as part of larger patterns of contemporary history. Special emphasis on the role of technology, foreign policy, domestic social and political climates, and the long-term implications of American strategy and policymaking.

**History 370. World War I.** Detailed analysis of the epochal event of the twentieth century. Explores the role of ideology, military and social doctrine, alliance systems, and European militarism on the outbreak and conduct of total war in Europe. Details the disparate military environments of stalemate on the Western Front, deadlock on the high seas, and maneuver warfare on the Eastern Front illustrates the struggle between military doctrine and emerging technology. Special emphasis on the integration of air power and the emergence of modern paradigms for conducting warfare.

**History 371. Air Power and Modern Warfare.** History of the air weapon with primary emphasis on leadership and tactics as they evolved during the twentieth century. Covers global development of military airpower, stressing the constant interplay among personalities, institutions, theories, technology, combat experience, and evolving doctrine.

**History 372. Sea Power and Modern Warfare.** History of sea weapons with primary emphasis on technology, tactics, and leadership as they evolved from 1000 BC to the present. World-wide treatment stresses the constant interplay among personalities, institutions, theories, technology, combat experience, and evolving doctrine.

**History 373. History of Sub-Saharan Africa.** Survey course examining important roles the peoples of Africa played in the unfolding story of humankind, and why the continent was ignored by Western Europeans for so long before being suddenly attacked in a “frenzy” of imperial conquests. Explores how Africans coped with the radical changes to their political, economic, and social institutions in the nineteenth century and the theories behind the origins of Africans civilizations. Examines the extensive Berber trading networks of North Africa; compares the Swahili city-states of East Africa with those of ancient Greece, and looks at why the Kingdom of Dahomey built its wealth and power in the African slave trade. Students study how Africa's past influenced its response to colonial rule and how Africans threw off colonial domination in the twentieth century. Also introduces students to modern-day problems of environmental degradation, population growth, debt crisis, security issues, and medical challenges in Africa. Uses primary documents on Africa and a rich abundance of historical novels written by African authors.

**History 374. Foundations of Middle Eastern History.** Introductory historical survey of early civilizations in the Middle East and North Africa from the dawn of civilization to the fall of Constantinople to the Ottoman Empire in 1453. Emphasizes the classical empires of the Near East, developments and contributions of Judaism and Christianity, the birth and spread of Islam, the impact of the Crusaders and Mongols on the region, and the rise to dominance of the “gunpowder empires.”

**History 375. Modern Middle Eastern History.** Surveys domestic and foreign affairs of the Middle East and North Africa from the rise of the Ottoman Empire to the present. Emphasizes the impact of imperialism, nationalism, constitutionalism, modernization, and reform. Analyzes independence movements of the twentieth century, the Arab-Israeli conflict, the Zionist and Islamic fundamentalist movements, the Gulf War, and other contemporary trends, problems, and challenges.

**History 376. A History of Space Power: Conquest of the New Frontier.** Surveys the history of space power with primary emphasis on the U.S. and Soviet space programs during the Cold War and beyond (ICBMs to satellites; the electronics revolution to manned space programs), and their origins in the German V-programs of World War II. Examines the interplay among leadership, politics, society, technology, the Air Force's ambivalent relationship with this new expression of military power, and associated doctrinal challenges.

**History 394. The American Way of War.** Surveys the history of American warfare from the colonial period to the present. Focuses primarily on the nature of American warfare, and addresses whether there is a peculiar American way of war. Addresses such issues as the American attitude toward war, civil-military relations, force structure, the role of professional leadership, and the impact of technology.

**History 457. History of Military Thought.** Investigates the ideas of selected major military thinkers from the time of Machiavelli to the present. Emphasizes writers whose impact on evolving strategy and doctrine, whether on land, sea, or in the air, has been most far-reaching.

**History 480. Studies in American Civilization.** Examines conflict and stability at various historical periods in American society, emphasizing such institutions as government, education, religion, the military, business, the family, media, and sports. Focus changes each semester.

**History 482. History of Science and Technology.** Examines contemporary science in terms of its historical antecedents. Addresses science from the pre-Socratic Greeks to the present and traces the intellectual development of scientific revolutions in the seventeenth and twentieth centuries. Interrelationship of physics, mathematics, and cosmology provides thematic continuity in addressing chemistry and the life sciences. The historical relationship between science and technology receives special treatment. Designed to suit engineering and science majors as well as those in the humanities. Research projects will be tailored to the disciplinary interests of students and the expertise of instructors.

**History 483. Great Americans.** Examines the role of the individual in American history. Through the illuminating prism of biography, lives of selected prominent Americans are studied to understand the unique personal qualities that contributed to their success and to determine the extent to which individual actions impact the course of history. Features political, military, business, labor, scientific, and literary figures.

**History 495. Special Topics.** Selected topics in history.

**History 498. Global Dimensions of History.** Examines the dynamic forces influential in shaping global history. Explores time, space (geography), politics, economics and society in the context of universal and world history. Devotes special attention to the impact of varying cultural perspectives upon individual historical understanding. Also explores the current process of globalization and its many challenges.

**History 499. Independent Study.** Reading and research in any recognized area of historical study. Areas selected by instructor depend on student interest.

## humanities major

The Humanities major is a divisional major requiring 141 semester hours for graduation. The major includes courses from the departments of English and Fine Arts, Foreign Languages, History, Military Strategic Studies, and Philosophy. A wide variety of elective options allows students the flexibility to tailor the major to individual interests. In addition, the divisional options make the major ideal for students who wish to minor in either Foreign Language or Philosophy.

Humanities majors confront fundamental questions of human existence. They enhance their reasoning ability, as well as their writing and speaking skills, by developing proficiency in critical and creative thought through an exploration of the ideas embodied in great works of Western thought, literature, and art. The Humanities major prepares students for graduate study and for a wide variety of career fields.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Beh Sci 110	Biology 315	Academy Opt
Econ 201	El Engr 315	Aero Engr 315
English 211	English 411	Astro Engr 410
Engr 100	English Opt	Beh Sci 310
Engr Mech 220	Engr 210	Divisional Opt
For Lang 3	Fine Art Opt	Divisional Opt
For Lang 4	History Opt	Divisional Opt
History 302	Divisional Opt	Divisional Opt
Law 220	Math 300	Divisional Opt
Mgt 200	Philos 310	Geo 310
Physics 110	Philos 390	MSS 400
Physics 215		
Pol Sci 211		

### FINE ARTS (Fine Art)

Offered by the Department of English and Fine Arts.

**Fine Art 375. Introduction to Film Studies.** A structured introduction to cinema which takes a thematic or chronological approach to the study of film as art form, with attention to film-making techniques, narration, forms of genre, and modes of production.

**Fine Art 452. Art in History.** A chronological historical survey of art from antiquity to the present. Includes study of the major periods, schools, and styles of art, and biographies of important artists. Hands-on exercises reinforce student's understanding of course material. Course is interdisciplinary; discussion includes music, drama, and dance as necessary to provide students with historical/social and political contexts of art masterpieces. Text and class lectures will be augmented with slides, videotapes, music selections, guest artists, and lecturers, and actual art objects.

**Fine Art 458. Music Appreciation.** Survey of music of the Western world and a study of basic elements, forms, and styles in representative works by major composers. Emphasis on listening, understanding, and appreciation. Voluntary field trip to an area concert during cadet activity time. Knowledge or talent in music is not required.

**Fine Art 459. Introduction to Drawing and Design.** The first course for students with no practical studio experience in drawing and design composition. Course assignments include hands-on class exercises and homework projects. Students learn to apply the principles of design to common design tasks. They will gain practical experience in sketching and using gesture and contour modes of drawing.

**Fine Art 461. Advanced Studio Art.** Studio course for students with previous art studio experience. Students plan and execute projects which provide more artistic and technical challenges than Fine Art 463 or 464.

**Fine Art 463. 3-D Studio Art: Clay and Sculpture.** Introductory course to practical 3-D processes in art. Students work with coil, slab, hand-built, and wheel-thrown pottery. They plan and create clay, wire, assemblage, and carved sculptural projects in relief and in-the-round. Students make preparatory sketches for their projects.

**Fine Art 464. 2-D Studio Art: Painting and Printmaking.** A course in practical 2-D processes in art. Students learn figure drawing, watercolor, and acrylic painting and complete several projects in each medium. They also complete several projects in printmaking: relief, etching, monoprint, or collograph.

**Fine Art 477. Fine Arts in the U.S.A.** Course offers an interdisciplinary approach to the arts in the U. S. with emphasis on the U. S. A chronological approach explores common themes in the arts by studying archeology, painting, sculpture, and music. Students experience the arts through slides, musical selections, guest artist, film, videotapes, and other media.

**Fine Art 495. Special Topics.** Selected special topics in Fine Arts.

**Fine Art 499. Independent Study.** Independent study in art or music. Subject and meetings arranged with the instructor.

## **HUMANITIES (Hum)**

Offered by the Departments of the Humanities Division.

**Hum 200. Introduction to the Humanities.** Seminar-style interdisciplinary course with an introduction to the intellectual history of Western Civilization through literature, philosophy, the fine arts, and the history of law and science. Course aims to lay the foundation for further study in the disciplines of the humanities, to enhance integrated knowledge and critical thinking, and to prepare students for advanced study.

**Hum 400. Humanities Seminar.** Seminar-style interdisciplinary course focused on the history of Western Civilization, through literature, the arts, and philosophy. Related topics include the history of law and science, and their impact on trends in the humanities. This approach is invaluable for enhancing integrated knowledge and critical thinking, and is excellent preparation for cadets wishing to pursue graduate studies.

**Hum 430. The Holocaust.** The subject of the Holocaust, the destruction of the Jews of Europe and others at the hands of the Nazis and their collaborators, is of great significance in the history of human civilization. The extensive documentation of this systematic genocide lends itself to the academic examination of critical lessons in the study of human history and behavior, as well as ethical issues. Through this investigation students can also understand what it means to be a responsible citizen and soldier.

**Hum 461. Russian Literature.** A study of representative Russian authors (such as Pushkin, Chekhov, Dostoevsky, Tolstoy, Sholokhov, Pasternak, and Solzhenitsyn) in their historical and cultural setting and their impact on the shaping of the national character of the Russian people.

**Hum 463. Far Eastern Literature.** An historical survey and analysis of major literary works of the Far East with emphasis on China and Japan.

**Hum 475. Army Heritage and Operations.** Survey of the United States Army, its history and traditions, doctrine, and tactics. Prepares students for commissioning as Army officers and attendance at the Army's Basic Officer Leader Course Phase II (BOLC II) by familiarizing them with the history and heritage of the Army; providing a basic understanding of fundamental Army operational and tactical doctrine; and introducing students to small unit leadership, doctrine, tactics, techniques, and procedures (TTP) of company grade leadership – Troop Leading Procedures (TLP). Written assignments, land navigation, and Tactical Exercise Without Troops (TEWT). Priority given to cadets with submitted written requests for Army Service Transfer (cross commissioning).

**Hum 495. Special Topics.** Selected topics in the humanities.

## **PHILOSOPHY** (Philos)

Offered by the Department of Philosophy.

**Philos 310. Ethics.** A critical study of several major moral theories and their application to contemporary moral problems with special emphasis on the moral problems of the profession of arms. Highlights an officer's responsibilities to reason and act ethically; develop critical thinking skills; know civic, cultural, and international contexts in which the U.S. military operates; and learn influential normative theories about ethics and the foundation of character.

**Philos 311. War, Morality, and the Military Profession.** In-depth examination of the moral issues raised by the profession of arms. Presumes an understanding of moral theory, as a minimum: relativism, egoism, utilitarianism, and deontology. May be taken as a sequel to or as a substitute for Philos 310 (with department permission) if the student has independently studied ethical theory.

**Philos 330. Introduction to the Philosophy of Science.** Analysis of the basic assumptions and principles of the sciences. Types of topics considered include the scientific method, scientific laws, theory construction, scientific explanation, probability, the relationship between the social sciences and the physical sciences, and the relationship between the sciences and the humanities, especially in the formation of values.

**Philos 360. Applied Reasoning.** Introduction to basic deductive and inductive applied logic. Includes analysis and evaluation of the notions of evidence and good arguments in fields such as law, medicine, science, engineering, behavioral and social sciences, and military studies. Students concentrate on reasoning in a specific field of interest.

**Philos 370. Introduction to Symbolic Logic.** Advanced course in logic that examines propositional and predicate languages, model theory, quantifiers, proofs, identity theory, and properties of logical systems.

**Philos 382. American Philosophy.** Examination of the philosophic background of Puritanism, the Revolutionary period, transcendentalism and pragmatism with special reference to the thought of major American philosophers such as Pierce, James, Royce, Santayana, and Dewey.

**Philos 390. Great Philosophers.** In-depth study of some of the central Western philosophers and their systems of philosophy. Philosophers read include some of the following: Plato, Aristotle, Augustine, Aquinas, Descartes, Locke, Berkeley, Leibniz, Hume, Kant, Hegel, Schopenhauer, and Nietzsche.

**Philos 395. Philosophy of Law.** Course serves as an introduction to legal philosophy and its relations to moral reasoning. Emphasizes the nature of law, its authority, its relations to morals, the controversies over judicial decision-making, the justification of states interfering with the liberty of its individual citizens, the various different or competing senses of "justice," the question of responsibility, and the justification of legal punishment.

**Philos 401. Comparative Religion.** A philosophical survey of selected world religions, possibly including "extinct" religions now known only through texts and other artifacts. Faith traditions to be surveyed in every offering of the course include Hinduism, Buddhism, Islam, Judaism, and Christianity. Course syllabus lists additional traditions to be examined in a given semester.

**Philos 402. Philosophy of Religion.** Topics covered include concepts of the divine, grounds for belief in a deity, theories of salvation, the problem of evil, the roles of revelation and reason in religion, problems of religious language, and the role of religion in moral theory.

**Philos 410. Medical Ethics.** Ethics applied to biomedical issues using a seminar approach. Ethical problems considered include informed consent, refusal of treatment, suicide, killing and letting die, paternalism, allocation of health care, patient confidentiality, codes of medical ethics, and specific case analyses.

**Philos 495. Seminar in Philosophy.** Selected topics in philosophy.

**Philos 499. Independent Study.** Philosophical research guided by an instructor.

## legal studies major

The Legal Studies major provides a broad liberal arts background upon which a cadet at the Academy may build expertise in the study of law and its role and function in both American society and the international community. Increasingly, complex legal considerations permeate every aspect of modern life in both the civilian and military environments. Cadets who choose the Legal Studies major will be able to develop the analytical skills that will permit them to identify, understand, and resolve the complex legal issues which they will likely encounter after graduation. The Legal Studies major is not a “prelaw” major, but is designed to provide cadets an enhanced knowledge of the law as part of a broadly focused education.

The Department of Law and the Legal Studies major fall within the Social Sciences Division. Cadets who elect to major in Legal Studies must complete fourteen courses in addition to the required academic core; five of these must be upper level courses offered by the Department of Law. In addition to the law courses, a Legal Studies major has discretion in selecting courses offered by the Departments of Behavioral Sciences and Leadership, Economics and Geosciences, English and Fine Arts, Foreign Languages, History, Management, Military Strategic Studies, Philosophy, and Political Sciences. This program of study is designed to expose the student to a broad range of issues within the discipline of law. It provides a broad liberal arts background upon which an Air Force officer may build specialized expertise in an area of increasing relevance and importance.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy Opt
Econ 201	Beh Sci 310	Astro Engr 410
English 211	Biology 315	English 411
Engr Mech 220	El Engr 315	Law 421
For Lang 3	History 302	Law 485
For Lang 4	Law 331	Law Opt 4
Law 220	Law 351	Law Opt 5
Law 221	Law Opt 2	Mgt 400
Law Opt 1	Law Opt 3	MSS 400
MSS 200	Math 300	Soc Sci 412
Physics 215	Ops Rsch 310	Soc Sci/Hum Opt 1
Pol Sci 211	Philos 310	Soc Sci/Hum Opt 2

### LAW (Law)

Offered by the Department of Law.

**Law 220. Law for Air Force Officers.** A core course introducing cadets to the legal knowledge and skills they will need as Air Force officers and educated citizens. The course examines the nature of law and its role in American society and the military; provides an overview of the American civilian and military justice legal systems; examines selected foundational constitutional rights, particularly as they apply in the armed forces; and introduces substantive areas of the law that military officers likely will encounter in their personal and official capacities, including criminal law, civil law, military administrative law, and the law of armed conflict.

**Law 221. Legal Research, Writing, and Advocacy.** Following an introduction to the fundamentals of legal research and legal reasoning, students will do various exercises intended to enhance research skills, hone the ability to recognize and articulate legal issues, foster critical analysis, and promote effective communication. Students will also practice advocacy skills. The course culminates with the students preparing a legal memorandum or equivalent legal document. Students will receive a fact scenario that presents an ill-defined issue of law. They will draft an appellate brief or equivalent document which they will use to advocate a position in oral argument.

**Law 331. Crime and Criminal Justice.** Examination of crime and the criminal justice system. Special emphasis on the definition of crime, the criminal justice system, and constitutional aspects of criminal law enforcement.

**Law 340. Business Law.** In-depth study of the law governing U.S. commerce and business organizations. Emphasis is placed on contracts, formation of business organizations and laws which regulate the workplace environment.

**Law 351. U.S. Constitutional Law.** In-depth analysis of Supreme Court decisions having a fundamental impact on the American legal system, government, and citizens. Topics include the legal definition of war powers and aspects of the Bill of Rights and the Fourteenth Amendment.

**Law 360. Law and Literature.** In-depth study of selected literary works which deal with law as well as the literary qualities found in court opinions by noted jurists and in editorial journalism. Primary emphasis on developing persuasive writing skills, and secondary emphasis on oral analysis of subject texts.

**Law 361. Modern Application of the Law of Armed Conflict (LOAC).** A detailed overview of the modern requirements and restrictions on military operations, with particular emphasis on combat operations between military forces. Analysis of the legal framework that guides an officer at the strategic and operational level. Special focus on the Geneva and Hague Conventions, along with more current agreements such as the Landmine treaty, and Rome/International Criminal court treaty.

**Law 421. Law for Commanders.** A continuation and expansion of Law 220, Law for Air Force Officers. Focus is on legal problems and issues of command and use of command tools. Examines command authority over military personnel, command authority over civilians living or working on base, military administrative law, and common legal concerns facing commanders and commanders' subordinates.

**Law 456. National Security Law.** Examination of the domestic and international legal authority affecting U.S. national security matters and the command and control of the key instruments of national security, focusing on the U.S. military. Topics include: Presidential and Congressional treaty and war powers under the Constitution; command and control of the military under the modern national security system; legal authority for the international use of force; intelligence and information security law; terrorism and unconventional warfare; and domestic uses of military and the Posse Comitatus Act.

**Law 461. International Law.** Study of the legal principles which govern relations among nations. Students study the historical development of international law and important principles which govern relations among nations today. Topics include: options for settlement of disputes; the law which affects military operations and the status of U.S. forces stationed overseas; roles and powers of international organizations; and the law of the sea.

**Law 485. Contemporary Problems and the Law.** Seminar on the legal implications of contemporary social, economic, and political problems and the ability of the American legal system to solve those problems. This course affords the student the opportunity to integrate knowledge and expertise acquired in other law courses and further hone their analytical skills as they identify and seek to understand and resolve the complex legal issues they are likely to encounter following graduation.

**Law 495. Special Topics.** Selected topic or topics in law.

**Law 499. Independent Study.** Study and research in a legal topic or topics of choice for students who have demonstrated their ability for advanced study in regularly offered enrichment courses. Topics and meetings arranged with the instructor.

## management major

The Management major prepares cadets for management and leadership roles in today's technologically complex, global Air Force. The curriculum is designed to develop cadets who can understand, analyze, and improve organizations through the efficient and effective use of systems. The courses in the major help students develop adaptive capacity and the organizational knowledge and skills vital for Air Force officers as well as future national leaders. The Management major is accredited by the Association to Advance Collegiate Schools of Business (AACSB) and ranks among the most prestigious undergraduate management and business degrees in the nation. The Academy's curriculum, together with our core courses, provide an excellent educational foundation for cadets interested in pursuing Air Force careers such as Acquisition Manager; Air Battle Manager; Aircraft Maintenance; Communications and Information; Contracting; Cost Analysis; Financial Management; Health Services Administrator; Intelligence; Logistics Readiness; Navigator; Pilot; Security Police; Space and Missile Operations; and Special Investigator. Additionally, the Management major prepares cadets interested in pursuing graduate degrees in Management, Management Science, and/or Business Administration.

The Management major is designed to produce critical thinkers who will lead organizations to quickly adapt and succeed in rapidly changing, highly technical, global environments. Management majors study traditional managerial and business topics such as organizational perspectives and theories, global organizations, complex human systems, financial and managerial accounting, managerial finance, human resource management, marketing, production and operations management, information systems, and strategic management. Related subjects, such as personal finance and investing, are also popular among our majors.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Eng 315	Academy Opt
Econ 201	Beh Sci 310	Astro Engr 410
El Engr 315	Biology 315	English 411
English 211	History 302	Mgt 400
Engr Mech 220	Math 300	Mgt 423
For Lang 3	Mgt 303	Mgt 437
For Lang 4	Mgt 341	Mgt 472
Law 220	Mgt 342	Mgt Capstone Enrichment
MSS 200	Mgt 345	Mgt Capstone Prep
Ops Resch 310	Mgt 361	Mgt Opt (1st Class)
Physics 215	Mgt Opt (2nd Class)	MSS 400
Pol Sci 211	Philos 310	Soc Sci 412

### MANAGEMENT (Mgt)

Offered by the Department of Management.

**Mgt 303. Management Perspectives.** Introduces students to the complex and dynamic nature of the world in which Air Force officers and managers operate. They are introduced to various perspectives that provide multiple insights into how the world functions.

**Mgt 341. Financial Accounting.** Analysis of business transactions and recording of business data taught from the perspective of understanding the theoretical and practical issues in measurement of income, assets, liabilities, and owner's equity. Annual reports are used to perform financial statement analysis. Alternative accounting methodologies permitted under GAAP are explored.

**Mgt 342. Managerial Accounting.** Focuses on the uses of accounting information by managers. Discusses full cost accounting and responsibility accounting, from the perspective of data collection and analysis, for short and long range decisions. Topics include cost behavior, activity-based costing, contribution margin analysis, measurement of cost of goods manufactured, capital budgeting, and management control systems.

**Mgt 345. Human Managerial Systems I.** Introduction to individual and group theories of behavior, and their integration into the organization as-a-whole. Theories of attitude, behavior, and cognition are applied to the understanding of how to make decisions based on accurate diagnoses of situations that involve people in organizational systems. Organizational behavior

issues like motivation, organizational citizenship behavior, organizational justice, decision making, conflict/negotiation, productivity, organizational learning, participative management, and power and politics will be applied to human capital issues such as human resource planning, job design/analysis, performance appraisal, pay-for-performance, training and career development, and legal issues in the work place. Topics apply to both the public and private sectors. Students learn through a variety of experiential exercises and case studies.

**Mgt 361. Human Managerial Systems II.** A continuation of Mgt 345 with greater depth and more emphasis on case studies and practical application of course concepts.

**Mgt 372. Introduction to Investing and Financial Responsibility.** Provides an introduction to the personal financial planning process, budgeting, financial markets, investment vehicles (corporate stocks and bonds, mutual funds), and planning for retirement. Topics include budgeting, time value of money, risk and return, fundamental and technical analysis of stocks, bond valuations, and the basics of mutual funds. This course is introductory in nature and assumes no prior knowledge of accounting or financial markets. A term project provides experience in comprehensive financial planning—incorporating goals, budgeting, retirement planning and investing.

**Mgt 375. Marketing.** Emphasizes how marketing concepts affect consumers, managers, and organizational strategic plans. Includes the marketing concept, consumer and industrial markets, market research and segmentation, purchase behavior, product planning, channels of distribution, promotion, pricing, and international marketing. Application of contemporary theory to both critical issues in the private and public sectors is stressed through the use of seminars, case studies, field trips, and projects.

**Mgt 382. Investing and Financial Responsibility.** Provides an introduction to the personal financial planning process, budgeting, financial markets, investment vehicles (corporate stocks and bonds, mutual funds), analysis, and an introduction to estate planning. Topics include budgeting, time value of money, risk and return, fundamental and technical analysis of stocks, bond valuations, and the basics of mutual funds. Course assumes a prior knowledge of the principles developed in Financial Accounting. A term project provides experience in developing and analyzing investment opportunities.

**Mgt 391. Information Technology for Organizations.** Examines how organizations use information technology to support the four major management functions of planning, organizing, leading, and controlling. Topics include information systems management, telecommunications, hardware trends, data warehousing, and information security in cyberspace. Students develop proficiency with current database and spreadsheet applications. Application of contemporary theory to both critical issues in the public and private sectors is stressed through seminars, case studies, field trips, and projects.

**Mgt 392. Organizational Networks in Cyberspace.** Examines how organizations use information technology to develop and manage relationships with external institutions. Topics covered include electronic commerce, supply chain management, customer relationship management, e-government, and electronic networking in cyberspace. Emphasis is on legal, cultural, and international issues. Case studies offer a real-world emphasis. Organizational strategies are analyzed, using examples of both successful and unsuccessful online implementations. Students get hands-on web site development experience.

**Mgt 400. Management and Command.** Interactive course focuses on the successful techniques that allow people to understand and influence their environment. Using various models and processes, students explore the interrelationships of power, the people that wield it, and the context within which it occurs. Students gain insights into how to make decisions for situations that involve complexity and uncertainty. The tools are applied to both military and business scenarios, with an emphasis on the transition from the cadet role to the role of an officer.

**Mgt 405. Management Seminar.** Seminar for first-class Management majors providing the opportunity for the presentation of cadet and faculty research, guest lectures, seminars on career and graduate school opportunities for Management majors in the Air Force, goal setting exercises, and applications of management principles.

**Mgt 419. Technological Innovation Management.** Examines how to recognize, analyze, and exploit opportunities in the competitive environments faced by business, nonprofit, and government organizations. Students explore the resources, processes, and structures necessary to transfer technological innovations to appropriate markets. Application of innovation management theories is stressed through the use of case studies, analysis papers, field trips, and projects. By the end of the course, students will have completed a feasibility study of a new concept which can be further developed in capstone projects.

**Mgt 420. Systems Research and Development Management.** Students complete an original, applied systems research and/or development project that demonstrates their capacity to solve complex problems in an organizational setting. Each student chooses a project from among three options: 1) Management Field Studies: Teams or individuals complete advanced case studies or organizational consulting projects for clients developed through the Management Department or arranged by the team independently with departmental approval—students work closely with clients and faculty to define and analyze difficult managerial and competitive problems and make recommendations for future action by the client or subject organization; 2) Venturing Projects: Teams or individuals develop or select innovative projects and create new venture plans or feasibility studies; or 3) Research Projects: Teams or individuals propose and investigate significant managerial or technological issues in a research context. These projects require extensive interaction with faculty to develop research findings that can be presented and/or published.

**Mgt 423. Managerial Economics.** Traditional economic theory emphasizing the principles of product and factor pricing, allocation and employment of resources, and the implications of various market structures. In addition to these microeconomic topics, the use of other economic tools which may aid the decision maker will be discussed including topics in macroeconomics and international economics. (Administered by the Department of Economics and Geosciences.)

**Mgt 437. Managerial Finance.** Study of financial decisions and their effects on the value of the firm. Emphasis is on developing the concept of risk/return tradeoff. Topics include stock and bond valuation, capital budgeting, cost of capital, dividend policy, and capital structure. Case studies and problems expose the student to current financial problems and their solutions.

**Mgt 440. Management Lessons in Literature.** Through a collection of classic and contemporary stories, novels and plays, this course provides a unique perspective of organizational life. Course looks at what authors like Arthur Miller and Mark Twain can tell you about being a more effective manager. Great literature reflects familiar patterns of behavior in a variety of circumstances. But, unlike self-help, inspirational, and how-to manuals, they dispense no advice; they preach no morals; they prescribe no rules. In a world of turbulent change, the works of literature offer us vivid testimony as to what stays constant in human behavior.

**Mgt 446. Organizational Theory.** Course examines the practical theories managers apply to create value in an organization. Given that managers must design the structure and culture of their organizations, students study and apply a number of contemporary and practical theories for effectively diagnosing organizational situations and designing activities that will create successful firms. Learning methods emphasize case studies, field trips, and analytical projects.

**Mgt 448. Power and Influence in Organizations.** Focuses on understanding how managers can effectively mobilize resources to be effective in their job. Course examines how power is acquired, retained, and used in organizations. In addition, what effect power has on employees and the overall performance of the organization is explored. Students learn through a variety of experiential exercises and case studies.

**Mgt 472. Strategic Management.** Emphasizes strategy formulation and implementation to include such topics as the strategic management process, environmental forecasting and analysis, top-level decision making, and strategic control. Application of contemporary theory to both critical issues in the public and private sectors is stressed through the use of seminars, case studies, field trips, and projects.

**Mgt 477. Production and Operations Management.** In-depth examination of the issues, strategies, and analytic techniques involved in providing resources to accomplish Air Force missions. The dominant theme is providing quality products on time and at a minimal cost. Discussions center on qualitative and quantitative approaches for managing production, logistics, and service organizations to create higher quality and greater efficiency.

**Mgt 485. Systems Acquisition Management.** Introduction to the acquisition process starting with development of a military requirement and continuing through the life cycle of a weapons system. Examines the acquisition functions, including the roles of each of the functional areas that make up the government acquisition team such as contracting, program control, and engineering. Uses current issues, problems, and guest speakers to bring "real world" happenings into the classroom, so students can see how the process works or fails to work.

**Mgt 495. Special Topics.** Selected topics in management.

**Mgt 498. International Management.** As a result of the increase in communications and flow of information, there is a growing need to possess a greater understanding about global, cross-cultural management issues. This course examines management on an international level looking at cultural, legal, financial, and trade considerations for managing in the Global Century, while integrating the functional areas of management.

**Mgt 499. Independent Study.** Tutorial investigation of a specific area of management.

## mathematical sciences major

We've designed the Mathematical Sciences major to teach the problem solving, analytical, and communication skills you'll need to deal with the complex operational, management, engineering and mathematical problems you'll encounter as an officer in the Air Force of today and tomorrow. You'll take courses in applied mathematics, analysis, statistics, and operations research to provide a breadth of education beyond the classical areas of mathematical study. In each of these areas you'll increase your ability to: a) logically analyze a problem; b) determine the tools required to formulate a solution; c) develop and execute the solution and d) effectively communicate the process and conclusions of that solution. The key to the Mathematics major is flexibility. It allows you the flexibility to choose the areas you'll study. You have the opportunity to choose one of three specialty options allowing you to study the area of mathematics in which you have the most interest. Should you declare a second major, you can substitute courses from your second discipline for your open options. The program also provides enormous flexibility in the opportunities that will be available to you as an Air Force officer. An officer with a background in mathematics has many different Air Force Specialty Codes (AFSC) from which to choose, such as space systems analyst, scientific analyst, and intelligence applications officer. This list is certainly not exhaustive since it doesn't include any of the Air Force specialties with no specific degree requirements. Mathematics majors do very well in a diverse set of graduate school disciplines, such as business administration, computer science, economics, most engineering disciplines, law, medicine, meteorology, operations research, physics, and, of course, mathematics.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy Opt
Comp Sci 211	Beh Sci 310	Astro Engr 410
Econ 201	Biology 315	English 411
English 211	El Engr 315	Math 420
Engr Mech 220	History 302	Math 421
Law 220	Math 342	Math Open Opt
Math 243	Math 346	Math Opt 1
Math 245	Math 360	Math Opt 2
Math 320	Math 366	Mgt 400
MSS 200	Math 377	MSS 400
Physics 215	Math 378	Soc Sci 412
Pol Sci 211	Philos 310	Sys Opt Comp Sci 453

### MATHEMATICS (Math)

Offered by the Department of Mathematical Sciences.

**Math 130. Basic Math.-Algebra and Trigonometry.** Designed to help reinforce algebraic and trigonometric skills necessary for success in the technical core. Basic graphing, algebraic manipulation, and trigonometric calculations are covered. Elementary functions, function manipulation, and some function applications are also discussed. May be used as an Academy option to fulfill graduation requirements. Does not fulfill any major's requirements.

**Math 141. Calculus I.** Study of differential calculus. Topics include functions and their applications to physical systems; limits and continuity; a formal treatment of derivatives; numeric estimation of derivatives at a point; basic differentiation formulas for elementary functions; product, quotient, and chain rules; implicit differentiation; and mathematical and physical applications of the derivative, to include extrema, concavity, and optimization. Significant emphasis is placed on using technology to solve and investigate mathematical problems.

**Math 142. Calculus II.** Study of integral calculus with a focus on the Fundamental Theorems and their application. Topics include estimating area under a curve; accumulation and total change, basic numeric integration methods; antiderivative formulas for the elementary functions; integration by substitution and parts; improper integrals; differential equations; exponential growth and decay; an introduction to Taylor Series; and mathematical and physical applications of the Fundamental Theorems. Physical applications include area and volume problems and the concept of work.

**Math 152. Advanced Placed Calculus II.** A more rigorous study of integral calculus for advanced-placed fourth-class cadets. Content is similar to Math 142, but with more in-depth treatment. Additional emphasis is placed on the mathematical and physical applications in preparation for students interested in pursuing a technical major.

**Math 243. Calculus III.** Multivariate calculus, including vector functions, partial differentiation, directional derivatives, line integrals, and multiple integration. Maxima and minima in multiple dimensions and the method of Lagrange Multipliers. Solid analytical geometry to include lines, planes, and surfaces in 3-space. Designed for cadets who indicate an interest in a technical major.

**Math 245. Differential Equations.** Modeling with and analysis of linear ordinary differential equations. Includes matrix algebra and matrix inverses, first-order ordinary differential equations (numerical methods, separation of variables, integrating factors, and method of undetermined coefficients), and second-order linear differential equations/first-order linear systems (Laplace transforms, determinants, eigenvalues, eigenvectors, and stability). Applications may include population growth, predator/prey, and mass-spring system modeling.

**Math 253. Advanced Placed Calculus III.** A more intense study of multivariate calculus for advanced-placed fourth-class cadets. Content is similar to Math 243. Additional emphasis is placed on mathematical and physical applications in preparation for students interested in pursuing a technical major.

**Math 300. Introduction to Statistics.** Descriptive statistics emphasizing graphical displays; basic probability and probability distributions; sampling distribution of the mean and the Central Limit Theorem; statistical inference including confidence intervals and hypothesis testing correlation; and regression.. Math 300 is designed primarily for social science and humanities majors. It emphasizes the elements of statistical thinking, focuses on concepts, automates most computations, and has less mathematical rigor than Math 356.

**Math 310. Mathematical Modeling.** Introductory course in mathematical modeling. Students model various aspects of real-world situations chosen from Air Force applications and from across academic disciplines, including military sciences, operations research, economics, management, and life sciences. Topics include: the modeling process, graphical models, proportionality, model fitting, optimization, and dynamical systems. Several class periods are devoted to in-class work on small projects.

**Math 320. Foundations of Mathematics.** Emphasizes exploration, conjecture, methods of proof, ability to read, write, speak, and think in mathematical terms. Includes an introduction to the theory of sets, relations, and functions. Topics from algebra, analysis, or discrete mathematics may be introduced.

**Math 340. Discrete Mathematics.** Useful for students interested in applications of mathematics to computer science and electrical engineering. Propositions and logic; sets and operations on sets; functions, recursion, and induction; graphs, trees, and their applications; discrete counting and combinatorics.

**Math 342. Numerical Analysis with Differential Equations.** Introductory numerical analysis course. Specific topics include round off, truncation, and propagated error; root finding; fixed-point iteration; interpolating polynomials, and numerical differentiation and integration. The approach is a balance between the theoretical and applied perspectives with some computer programming required.

**Math 344. Matrices and Differential Equations.** Properties, types, and operations of matrices; solutions of linear systems; Euclidean vector spaces, linear independence, and bases; eigenvalues and eigenvectors. Computational aspects. Applications to differential equations. First- and second-order differential equations and systems. Models may include population growth, warfare, and economic growth.

**Math 346. Engineering Math.** Provides advanced mathematical concepts and skills necessary for technical disciplines. Topics include differential and integral vector calculus (gradient, directional derivative, divergence, curl, Divergence Theorem, Stokes' Theorem), Fourier series, orthogonal functions, and partial differential equations (separation of variables, transform methods, numerical techniques).

**Math 356. Probability and Statistics for Engineers and Scientists.** Classical discrete and continuous probability distributions; generalized univariate and bivariate distributions with associated joint, conditional, and marginal distributions; expectations of random variables; Central Limit Theorem with applications in confidence intervals and hypothesis testing; regression, and analysis of variance. Designed for cadets in engineering, science, or other technical disciplines. A core substitute for Math 300.

**Math 359. Design and Analysis of Experiments.** Introduction to the philosophy of experimentation and the study of statistical designs. Course requires a knowledge of statistics at the Math 300 level. Topics include design and analysis of single-factor and many-factor studies. A valuable course for all science and engineering majors.

**Math 360. Linear Algebra.** A first course in linear algebra focusing on Euclidean vector spaces and their bases. Using matrices to represent linear transformations, and to solve systems of equations is a central theme. Emphasizes theoretical foundation (computational aspects are covered in Math 344).

**Math 366. Real Analysis I.** Theoretical study of functions of one variable focused on proving results related to concepts first introduced in differential and integral calculus. An essential prerequisite for graduate work in mathematical analysis, differential equations, optimization, and numerical analysis.

**Math 370. Introduction to Point-Set Topology.** Review of set theory; topology on the real line and on the real plane; metric spaces; abstract topological spaces with emphasis on bases; connectedness and compactness. Other topics such as quotient spaces and the separation axioms may be included. A valuable course for all math majors in the graduate school option.

**Math 372. Introduction to Number Theory.** Basic facts about integers, the Euclidean algorithm, prime numbers, congruencies and modular arithmetic, perfect numbers and the Legendre symbol will be covered and used as tools for the proof of quadratic reciprocity. Special topics such as public key cryptography and the Riemann Zeta function will be covered as time allows.

**Math 374. Combinatorics and Graph Theory.** Permutations, combinations, recurrence relations, inclusion-exclusion, connectedness in graphs, colorings, and planarity. Theory and proofs, as well as applications to areas such as logistics, transportation, scheduling, communication, biology, circuit design, and theoretical computer science.

**Math 377. Applied Probability and Statistics.** Descriptive statistics. Classical discrete and continuous random variables and probability distributions. Generalized univariate and bivariate distributions with associated conditional and marginal distributions. Central Limit Theorem. Single sample inferential statistics with applications using confidence intervals and hypothesis testing. Simple linear regression. Designed for Mathematics, Operations Research, and Economics majors. A core substitute for Math 300.

**Math 378. Advanced Probability and Statistics.** Advanced discrete and continuous random variables and probability distributions. Point estimation, joint, conditional, and marginal distributions. Functions of random variables and the Central Limit Theorem. Inferential statistics for categorical data and multiple samples including ANOVA. Nonparametric statistics. Design and analysis of experiments, including factorial, fractional, and response surface designs.

**Math 405. Math Seminar.** A problem solving course reviewing major areas and concepts of undergraduate mathematics. An assessment exam may be administered.

**Math 420. Mathematics Capstone I.** The first semester of the mathematics capstone experience. Students decide on a topic of independent research in, or related to, the mathematical sciences and begin work with a faculty advisor. Significant progress toward a thesis will be made during the semester.

**Math 421 Mathematics Capstone II.** The second semester of the mathematics capstone experience. Students complete work on their independent research project and produce a thesis to present their findings.

**Math 451. Complex Variables.** Valuable course for students intending to pursue graduate work in mathematics or its applications, particularly in areas involving partial differential equations. Analytic functions; integration, the Cauchy Integral Theorem and applications; power and Laurent series, residues and poles; conformal mapping with applications to potential theory and fluid flows.

**Math 465. Modern Algebra.** Valuable course for students intending to pursue graduate work in mathematics or its applications. Focuses on the study of algebraic structures and functions between these structures. Topics include: cyclic groups, permutation groups, normal subgroups and quotient groups; rings, ideals, polynomial rings and fields. Depending on instructor and student preferences, applications to coding theory, crystallography, or combinatorics are explored.

**Math 467. Real Analysis II.** Theoretical study of functions of several variables to include topology of Cartesian spaces, compact and connected sets, convergence of sequences of functions, continuous functions, fixed point theorems, contractions, Stone-Weierstrass approximation theorems, differentiation, partial differentiation, mapping theorems, and Implicit Function Theorem.

**Math 468. Dynamical Systems.** The study and application of linear and nonlinear differential equations to physical systems from both computational and analytical points of view. Topics vary but may include these typical choices; systems of differential equations, stability analysis, bifurcations, maps, and chaos.

**Math 469. Partial Differential Equations.** Solutions of boundary value problems with applications to heat flow, wave motion, and potential theory. Methods of solution include separation of variables and eigenfunction expansion, including Fourier series. Topics typically include the method of characteristics, generalizations to higher dimensions, and the use of non-Cartesian coordinate systems. Additional topics may include numerical methods, nonlinear equations, and transform methods.

**Math 470. Mathematical Physics.** Introduction to various mathematical topics needed in graduate-level physics and applied mathematics courses. Topics vary; typical choices include special functions (Legendre polynomials, Bessel functions, etc.), calculus of variations, complex functions (Laurent series, contour integration, and the Residue Theorem), Fourier series and their convergence properties, integral transform concepts (Fourier and Laplace transforms, Green's functions), dynamical systems.

**Math 495. Special Topics.** Selected advanced topics in mathematics.

**Math 499. Independent Study and Research.** Individual study and/or research under the direction of a faculty member.

## mechanical engineering major

If you want to design and build things, then you should consider majoring in Mechanical Engineering. Mechanical Engineering is, more than anything else, the engineering of systems. Systems are interactions of components, power, and information.

Examples are an automobile's fuel injected, electronic ignition power train; its electronically controlled and load leveling suspension system; its anti-lock, traction control braking system; or its climate control system. Aircraft systems include turbine engines, attitude and flight controls, automated navigation, and guided weapons. There are incredible mechanical engineering systems in space hardware, power generation facilities, and manufacturing. Because systems bring together the engineering of mechanics and motion, thermodynamics and fluids, materials and structures, and control, Mechanical Engineering is a broad discipline of design and analysis. The Mechanical Engineering degree is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore MD 21202-4012, telephone: (410) 347-7700.

The goal of the Engineering Mechanics program is to prepare cadets to become leaders of character who:

- Possess breadth of integrated, fundamental knowledge in engineering, the basic sciences, social sciences, and the humanities; and depth of knowledge in mechanical engineering.
- Communicate effectively.
- Work effectively on teams and grow into team leaders.
- Are independent learners, and as applicable, are successful in graduate school.
- Can apply their knowledge and skills to solve Air Force engineering problems, both well- and ill defined.
- Know and practice their ethical, professional, and community responsibilities as embodied in the Air Force core values.

Upon completion of the Engineering Mechanics program each graduate shall demonstrate satisfactory:

- Application of the fundamental analysis concepts of mechanical engineering to solve engineering problems.
- Modeling, design, and fabrication techniques of thermal and mechanical systems under real-world conditions.
- Use of contemporary mechanical engineering analysis, design, and test tools.
- Experimental techniques to include test design, execution, data analysis and interpretation.
- Written and oral communications skills.
- Knowledge of ethical and professional responsibilities.
- Breadth and depth of engineering knowledge and skills to effectively identify and solve the types of complex, interdisciplinary problems they will encounter as Air Force engineers.
- Ability to be effective interdisciplinary team members and leaders.
- Skills to be independent life-long learners while knowing when to seek help.
- Knowledge of contemporary social, political, military, and engineering issues, as well as the role of Air Force engineering officers and citizens in our global society.

With a degree in Mechanical Engineering you can get an Air Force assignment as an aeronautical engineer, astronautical engineer, civil engineer, mechanical engineer, or project engineer. The Mechanical Engineering degree also satisfies the educational requirements for Air Force Test Pilot, Flight Test Navigator, and Flight Test Engineer duties. Additional specialties are Scientific Analyst and Acquisition Project Officer. Successful completion of this degree may qualify you for assignment in the Developmental Mechanical Engineer career field.

If you are a top performer in the Mechanical Engineering major, graduate school can be an option as a first Air Force assignment, either by winning a prestigious national scholarship (Guggenheim, Hertz, Rhodes, etc.) or through direct departmental sponsorship. The Mechanical Engineering major gives you the flexibility to pursue either a more specialized degree in graduate school or to continue your broad-based study in engineering. Whether you ultimately choose aeronautical engineering, astronautical engineering, materials engineering, mechanical engineering, or engineering mechanics, your decision will be an informed one.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy/Mech Engr Opt 2
Econ 201	Beh Sci 310	Astro Engr 410
El Engr 231	Biology 315	English 411
English 211	Engr Mech 305	Engr Mech 460
Engr Mech 220	Engr Mech 320	Mech Engr 325
Engr Mech 330	Engr Mech 350	Mech Engr 441
Law 220	History 302	Mech Engr 491
Math 243	Math 346	Mech Engr 492
Math 245	Math 356	Mech Engr Analysis Opt
MSS 200	Mech Engr 341	Mech Engr Opt 1
Physics 215	Mech Engr 370	MSS 400
Pol Sci 211	Philos 310	Soc Sci 412
	Sys Opt Mech Engr 312	

### MECHANICAL ENGINEERING (Mech Engr)

Offered by the Department of Mechanical Engineering.

**Mech Engr 312. Thermal Fluids Systems Engineering I.** First and second laws of thermodynamics applied to closed systems; basic modes of heat and work processes, with concentration on conduction. Mass and momentum conservation, entropy balance. Cycle concepts as applied to Carnot cycle. Properties of thermodynamic substances, including phase diagrams, ideal gases, and pure substances. Fundamental aspects of fluid statics. Bernoulli and mechanical energy equations. Laboratory methods and applications. Emphasis on developing problem solving methods applied to thermal-fluids systems, and on communication skills.

**Mech Engr 325. Engineering System Dynamics.** Modeling, analysis, and design of multi-domain engineering systems including mechanical, electrical, hydraulic, instrumentation, and control elements. Models are developed based on tracking power interactions between system components. Mathematical models are developed in state space form and are investigated both analytically and numerically. System response to initial conditions and forcing functions is examined. Tools are introduced to predict system stability, behavior and response to parameter variation. Non-linear models and elementary control systems are introduced.

**Mech Engr 341. Thermal Fluids Systems Engineering II.** Continuation of Mech Engr 312. First and second laws of thermodynamics applied to open systems. Basic engineering plant component analysis, to include isentropic efficiencies. Navier-Stokes equations and applications. Fluid flow and heat transfer boundary layer applications. Convection heat transfer, with a concentration on heat exchangers. Dimensional analysis, modeling, and similitude. Laboratory methods and applications. Emphasis on developing problem solving methods applied to thermal-fluids systems, and on communications skills.

**Mech Engr 370. Introduction to Machine Design.** Introduction to static failure theories and fatigue. Analysis and design of machine components including shafts, hydrodynamic and rolling element bearings, spur gears, clutches, brakes, and springs. Design of joints using screws, bolts, and welds. Emphasis on stress analysis and design trade-offs.

**Mech Engr 396. Mechatronics.** Integration of mechanical and electrical design, applying the design process to develop an integrated electromechanical system autonomously controlled by a microprocessor. Electrical system development topics include digital logic, actuator control, sensor integration, and signal conditioning. Group design projects throughout the semester leading to the integrated final project. Open only to Mechanical Engineering majors with departmental permission.

**Mech Engr 441. Thermal Fluids Systems Engineering III.** Radiation heat transfer. Numerical methods applied to selected problems in heat transfer and fluid mechanics. Introduction to basic power cycles (Rankine, Otto, Diesel, Brayton, etc.). Psychometric processes. 1-D compressible flow with application to turbomachinery and varying area channels, to include normal shocks. Analysis of turbomachinery. Laboratory methods and applications. Emphasis on developing problem solving methods applied to thermal fluids systems, and on communications skills.

**Mech Engr 467. Energy Conversion.** Applications of the first and second laws of thermodynamics to the major energy converters including steam plants, internal combustion engines, and turbojet engines. Additional topics may include combustion analysis, energy storage, refrigeration, and alternate energy sources.

**Mech Engr 490. Automotive Systems Analysis for the Engineer.** Analysis of the modern automobile as an engineering system. Engineering concepts applied to the design, maintenance, and integration of automotive subsystems. Analysis of power plants, clutches, transmissions, drive trains, suspension systems, steering and braking dynamics, and overall vehicle performance including economy.

**Mech Engr 491. Capstone Design Project I.** Capstone engineering design experience for the Engineering Mechanics and Mechanical Engineering majors. Emphasis placed on the design process, complete analysis, and technical communication in the creative development of a mechanical system. The system is designed, fabricated, and tested against performance specifications determined by faculty members.

**Mech Engr 492. Capstone Design Project II.** Capstone engineering design experience for the Engineering Mechanics and Mechanical Engineering majors. Emphasis placed on the design process, complete analysis, and technical communications in the creative development of a mechanical system. The system is designed, fabricated, and tested against performance specifications determined by faculty members.

**Mech Engr 499. Independent Study.** Individual study, research, or design on a topic established with the permission of the department head.

# meteorology major

Meteorology is the study of atmospheric phenomena. The Meteorology major provides the background necessary for understanding atmospheric behavior over a broad range of time and space scales. These include small features such as turbulent eddies and tornadoes; medium-sized features such as squall lines, hurricanes, and blizzards; and even larger features such as continental weather, climate regimes and waves in the jet stream.

The science of meteorology has experienced dramatic changes. New observation techniques based on remote sensing have improved our understanding of weather phenomena and their interrelationships. Images of the earth from satellites have given us a truly global weather perspective. Doppler radar enables us to look at the circulations within thunderstorms to try to identify whether they might generate a tornado. Coupled with this increased observational capability, the introduction of sophisticated numerical weather prediction models has greatly improved our ability to forecast the weather.

The Meteorology major requires a strong foundation in physics, geospatial science, and mathematics, in addition to an aptitude for problem solving. Many of the decisions Air Force officers make, from planning deployments and air strikes in a time of war to launching the Space Shuttle, flying a sortie, or simply deciding what uniform to wear on a particular day, are affected by the weather. While graduates in the Meteorology major are academically qualified to enter the weather career field, future pilots and navigators can greatly benefit from a better understanding of the environment in which they fly.

## Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Biology 315	Aero Engr 315	Academy Opt
Chem 200	Beh Sci 310	Astro Engr 410
Econ 201	El Engr 315	English 411
English 211	History 302	Meteor 431
Engr Mech 220	Math 300/356/377	Meteor 440
Law 220	Meteor 325	Meteor 451
Math 243	Meteor 330	Meteor 452
Math 245	Meteor 352	Meteor 465
Meteor 320	Meteor 430	Meteor 490
MSS 200	Philos 310	Mgt 400
Physics 215	Physics 370	MSS 400
Pol Sci 211	Sys Opt Geo 310	Soc Sci 412

## METEOROLOGY (Meteor)

Offered by the Departments of Economics and Geosciences and Physics.

**Meteor 320. Introduction to Meteorology and Aviation Weather.** Surveys the fundamentals of meteorology. Emphasizes flight weather and its impact on aviation. Topics include atmospheric thermodynamics, cloud physics, air masses and weather systems, weather forecasting, severe weather, hazards to aviation, introduction to weather satellites and radar, and an introduction to the near-earth space environment.

**Meteor 325. Weather Data, Analysis and Quantitative Methods.** Introduction to the data sources, objective and subjective data analysis techniques, and quantitative methods used in meteorology. Topics include conventional surface and upper air data, fundamentals of radar and satellite observations, weather map analysis, and quantitative methods covering partial derivatives, vector analysis, kinematic properties of fluid flow, Lagrangian and Eulerian frames of reference, and numerical integration and differentiation. Emphasizes practical application of the above quantitative techniques to weather charts and vertical atmospheric soundings.

**Meteor 330. Atmospheric Physics.** Classical radiative transfer, thermodynamics and microphysics applied to the atmosphere. Topics include atmospheric absorption and attenuation, the gas laws, the first and second laws of thermodynamics, water-air systems, isobaric, adiabatic and isentropic processes, thermodynamic diagrams, atmospheric statics and vertical stability, atmospheric aerosols, nucleation of water vapor and ice, cloud droplet and ice crystal growth, and precipitation generation.

**Meteor 352. Climatology.** Introduction to climatology, including fundamental, long-term processes involving energy, moisture and momentum transfer in the earth's climate system. Topics include understanding current world climate patterns and climate change, and applying climatology to enhance human activities.

**Meteor 430. Atmospheric Dynamics I.** Advanced course in atmospheric dynamics. Topics include continuity, thermodynamic energy, the equations of motion, hydrostatic balance, generalized vertical coordinate systems, balanced and unbalanced flows, circulation, vorticity and potential vorticity, and quasi-geostrophic theory.

**Meteor 431. Atmospheric Dynamics II.** Advanced applications of atmospheric dynamics. Topics include advanced quasi-geostrophic applications, baroclinic instability, cyclogenesis, fronts and frontogenesis, atmospheric wave theory and behavior, boundary layer physics, and numerical weather prediction.

**Meteor 440. Synoptic-Dynamic Meteorology Laboratory.** Laboratory course emphasizing the use of meteorological observations, analyses and forecasts to describe the structure and dynamics of large-scale atmospheric systems. Involves extensive use of conventional surface and upper-air observations, satellite and Doppler radar data, and numerical forecast products in the meteorology laboratory.

**Meteor 451. Synoptic Meteorology.** Study of the development and evolution of large-scale weather systems, including surface and upper level pressure, temperature and wind patterns, air masses, fronts, extratropical cyclones and jet streams.

**Meteor 452. Mesoscale Meteorology.** Study of the structure, development and evolution of mesoscale weather systems. Topics include fronts and jet streams, instabilities, gravity waves, convective storms, squall lines, tornadoes, and mesoscale convective complexes. Introduces analysis techniques and nowcasting. Extensive use of real-time satellite and Doppler radar data and numerical forecast products in the meteorological laboratory.

**Meteor 465. Marine and Tropical Meteorology.** Introduction to the marine environment including the structure of the ocean environment, visibility at sea, and sea-state and swell forecasting, and to the tropical environment including understanding the interactions between the tropics and mid-latitudes, tropical cyclone structure and tropical cyclone forecasting. Particular emphasis will be placed on how these environments affect joint Naval and Air Force operations.

**Meteor 490. Meteorological Interpretation, Analysis, and Integration.** Capstone course in meteorology. Using real world scenarios, course assesses the student's ability to integrate and synthesize a wide range of meteorological information to include observational data, analyses, and operational forecasts. Particular attention is given to weather support for military operations.

**Meteor 499. Independent Study.** Individual research under the direction of a faculty member.

## military strategic studies major

Your effectiveness as an Air Force leader will be shaped by your ability to think strategically and creatively when faced with the complex operational challenges of the twenty-first century security environment. The Military Strategic Studies (MSS) major prepares you to lead and operate across the spectrum of conflict. Whether you choose to make the Air Force a career, pursue other public service, or enter the private sector, this versatile major has direct relevance for your chosen profession and will help you develop the capabilities and mindset to compete successfully in a changing and challenging world.

The MSS major sharpens and expands upon the knowledge gained in your first MSS core course on military theory and strategy. Building upon that foundation, you pursue courses related to the uniquely demanding context of the military profession—morality and war, contemporary military threats, formulation of military strategy, theory of military transformation, and the nature of contemporary air forces. You will learn to think as a strategist, identifying and framing the battle space, evaluating theories and models applicable to air, information, and space power. You will also learn to plan and think as an operator with multiple opportunities to simulate exploitation of the air, space, and cyberspace operating environments with effects-based strategies, modern weapons technologies, and unconventional approaches.

In your second-class year, you will acquire a solid understanding of air, space, and information power theory. In your second-class year, you will select a research topic in our research methods course and, with the help of an advisor, design what will become your senior thesis. As a first-class cadet, you will author your senior thesis and have an opportunity to publish your findings in our Airman-Scholar Journal. You will also take the advanced version of the final MSS core course on joint and coalition operations.

In addition to nine required major's courses, you have the flexibility to choose one of two MSS contemporary threats courses and three of four MSS functional domain courses. Whichever course of study you plan, the MSS major will strengthen your problem solving and decision making skills, and directly prepare you to excel in executing the Air Force mission: to deliver sovereign options for the defense of the United States of America and its global interests—to fly and fight in Air, Space, and Cyberspace.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Biology 315	Academy Opt	Astro Engr 410
Chem 200	Aero Engr 315	Elective
Econ 201	Beh Sci 310	English 411
English 211	El Engr 315	Functional Domain Opt
Engr Mech 220	Functional Domain Opt	Functional Domain Opt
For Lang 3	History 302	Mgt 400
For Lang 4	MSS 365	MSS 410
Law 220	MSS 379	MSS 462
Math 300	MSS 382	MSS 463
MSS 200	Philos 310	MSS 490/491
Physics 215	Philos 311	MSS 498
Pol Sci 211	Sys Opt Geo 310	Soc Sci 412

## **MILITARY STRATEGIC STUDIES (MSS)**

Offered by the Department of Military Strategic Studies.

**MSS 200, Military Theory and Strategy.** Provides the professional cornerstone for the military officer through the exploration of military theories and strategies. Drawing on a wide range of military thought—from the ideas of the classical military thinkers to the propositions of modern theorists—students analyze relevant theories of warfare, evaluate various approaches to military strategy, and apply them to contemporary and notional conflicts. Develops military thinkers who can form creative solutions to complex military problems.

**MSS 282. Air, Space, and Information Power Theory.** Provides a foundation for military officers to innovate beyond current doctrinal boundaries through critical analysis of air and space power theories. Identifies, explains, and examines existing propositions, frameworks, and assumptions of air and space power doctrine and theory. Case studies and seminar discussions, analyze alternatives to current approaches of air and space power employment and their relationship to information power. Examines current and notional characteristics of air and space platforms and investigates future requirements of air and space platforms. Evaluates air and space issues such as the integration and/or separation of air and space power.

**MSS 365. Developing the Military Strategist.** Examines how military strategists shape the international environment, prepare for the future, recognize threats to national security, and develop military responses. Explores military theories of air, sea, space, information, and land warfare, and the context in which these ideas develop. Analyzes case studies to identify elements that lead to success or failure. Investigates future national security challenges, and using strategy formulation tools, develops and practices the skills necessary to methodically and aggressively dominate the battle space by coercing, punishing, disabling, delaying, containing, decapitating, denying, or destroying an adversary.

**MSS 379. Research Methods in Military Strategic Studies.** Introduces and explains research methods and their application to Military Strategic Studies. Provides the foundation for a range of qualitative and quantitative research designs, tools, processes and resources to analyze military issues including strategy, theory, doctrine, force structure, and operations. Seminar director assigns each student a faculty thesis advisor to provide additional research mentorship. Course concludes with a final paper that will be developed into a thesis in MSS 498.

**MSS 385. Special Operations.** Course is designed to educate future airmen regarding the capabilities, limitations, and potential for employing special operations forces (SOF) at the operational and strategic levels. In addition, it develops critical thinking skills by requiring analysis, problem-solving, and application of theoretical concepts to real-world situations. It traces the evolution of SOF capabilities and evaluates the reasons behind successes and failures. Case studies are incorporated for comparison with contemporary operations and introduction of a common framework.

**MSS 400 Joint and Coalition Operations.** Course introduces the capabilities of all U.S. military services, with emphasis on individual service cultures and doctrine. It culminates by synergistically leveraging service-specific capabilities in a joint war fighting simulation. It also explores integration of Special Operations and Coalition forces in war fighting. Teamwork is emphasized. War-gaming scenarios and teaching cases, reinforce and validate concepts taught in the classroom.

**MSS 410. Advanced Studies in Joint and Coalition Operations.** Course introduces the cultures, organization, doctrines, and capabilities of all U.S. military services. Discussions also include the National Military Strategy, the organization for National Security, the Unified Command structure, and the critical role of Special Operations Forces. Once this foundation is set, classroom discussions center on joint U.S. and coalition operations in specific areas of Military Operations Other Than War (MOOTW). These areas include, but are not limited to, terrorism, proliferation of Weapons of Mass Destruction (WMD), peace operations, humanitarian relief, and stability operations.

**MSS 462. Theory of Military Transformation.** The U.S. Armed Forces are currently in the midst of a process of transformation designed to posture American air, land, and sea forces for the security challenges of the coming decades. Students develop and apply critical intellectual inquiry to penetrate the complexities of transformation during peacetime and wartime. Contextual and comparative case studies of American and foreign military innovations will be examined to evaluate the processes of successful—and failed—military innovations and their relationship to service transformation.

**MSS 463. Military Innovation and Emerging Threats.** Course focuses on organizational learning and the various factors that promote or inhibit changes in military technology, doctrine, and organization. By examining cases of successful and unsuccessful peacetime and wartime innovation across the various mediums of warfare, students consider applications and implications of organizational learning in a variety of operational settings.

**MSS 470. Information and Cyberspace Operations.** Examines Information Operations and Cyberspace capabilities and strategies by means of a thorough study of Influence Operations, Network Warfare Operations, and Electronic Warfare Operations. Analyzes the current and emerging influence of Information Operations on force structure, strategy, and operational capabilities together with an assessment of the crucial role of information dominance across the spectrum of war.

**MSS 476. Comparative Air Forces.** This seminar applies comparative methodology to examine selected air forces and how they organize and employ military air, space, and cyberspace power. Students analyze and compare the doctrine, strategy, structure, capabilities, and employment characteristics of selected air and space forces including those of the U.S., Great Britain, Russia, China, France, and Israel.

**MSS 485. Space As An Element of National Power.** This seminar cultivates a conceptual framework to understand the context, theory, and application of space as an element of national power. Students contextually understand the intellectual foundations of space strategy and theory for American and foreign space powers, as well as contemporary and notional future space capabilities of the U.S. and its global space competitors.

**MSS 490. Contemporary Military Challenges: International Threats.** Drawing on major contemporary military challenges for context, this course explores concepts, principles, and processes involved in formulating military strategy and in developing derivative plans and operations. Depending on the scope and nature of current threats, strategic regions selected for examination may include the Asian littoral, the Middle East, Central Asia, the Balkans, Latin America, and/or Africa.

**MSS 491. Contemporary Military Challenges: Threats to the Homeland.** Drawing on major contemporary military challenges for context, this course explores the concepts, principles, and processes involved in formulating military strategy and in developing derivative plans and operations. Focuses on national strategy for homeland security, understanding the threat, and strategic and military force approaches to countering the terrorist threat.

**MSS 495. Special Topics.** Selected topics related to military doctrine, operations and strategy.

**MSS 498. Capstone Thesis in Military Strategic Studies.** Course provides an opportunity for all MSS majors to participate in higher-level discussions and learning that combine all aspects of previous MSS coursework. In addition, it offers an opportunity for each MSS major to work closely with their thesis advisor to complete a major paper for publication on the topics included within the genre of Military Strategic Studies.

**MSS 499. Independent Study.** Individual study and/or research under the direction of a Military Strategic Studies instructor.

The following are additional course offerings from the Department of Military Strategic Studies.

## **AVIATION** (Aviation)

Offered by the Department of Military Strategic Studies (DFMI)

**Aviation 483. Air Warfare Applications.** Examines the context, theory, and application of contemporary airpower employment and explores potential future airpower applications. Learning methods include classroom discussion, relevant case studies, independent research, and laboratory exercises in the Warfare Simulation Lab, the Air Warfare (aircraft simulator) Lab, and the T-41 Airborne Conceptual Application and Validation (TACAV) Lab. Students explore current airpower applications in classroom discussions and through multiple lab-based missions. Post-mission analysis emphasizes emerging airpower capabilities at the strategic and operational levels.

**Aviation 495. Special Topics in Aviation.** Selected special topics courses in aviation.

**Aviation 498. Fundamentals of Air Force Aviation.** Focuses on essential Air Force aviation-related topics such as airmanship, aerodynamics, time-sensitive decision making processes (emergency procedures), human physiology, and operational risk management models; aims to provide in-depth understanding of many timeless aviation topics. Student learning experience focuses on application and reinforcement of military aviation theory and knowledge. Theoretical foundation is complemented by 'hands-on' learning in aircraft simulators. When registering, please indicate preference for first half (Aviation 498) or second half (Aviation 498X) of the semester.

**Aviation 499. Independent Research and Study.** Individual study and research in Aviation under the direction of a MSS academic instructor.

# operations research major

Operations Research (OR) is the application of quantitative techniques to managerial decision-making. To gain an appreciation for the field, it is necessary to look at the origins of Operations Research.

Operations Research, as a discipline, arose from the need to determine optimal resource allocation and assist decision makers during World War II. Groups of mathematicians, physical scientists, and economists were assembled to perform studies that would provide quantitative input for commanders. The results of their efforts were impressive and, soon thereafter, the commercial sector realized the power of these new planning techniques.

Using mathematics to model real world systems was nothing new; physicists and economists had been doing it for years. What defined this new field called OR was its focus on the operations of organizations. Not only were traditional mathematical modeling methods, such as statistics and probability used, but new modeling methods, such as mathematical programming and queuing theory were created.

Operations Research, therefore, entails the development and application of new quantitative modeling methods to real management and economics problems. This is an exciting field—one that attracts curious problem-solvers who are strong in mathematics and computer science and are eager to solve real world problems.

The description of OR provided above highlights its interdisciplinary nature. The Academy has captured the essence of the field by establishing a truly interdisciplinary major. The OR program is jointly administered by the Departments of Computer Science, Economics and Geosciences, Management, and Mathematical Sciences. In addition to the basic set of OR courses, the required major's courses will include courses from each of the four departments.

## Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Beh Sci 310	Academy Opt
Econ 201	Biology 315	Aero Engr 315
El Engr 231	Comp Sci 211	Astro Engr 410
English 211	Comp Sci 362	Comp Sci 364
Engr Mech 220	Econ 332	Econ 465
Law 220	Econ 333	Econ 466
Math 243	History 302	English 411
Math 343	Math 377	Mgt 400
MSS 200	Math 378	MSS 400
Physics 215	Ops Rsch 321	Ops Rsch 419
Pol Sci 211	Ops Rsch 411	Ops Rsch 420
Sys Opt Ops Rsch 310	Philos 310	Soc Sci 412

## OPERATIONS RESEARCH (Ops Rsch)

Offered by the Departments of Computer Science, Economics and Geosciences, Management, and Mathematical Sciences.

**Ops Rsch 310. Systems Analysis.** Course provides an introduction to rigorous quantitative modeling methods that have broad application. Focuses on the mathematics of models, computer implementation of models, and application of these models to practical decision-making scenarios. By demonstrating the application of these techniques to problems in a wide range of disciplines, the course is relevant to technical and non-technical majors at the Academy. Course consists of six distinct blocks: decision analysis and utility theory, linear and nonlinear optimization, project management, queuing theory, simulation, and the systems approach to engineering and decision-making.

**Ops Rsch 321. Probabilistic Models.** Selected probabilistic models (such as random walks, Markov Chains, queues, and reliability models) are analyzed as stochastic processes.

**Ops Rsch 405. Operations Research Seminar.** A course for OR majors that provides for presentation of student and faculty research; guest lectures; field trips; seminars on career and graduate school opportunities for scientific analysts in the Air Force; goal setting exercises; and applications of OR.

**Ops Rsch 411. Topics in Mathematical Programming.** Topics include linear programming (with sensitivity analysis and applications), and non-linear programming. Both the theory and the computer implementation of these techniques are addressed.

**Ops Rsch 419. Capstone in Operations Research: Case Studies.** Study of methodologies associated with business and operations management. Case-based course intended to provide the proper foundation needed to conduct effective analyses supporting a variety of scenarios. Students evaluate various cases, develop plans for and conduct analyses, and create effective written and oral presentations. Develop capstone project proposal for Ops Rsch 420.

**Ops Rsch 420. Capstone in Operations Research.** Project development and implementation for real-world clients using advanced operations research techniques with emphasis on problem recognition, model formulation, and Air Force applications.

**Ops Rsch 495. Special Topics.** Selected advanced topics in OR.

**Ops Rsch 499. Independent Study.** Individual study and/or research in OR, under the supervision of a faculty member.

## philosophy minor

The Philosophy minor requires a minimum of 147 hours and four philosophy courses in addition to Philosophy 310. Because philosophy courses can often be used to fulfill a major's requirements in other disciplines, the Philosophy minor can sometimes be earned by taking only one or two additional courses.

"Philosophy" is not another discipline. Rather, it is rational inquiry into any discipline (e.g., philosophy of psychology, philosophy of history, philosophy of law). Philosophers seek answers to the basic, fundamental questions, which underpin any field of study. In addition to the questions addressed in the core course about how we should live our lives, philosophers also study: principles of language and reasoning (logic); foundations of empirical discovery and other ways of knowing (epistemology); and the ultimate underpinnings and structure of the self and the world (metaphysics).

Philosophy is an ancient and valuable sub district within the vast marketplace of ideas. It is concerned with the most interesting questions in life—the questions that are fundamental and the least easy to answer or avoid. All cadets are required to take a course in ethics, which is the discipline concerned with answering the questions: What is a good act? What sort of person is the best person? What is truly valuable? By what principles should life be led? Obviously, philosophy is not for everyone. It is not for those who want easy answers, nor is it for those who do not care about the deeper meanings of life or the purpose of their own lives. It is for those who wish to gain a more thorough understanding of themselves as rational, reflective beings inhabiting and working in a world that sometimes allows us to glimpse its deeper meanings.

### Course Requirements

- A. Four courses (12 semester hours) in addition to Philosophy 310 in which the student earns a grade of "C" or better.
- B. Required courses include:
  1. Philos 390: The Great Philosophers
  2. One of the following logic courses:
    - Philos 360:
    - Philos 370:
    - Applied Reasoning
    - Introduction to Symbolic Logic
  - 3/4. Any two philosophy courses not taken above.

NOTE: See course descriptions under the Humanities major.

# physics major

Physics involves the study of the small and very small (atoms, molecules, nuclei and elementary particles), the large and very large (the Earth, Moon, solar system, stars, galaxies, and the universe), the strange (black holes, anti-matter and superconductivity), the common (swings on playgrounds, springs and wheels), the relevant (space systems sensors and the motions of aircraft and satellites), and just about anything else! In other words, the scope of physics is limited only by the imagination of the physicist. Because the scope of physics is so broad, a physicist must be a generalist who can see the underlying connections between diverse topics. As a result, the Physics major concentrates on the basic physical and mathematical principles that help us understand the world. This is also why the Physics major is so flexible; your vision can help you design a Physics sequence that fits your role as an Air Force officer. The Physics curriculum blends traditional academic instruction, practical laboratory work and independent research projects to develop your ability to think creatively and analytically.

The Physics major has a reputation for being challenging, but its rewards are great. It will prepare you for a successful career in the increasingly technical Air Force and reward you with satisfaction coming from mastering a rigorous, demanding discipline. Physics is never obsolete; it forms the foundation upon which new technologies rest. Whether operational or scientific in nature, the technical innovations in today's Air Force have physics as their fundamental element.

## Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy Opt
Econ 201	Beh Sci 310	Astro Engr 410
El Engr 231	Biology 315	English 411
English 211	History 302	Mgt 400
Engr Mech 220	Math 346	MSS 400
Law 220	Math 356	Physics 405 (Seminar)
Math 243	Philos 310	Physics 442/480
Math 245	Physics 341	Physics 465
MSS 200	Physics 355	Physics Conc 1
Physics 215	Physics 356	Physics Conc 2
Physics 264	Physics 361	Physics Conc 3
Pol Sci 211	Physics 362	Soc Sci 412
	Sys Opt Physics 421	

## PHYSICS (Physics)

Offered by the Department of Physics.

**Physics 110. General Physics I.** Introductory calculus-based physics course with emphasis on contemporary applications (first semester). Topics include Newtonian mechanics (statics and dynamics); conservation of energy, momentum, rotational motion, Universal Law of Gravitation and motion in gravitational fields, Kepler's Laws and waves. Possible additional topics include angular momentum, oscillations, special relativity, fluids and thermodynamics. Emphasizes the use of vectors and calculus in problem solving. Course includes in-class laboratories and computer applications to highlight key concepts.

**Physics 215. General Physics II.** Introductory calculus-based physics course with emphasis on contemporary applications (second semester). Topics include electrostatics, simple DC circuits, magnetic fields, electromagnetic induction, electromagnetic waves, and physical optics. Possible additional topics include; simple AC circuits and applications, geometric optics, and selected topics in modern physics. Emphasizes use of vectors and calculus in problem solving. Course includes in-class laboratories and computer applications to highlight key concepts. Highly desirable to be taken in the semester immediately following the successful completion of Physics 110.

**Physics 264. Modern Physics.** Introduction to the special theory of relativity and a historically-based development of quantum theory. Investigation of Bohr model of the atom. Introduction to quantum mechanics and its application to problems involving simple forms of potential energy. Possible application topics include atomic and molecular physics, solid state physics, nuclear reactions and decay, and elementary particles.

**Physics 310. Principles of Nuclear Engineering.** Survey course in aerospace uses of nuclear energy. Course introduces the student to the sources and uses of nuclear energy from radioactive decay, fission, and fusion. It covers such topics as nuclear space propulsion and power; ground-based nuclear power; the production, effects, and detection of nuclear weapons; the protection of man and aerospace assets from nuclear radiation; and the safe disposal of radioactive waste.

**Physics 315. Combat Aviation Physics.** Broad-based study of the principles of physics as they directly apply to the world of combat aviation. Course covers two topical areas: the physics of flight as a dynamic investigation of forces and energy applied to the combat maneuvering required to win air-to-air engagements; and the combat use of the electromagnetic spectrum, primarily as it applies to radar, IR seekers, and countermeasures.

**Physics 341. Laboratory Techniques.** Introductory laboratory course developing skills in experimental techniques and data analysis. Course includes instruction in using various types of electronic instrumentation and devices to analyze and design electrical circuits. Experiments will investigate the laws and principles of modern physics taught in Physics 264.

**Physics 355. Classical Mechanics.** Examination of the underlying classical laws governing the general motion of bodies. The topics covered include vector calculus, Newtonian dynamics, Lagrangian, and Hamiltonian dynamics, the law of gravity and central-force motion, two-particle collisions, and scattering. Possible other topics include linear and coupled oscillations, noninertial reference frames, chaos, transformation properties of orthogonal coordinate systems, and rigid-body motion. Extensive application of calculus, ordinary differential equations, and linear algebra will be made in the solution of problems.

**Physics 356. Computational Physics.** Introduction to solving complex physical problems using numerical techniques. Subjects covered may include: kinematics, damped/driven oscillators, nonlinear dynamics, chaos, coupled oscillators, waves, thermal diffusion, and electromagnetic potentials. Methods presented include regression analysis, numerical differentiation, and solutions to ordinary and partial differential equations.

**Physics 361. Electromagnetic Theory I.** Develops Maxwell's equations and basic principles of electromagnetism. Includes electrostatic fields in both vacuum and in dielectrics, the Laplace, and Poisson equations, magnetic fields associated with constant and time varying currents, and magnetic materials.

**Physics 362. Electromagnetic Theory II.** Application of Maxwell's equations: plane waves, reflection, refraction, guided waves, electric and magnetic dipoles and quadruples, and antennas. The interaction between plane waves and plasmas is treated. Basics of relativistic electrodynamics are introduced.

**Physics 370. Upper Atmospheric and Geo-Space Physics.** Survey course on the composition and physics of the upper atmosphere and near-earth environment. Topics include solar-terrestrial interactions; observations, phenomena, and military operations in the near-earth environment; structure, dynamics and transport in the upper atmosphere; and energy transfer, remote-sensing, and military operations in the upper atmosphere.

**Physics 371. Astronomy.** Calculus-based study of the fundamental concepts of astronomy. Emphasis is placed on understanding the basic physical concepts that explain stellar structure, stellar evolution, galactic structure, the solar system, and the origin of the universe. Includes up to three night classes at the Academy Observatory.

**Physics 391. Introduction to Optics and Lasers.** Survey course in optics. Including geometrical optics (lenses, mirrors, ray tracing, and optical instruments); physical optics (interference, diffraction, polarization, spectra, and scattering); introduction to lasers (laser operation, pumping, resonators, and optical cavities); and contemporary topics (Fourier optics, imaging, and holography).

**Physics 393. Solid State Physics.** Introduction to the physics of the solid state nature of matter. Crystal structure, crystal binding, lattice vibration, free electron theory, and band theory. Basic introduction to quantum theory and quantum statistics of solids. Theories are used to explain metals, semiconductors, and insulators. Survey topics include magnetism, superconductivity, optical phenomena in solids, crystal imperfections, and the physics of solid state devices.

**Physics 405. Physics Seminar.** A problem solving course reviewing major areas of undergraduate physics.

**Physics 421. Thermal and Statistical Physics.** Classical thermodynamics with an emphasis on thermodynamic laws and applications to cycles. Kinetic theory, statistical thermodynamics, and quantum statistics. Applications of statistics to quantum systems.

**Physics 442. Advanced Physics Lab.** Series of selected experiments to develop the student's laboratory skills and reinforce basic physical concepts. Possible topics covered include atomic and molecular physics, gamma ray spectroscopy, laser physics, proton-induced elementary nuclear reactions, x-ray crystallography, optical interferometry and holography, and nonlinear optical processes. The experiments are performed by small groups of students working as teams. Emphasis on the ability to write and brief technical subjects to a technical audience.

**Physics 451. Plasma Physics.** A comprehensive introduction to the plasma state of matter. Topics include single particle motion, adiabatic invariants, fluid description of a plasma, waves in plasmas, kinetic theory, diffusion and resistivity, and stability.

**Physics 465. Quantum Mechanics.** Basic principles of quantum mechanics. Postulates. Dirac notation. Schrodinger's equation. Operators, eigenfunctions, and eigenvalues. Potential barriers and wells. Simple harmonic oscillator. Orbital and spin angular momentum. Addition of total angular momentum. Hydrogen atom. Elementary radiation theory. Time independent perturbation theory. Two-level systems. Stark effect. Fine structure.

**Physics 468. Atomic and Nuclear Physics.** Treatment of the fundamental physical concepts governing all of microscopic physics which includes elementary particle, nuclear, atomic, and molecular physics. The topics covered include the standard model of elementary particles and interactions, symmetries and conservation laws, gauge theories, properties of the nucleus, nuclear models, nuclear interactions, and decays, scattering theory, atomic systems, atomic and molecular spectroscopy techniques.

**Physics 480. Astronomical Techniques.** Introduction to optical astronomy using the Academy's 16" and 24" telescopes during nine scheduled night laboratories. Emphasis on equipment operating principles, scientific method, data reduction, and reporting results. Includes astrophotography, photoelectric photometry, charge coupled devices, and spectroscopy.

**Physics 482. Laser Physics and Modern Optics.** Detailed study of the operation of the laser: types of lasers, lasing media, pumping mechanisms, resonators and cavities, laser modes, and Gaussian properties. Covers modern optics, introductory electro-optics, nonlinear optics, statistical optics, and quantum mechanical analogs of optical systems.

**Physics 486. Astrophysics.** Applications of physics to astrophysical problems and topics of current interest in astrophysics. Typical topics include stellar structure and evolution, supernovae, white dwarfs, neutron stars, black holes, galactic structure, active galaxies, quasars, cosmology, and general relativity. The choice of topics depends on instructor and student preferences.

**Physics 495. Special Topics.** Selected topics in physics.

**Physics 499. Independent Study.** Individual research under the direction of a faculty member.

## political science major

The Political Science major offers a course of studies tailored to the needs of prospective Air Force officers by providing a comprehensive understanding of both the substance and process of politics and public policy. The major is uniquely capable of preparing future Air Force officers to comprehend the political events, both domestic and international, that will shape their careers. It accomplishes this by examining topics such as political theories and ideologies, comparative politics, international relations, American politics, international security, defense decision-making, the politics of foreign governments, organizational behavior, and political economy.

The Political Science major is very flexible. The major allows cadets to study areas in-depth or to examine a variety of political topics. In addition, cadets who wish to earn a Foreign Language minor may take all four required upper-level language courses within the Political Science major. A Philosophy minor can be earned with minimal extra classes, as well. The major offers four areas of concentration: American politics, international politics, comparative politics and area studies, and national security policy. Cadets can also work with their advisors to tailor an academic program to meet their individual needs.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy Opt
Econ 201	Beh Sci 310	Astro Engr 410
English 211	Biology 315	English 411
Engr Mech 220	El Engr 315	Mgt 400
For Lang 3	Math 300	MSS 400
For Lang 4	Philos 310	Pol Sci 491
History 302	Pol Sci 300	Pol Sci Basket 3
Law 220	Pol Sci 301	Pol Sci Opt
MSS 200	Pol Sci 302	Pol Sci Opt
Physics 215	Pol Sci Basket 1	Pol Sci Opt
Pol Sci 211	Pol Sci Basket 2	Pol Sci Opt
Soc Sci 212	Sys Opt	Soc Sci/Hum Opt

### POLITICAL SCIENCE (Pol Sci)

Offered by the Department of Political Science.

**Pol Sci 211. Politics, American Government and National Security.** Introduces students to the study of politics and government and examines the basic ideological, structural, and procedural choices faced by any political system. Special emphasis is given to an understanding of the foundations and traditions of American democracy and the structure, decision processes and policy outcomes, especially defense policy outputs, of the American political system. Students examine current policy issues that affect the military.

**Pol Sci 300. Introduction to Political Science: Overview and Methods.** Provides an introduction to the discipline. Introduces students to the methods used in political science, placing emphasis on the process of research design—from coming up with a hypothesis, to determining how to test that hypothesis, to how to present the conclusions of the research. Research approaches presented in this class are essential to the political science major, and of great benefit to students in other majors that require the systematic examination of research questions.

**Pol Sci 301. Political Theory.** An overview of political thought from the ancient Greeks to the present. Philosophers studied include Plato, Aristotle, Augustine, Aquinas, Machiavelli, Hobbes, Locke, Montesquieu, Rousseau, Marx, and Nietzsche. Examines debates important for airman-scholars and the political science major; human nature, the best regime, justice, equality, freedom, community, natural rights, religion, and comparative and national security politics.

**Pol Sci 302. Politics of National Security.** Explores concepts formulated by great thinkers in response to security challenges, from the wars of Ancient Greece through the Cold War to September 11th, to shape our assessment of the way in which the U.S. employs its power. Applies all the subfields and methods of political science to the study of national security. Prepares students for advanced electives in international relations, American and comparative politics, and complements professionally oriented courses on contemporary security problems in the context of American grand strategy.

**Pol Sci 390. International Relations Theory.** Introduces the basic concepts of international relations. Major theoretical approaches to the analysis of international politics (realism, liberalism, and globalism) are used to explore the nature of the international system and various aspects of state behavior in their historical and contemporary settings. Among the subjects examined within this framework: the formulation of foreign policy, mechanisms of conflict and cooperation, the origins of war, issues of international interdependence, international political economy, and questions of international ethics.

**Pol Sci 392. American Political System and Theory.** Explores the origin and development of American political ideas and institutions. Examines the notion of American exceptionalism and the design and operation of the American system. Topics include: American constitutional design and its consequences; the expression of preferences; the analysis of institutional behavior; and the policy process.

**Pol Sci 394. Comparative Government and Politics.** Introduces major theoretical approaches to the comparative study of politics. Applies these approaches to topics like government institutions, political participation, and social change as they relate to various state and nonstate actors.

**Pol Sci 421. International Security: Political Violence and Terrorism.** Applies theories of international security to the roots and forms of political violence in a globalized era. Examines the sub-national and transnational sources of conflict as well as the impact of globalization on the character of collective violence. Investigates the emergence, motivations and strategies of violent nonstate actors with emphasis on ethno-political groups, militant religious movements, transnational criminal organizations, warlords and insurgencies. Focuses on the use of terrorism to achieve political objectives.

**Pol Sci 423. War Crimes, Genocide, and Human Rights.** Explores historical, legal, and political perspectives on the law of armed conflict and the development of human rights law. The Nuremberg Tribunals, the Holocaust, the Cambodian and Rwandan genocides, the My Lai incident, and experiences of prisoners of war are used as case studies within this framework. Resistance movements are also examined. Course is team taught by members of the Political Science, Law, and History departments, and can be used as a social science elective or an elective in any of these three departments.

**Pol Sci 444. International Political Economy.** Explores the theory and practice of how economic motives affect political decisions and how most political decisions have economic repercussions, both domestically and internationally. Specific topics include the development of the international monetary system, international trade policy, the effects of multinational corporations, foreign direct investment, development of the Global South, and contemporary issues such as the recent Asian financial crisis.

**Pol Sci 445. International Organizations and Global Issues.** Examines the role and interrelationships of international organizations, nation states, and nonstate actors in the global system. North-South and East-West relations are discussed in terms of pertinent global issues: crisis management, conflict resolution, human rights, refugee problems, international finance, world trade, and economic aid programs.

**Pol Sci 451. American Political Thought.** Surveys basic themes in American political thought beginning with the seventeenth century European origins of American political thought and extending to modern attempts to strike a balance between individual rights and social needs. Focuses on the difficulties of translating principles into practice.

**Pol Sci 460. Comparative Security Policy and Civil-Military Relations.** Studies the security policies and policy-making processes of various world regions as well as the national and regional implications of both traditional and nontraditional security issues. Examines the relationship between civilian authorities and the military establishment and the implications for governance. Specific cases help develop individual skills in analyzing national security priorities in the post-Cold War world.

**Pol Sci 462. Politics and Intelligence.** Explores the character of secrecy in the American democratic system. Investigates the role of intelligence in the development and implementation of U.S. national security policy. Focuses on the key players in the intelligence community, the capabilities of intelligence systems, the tradecraft of spying, and the core intelligence functions of collection, analysis, covert action and counterintelligence. Includes examination of the roles and contributions of military intelligence and current issues in the intelligence field.

**Pol Sci 464. Democratization: The Theory and Practice of State Building.** The movement worldwide from authoritarianism to democracy has been the major political event of our generation. This trend to democratic governance is coupled with the U.S. military's increasing role in establishing and fostering not only the institutions of state, but the environment that ensures liberal governance. Course explores democratization, the means and methods that the 70 plus countries since the mid-1970s have employed in their movement toward a democratic regime.

**Pol Sci 465. U.S. National Space Policy and Law.** Examines the evolution, major influences on, and consequences of U.S. national space policy and space law. Focuses on the relationships among politics, policy-making processes, law and technology as they relate to the civil, military, commercial, and intelligence space sectors. Addresses the rights and responsibilities of states in the use of outer space. Topics include NASA space strategies; military space missions; commercial space trends; intelligence function; international agreements; sovereignty over air, space and celestial bodies; and government liability.

**Pol Sci 469. Politics of Russia and Newly Independent States.** Examines historic, cultural, economic, social and geographic traits that distinguish Russia and its neighbors and shape their domestic political processes and interstate relations. Critically compares the politics, governments, and orientations of post-Soviet states. Surveys contemporary regional issues such as ethnic conflict, nationalism and politico-economic reforms, with a particular emphasis on security concerns.

**Pol Sci 471. Politics of Europe.** Examines historic, cultural, economic, social and geographic traits that distinguish this region and shape its domestic political processes and interstate relations. Critically compares the politics, governments and orientations of European states and important regional powers. Surveys contemporary issues such as democratization, arms control and regional integration, with a particular emphasis on security concerns.

**Pol Sci 473. Politics of Asia.** Examines historic, cultural, economic, social, and geographic traits that distinguish this region and shape its domestic political processes and interstate relations. Surveys the governments of selected countries. Examines in particular the influence of Japan and China on regional and global affairs. Includes a survey of contemporary multilateral issues salient in the region, with particular focus on regional security concerns.

**Pol Sci 475. Politics of Latin America.** Examines historic, cultural, economic, social, and geographic traits that distinguish this region and shape its domestic political processes and interstate relations. Selected Latin American political systems are explored in detail. Issues such as political stability, civil-military relations, and democratization are treated as well, along with politico-economic concerns such as developmental strategies, debt relief, and trade relations. Includes a survey of contemporary multilateral issues salient in the region, with particular focus on regional security concerns.

**Pol Sci 477. Politics of the Middle East.** Examines historic, cultural, economic, social, religious, and geographic traits that distinguish the region extending from North Africa through Central Asia and shape its domestic political processes and interstate relations. Surveys the governments of selected countries, considering factors such as legitimacy and political development. Includes a survey of contemporary multilateral issues with particular focus on regional security concerns.

**Pol Sci 479. Politics of Sub-Saharan Africa.** Examines historic, cultural, economic, social, religious, and geographic traits that distinguish the states of sub-Saharan Africa and their domestic political processes and interstate relations. Critically compares the politics, governments, and orientations of selected African states. Surveys contemporary regional issues with a particular emphasis on security concerns.

**Pol Sci 481. American Elections and Political Parties.** Examines the nature of the electoral process and the roles that candidates, political parties, public opinion, and interest groups play in the process. Focuses on the role of candidates' election organizations, political parties, professional campaign managers, public opinion pollsters, professional fundraisers, and media consultants in congressional and presidential campaigns. Special attention is given to the current presidential or congressional elections.

**Pol Sci 482. The U.S. Supreme Court.** The Supreme Court is extremely influential in American politics, sometimes even acting as a policy-making body, deciding the fate of such contentious matters as abortion, capital punishment, public expressions of religious belief, and even a presidential election. Examines the Court's rulings in these areas and many others, focusing on the written opinions, the thoughts of those who designed our government, and competing views about the Court's proper role in our system of separated powers.

**Pol Sci 483. The U.S. Congress.** Studies Congress as a political institution, with an emphasis on the unique natures of the House and the Senate, congressional norms and procedures, and the roles of committees and political parties. Topics include elections, member-constituent relations, national policy roles, leadership, the committee system, legislative procedures, legislative oversight of the executive branch, and the effects of public opinion and interest groups on law making.

**Pol Sci 484. The American Presidency.** Provides an in-depth study of the Presidency with emphasis on the post-World War II period. Examines the presidential selection process and the office and powers of the President, as well as presidential administrative structures, styles, roles and personalities.

**Pol Sci 485. Decision Making in Public Policy.** Examines the formulation and implementation of American public policy. Uses various theories and analytical models, including the bureaucratic politics, process, and group. Rational, incremental, and public choice models, describe and explain the causes and consequences of several key domestic public policy areas. Depending on contemporary significance, these may include civil rights, economic policy, education, environment, health and welfare, science and technology, and national defense.

**Pol Sci 491. Capstone Seminar in Political Science.** Course is the culmination of the political science curriculum. Focuses on practical political and military issues. These include how soldiers have reacted in battle from ancient time to the present; how hierarchical authoritarian organizations operate, their strengths and weaknesses and what strategies tend to be successful for achieving positive outcomes; the relationship between capabilities and national strategies; and how personality, bureaucratic politics, perceptions, and experience shape policy.

**Pol Sci 495. Special Topics in Political Science.** Selected topics in political science, taught in seminar format.

**Pol Sci 496. Causes of War and Conflict Resolution.** Examines the causes, conduct, and consequences of international conflict, interventions, crises, and wars and the theory and practice of conflict resolution. Course uses wars from around the world, drawn from different historical periods, focusing on both theoretical and normative issues. Special attention is paid to wars involving the U. S. , including ongoing interventions

**Pol Sci 498. Political Science Thesis.** Students enrolled in this course prepare a 50-75 page senior thesis under the guidance of the course director and other faculty members with particular expertise on the topic of research. It combines the tutorial aspect of an independent study (Pol Sci 499) with seminar on applied research methods. Students meet individually or in seminar in accordance with a schedule determined by the course director. Formulation of thesis and research normally begins in Pol Sci 300 and other political science courses. When the thesis is completed, a formal defense is presented to a faculty committee in April or May. In preparation for the formal defense, each thesis is presented to fellow students in the seminar for critique and evaluation.

**Pol Sci 499. Independent Study in Political Science.** Individual study or research of a carefully selected topic conducted on a tutorial basis.

## social sciences major

Social sciences deal with human behavior in its social and cultural aspects. At the Air Force Academy, the following disciplines are within the social sciences: Economics, Geospatial Science, Management, Law, Political Science, and Behavioral Sciences. Additionally, courses offered by Military Strategic Studies can also be used to fulfill some of the major's requirements.

The major in social sciences is designed for the student whose interests and abilities lie in a broader program of study than a single disciplinary major would provide. The Social Sciences major requires completion of at least one course in Economics, Management, Law, Political Science, and Behavioral Sciences. More concentrated study in one discipline is possible through social science divisional options (any course(s) from the social science disciplines in addition to Military Strategic Studies). Flexibility in course selection is one advantage of this major. A specialized degree in a particular discipline would be an option after graduation.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Breadth Opt 1	Aero Engr 315	Academic Div Opt
Chem 200	Beh Sci 310	Academy Opt
Econ 201	Biology 315	Astro Engr 410
English 211	Breadth Opt 2	Depth Opt 2
Engr Mech 220	Breadth Opt 3	Depth Opt 3
For Lang 3	Breadth Opt 4	Depth Opt 4
For Lang 4	Breadth Opt 5	English 411
Law 220	Depth Opt 1	Mgt 400
MSS 200	El Engr 315	MSS 400
Physics 215	History 302	Soc Sci 412
Pol Sci 211	Math 300	
Sys Opt	Philos 310	

### **SOCIAL SCIENCES** (Soc Sci)

Offered by the various departments within the Social Sciences Division.

**Soc Sci 212. Geopolitics.** Integrated interdisciplinary course provides the primary experience to facilitate senior student understanding of the global environment into which they will deploy. The global environment includes international relations, comparative politics, global gender roles, culture, and physical process, and examines how these factors influence global and national politics. Students will describe, interpret, and evaluate global political relations and formulate strategies for interacting in Western and non-Western cultures. This course is a core substitute for Soc Sci 412 for students requiring this material early in their major.

**Soc Sci 400. Social Sciences Seminar.** Interdisciplinary interactive seminar focused on relevant social sciences topics.

**Soc Sci 412. Geopolitics.** Integrated interdisciplinary course provides the primary experience to facilitate senior student understanding of the global environment into which they will deploy. The global environment includes international relations, comparative politics, global gender roles, culture, and physical process, and examines how these factors influence global and national politics. Students will describe, interpret, and evaluate global political relations and formulate strategies for interacting in Western and non-Western cultures.

**Soc Sci 420. Law and Economics.** Interdisciplinary course examining various legal issues from an economics perspective. Employs basic economic principles to understand the nature of legal rules, their effect on society and to suggest how these rules might be reformed. Framework is applied to tort, criminal, contract and property law.

**Soc Sci 483. Principles of Negotiation and the Mediation Process.** Studies the process of negotiation in a variety of conflict situations, from negotiating with family members to international, multi-party disputes. Focuses on an "interest-based" approach to negotiations to achieve effective, efficient and amicable agreements. Students study a model approach and experiment with that approach in a number of simulated negotiations. Students also learn the Air Force mediation process and practice using it.

**Soc Sci 495S. Statesmanship.** Capstone seminar course for the Academy Scholars Program focused on statesmanship.

## space operations major

The Space Operations major is an interdisciplinary program with primary emphasis on preparing cadets for a career in space operations. The major is designed to develop Air Force officers with a technical background in space and an understanding of contemporary problems and issues peculiar to space. Course work in science, geospatial science, mathematics, and astronautics provides the technical background required for this field. Coupled with courses in space history, law, policy and military doctrine, this program provides the breadth of education required for this growing field. The Space Operations major provides the student with excellent preparation for entering a graduate program in space operations or space systems.

Space operations are the backbone of Air Force Space Command and are vital to our nation's war fighting capabilities. This program gives you the chance to directly apply what you learn in your major to an Air Force career. The Space Operations major will give you a solid framework for your future Air Force career whether it is in space or as a pilot. In addition, this major serves as an excellent foundation for graduate studies in such fields as space operations, space systems management, space technology, communications, computer systems, remote sensing, operations research, and business administration.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Astro Engr 210	Aero Engr 315	Academy Opt
Chem. 200	Astro Engr 331	Astro Engr 437/453
Econ 201	Beh Sci 310	English 411
El Engr 315	Biology 315	History 376 or Geo 382
English 211	Geo 382 or History 376	MSS 400
Engr Mech 220	History 302	MSS 485
Law 220	Math 356	Philos 310
MSS 200	MSS 282	Pol Sci 465
Ops Rsch 310	Pol Sci 211	Soc Sci 412
Physics 215	Space Ops 360	Space Ops 461
Physics 370	Sys Engr 301	Space Ops 462
Space Ops Spec 1	Sys Opt Geo 310	Space Ops Spec 2

### SPACE OPERATIONS (Space Ops)

Offered by the Department of Astronautics.

**Space Ops 360. Space Mission Operations Fundamentals.** Introduces the principles, problems, and history of space operations. Examines elements of space operations including operations management, planning, architecture, and execution. Explores ground station hardware, software, and communication principles. Concludes with ground station qualification training and certification. Certification prepares the student at the entry level to support active satellites like FalconSAT missions, which are student-built satellites produced through the Astro 436/437 course sequence.

**Space Ops 461. Space Mission Operations I.** A second course in space operations. Advanced topics in space operations are discussed, such as satellite pass prediction, planning, and execution. Students interface with engineers and program managers in Small Spacecraft Engineering I (Astro Engr 436) to develop mission operations concepts and plans for current and future FalconSAT missions. Students maintain and operate ground equipment in support of on-going satellite operations. At the conclusion of this course, the student will be fully qualified to train future students in any of the three positions—Ground Station Operator, Satellite Operator, or Crew Commander.

**Space Ops 462. Space Missions Operations II.** A third course in space operations. Advanced topics in space operations are discussed, such as ground station design and placement, ground support equipment design, and satellite communication subsystem design. Students interface with engineers and program managers in Small Spacecraft Engineering II (Astro Engr 437) and with operators at Schriever AFB, Colorado, to fully develop their understanding of mission operations concepts and plans for current and future FalconSAT missions. Students serve as trainers and mentors for other students enrolled in Space Ops 360. Students also execute mission support for any active FalconSAT mission.

## systems engineering major

Systems Engineering, an interdisciplinary major administered by the Department of Aeronautical Engineering and supported by the Departments of Aeronautical, and Astronautical Engineering, Behavioral Sciences, Computer Science, Electrical and Computer Engineering, and Engineering Mechanics with participation by the Department of Management, is a broad discipline addressing the engineering of large, complex systems and integration of the many subsystems that comprise the larger system. All of these various components must function together effectively and efficiently to carry out the mission. Systems engineers are “big picture” engineers who design, integrate, and ensure smooth functioning of complex systems typical in today’s high-tech Air Force. They keep their eye on the design of the overall system ensuring it will meet the needs of all the system’s stakeholders including operators, maintainers and commanders, and even our ultimate customer – the American public!

Systems engineers consider elements of system development, verification, manufacturing, deployment, training, operations, support, and disposal. The entire life cycle of the system is considered in a holistic fashion early in the development cycle. Systems engineers accomplish this difficult job, by having broad interdisciplinary knowledge across many areas of study.

The Academy’s system engineering program emphasizes a systems-of-systems approach integrating a rigorous engineering curriculum augmented with studies in human systems, operations research analysis, program management, and the core curriculum. Students learn that this process is an interdisciplinary one which evolves, verifies, and documents an integrated, life-cycle-balanced set of solutions that satisfy customer needs. Students specialize in one of nine defined option areas such as: Aeronautical, Communications, Computer, Control, Electronic Design, Human, Information, Mechanical, and Space systems.

Students successfully completing the Systems Engineering major are awarded a Bachelor of Science in Systems Engineering degree.

The goal of the Systems Engineering program is to prepare cadets to become leaders of character who:

- Possess breadth of integrated, fundamental knowledge in the basic sciences, engineering, the humanities, and social sciences; and depth of knowledge in the selected option sequence.
- Can communicate effectively.
- Can work effectively with others.
- Are independent thinkers and learners.
- Can apply their knowledge and skills to solve Air Force engineering problems, both well- and ill-defined.
- Know and practice their ethical and professional responsibilities as embodied in the Air Force Core Values.

Upon completion of the Systems Engineering program each graduate shall demonstrate satisfactory:

- Application of the fundamental concepts of mathematics, science, and engineering to solve systems engineering problems,
- Ability to design and conduct experiments and tests, as well as to collect, analyze, and interpret data,
- Ability to apply modern systems engineering techniques, skills, and tools to solve systems engineering problems,
- Ability to write and speak effectively,
- Understanding of professional and ethical responsibilities of military officers and systems engineers,
- 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, while balancing cost, schedule, performance, and risk factors,
- Depth of knowledge and skills in systems engineering and a breadth of knowledge and skills in other disciplines to effectively identify, formulate, and solve complex systems engineering problems encountered in the military,
- Appreciation for and the skills required to engage in independent, life-long learning,
- Ability to function effectively on multi-disciplinary teams as a systems engineer,
- Knowledge of contemporary issues and the role of military officers in our global society, and
- Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, military, and societal context.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Acad Opt Comp Sci 211	Aero Engr 315	Astro Engr 410
Chem 200	Beh Sci 310	Beh Sci 373
Econ 201	Biology 315	English 411
English 211	El Engr 231	MSS 400
Engr Mech 220	History 302	Philos 310
Law 220	Math 356	Soc Sci 412
Math 243	Ops Rsch 321	Sys Engr Capstone I
Math 245	Sys Engr 290	Sys Engr Capstone II
MSS 200	Sys Engr 301	Sys Engr Concentration 4
Physics 215	Sys Engr Concentration 2	Sys Engr Concentration 5
Pol Sci 211	Sys Engr Concentration 3	Sys Engr Concentration 6
Sys Engr Concentration 1	Sys Opt Ops Rsch 310	Sys Engr Concentration 7

### SYSTEMS ENGINEERING (Sys Engr)

Administered by the Departments of Aeronautical Engineering, Astronautical Engineering, Behavioral Sciences, Computer Sciences, Electrical Engineering, and Engineering Mechanics, with participation by the Department of Management.

**Sys Engr 290. Systems Engineering I.** Introduction to the systems engineering process and the development lifecycle as a foundation for solving complex problems to fulfill end user needs. Topics include customer needs, technical requirements analysis, functional analysis, creative design synthesis, and selection across all eight primary system functions (development, manufacturing/production, verification, deployment, training, operations, support, and disposal). Planning, organizing, leading, and controlling a project throughout the phased program development lifecycle is also addressed. Other topics include engineering ethics and economics, technical communications, and Computer Aided Design (CAD). Students apply the systems engineering processes through the development, manufacture, and verification of several system prototypes.

**Sys Engr 301. Project Management.** Introductory project management course. Topics covered include financial project selection models, risk management, project life cycle management, negotiation and meeting management, scheduling, planning, budgeting, and project control. Many of these skills are enhanced through the use of MicroSoft Project software.

**Sys Engr 405. Systems Engineering Seminar I.** Seminar course to help integrate Sys Engr and Sys Engr Mgt (SE/SEM) majors into the capstone design sequence and share knowledge across various capstone design projects. Seminar also helps transition SE/SEM majors from undergraduate education to duties as Air Force officers and systems engineering professional. Topics include current Sys SE/SEM literature and tools used to manage large complex systems and integrate the many subsystems comprising the larger systems, engineering ethics and typical engineering/management problems which students may encounter during their capstone design experience and after graduation. Invited speakers offer their view of what it takes to be successful in the Air Force.

**Sys Engr 406. Systems Engineering Seminar II.** Seminar designed to help integrate Sys Engr and Sys Engr Mgt (SE/SEM) majors into the capstone design course sequence and share knowledge across various capstone design projects. Seminar also helps transition SE/SEM majors from undergraduate education to duties as Air Force officers and systems engineering professionals. Topics include current SE/SEM literature and tools to manage large complex systems and integrate the many subsystems comprising the larger systems, engineering ethics, and typical engineering/management problems which students may encounter during capstone and after graduation. Invited speakers offer their view of what it takes to be successful in the Air Force.

**Sys Engr 460. Unmanned Aerial Vehicle (UAV) Systems.** Introduction to unmanned aerial vehicle (UAV) systems and systems engineering processes used to build them. Topics include air vehicles and capabilities, ground control stations, payloads, personnel training and support systems. Students work on interdisciplinary teams to build, fly, and test one or more UAV systems.

**Sys Engr 472. Cognitive Systems Engineering.** Survey of systems processes applied to the cognitive engineering of complex sociotechnical systems. Examines methodologies for the acquisition and translation of expert user knowledge into designs of decision aiding automated systems and for the derivation of system information requirements/human decision-making requirements. Focuses on design of system solutions and functional system interfaces that meet users'/operators' needs and capabilities in the cognitive and decision making domains. Particular consideration is given to military applications in the Command, Control, Communications, Computer, Intelligence Surveillance and Reconnaissance (C4ISR) scenario.

**Sys Engr 491. Systems Engineering Capstone Design I.** Capstone design experience for Sys Engr and Sys Engr Mgt (SE/SEM) majors. Emphasizes execution of the systems engineering process over the entire development lifecycle of a complex system. Generally, students will fulfill the SE/SEM roles on existing capstone design projects in various departments. Students apply the systems engineering tools acquired in their previous SE/SEM coursework.

**Sys Engr 492. Systems Engineering Capstone Design II.** Continuation of Sys Engr 491.

**Sys Engr 495. Special Topics in Systems Engineering.** Selected topics in systems engineering.

## systems engineering management major

Systems Engineering Management, an interdisciplinary major, administered by the Department of Management with participation by the Departments of Aeronautical and Astronautical Engineering, Behavioral Sciences and Leadership, Civil Engineering, Computer Science, Electrical and Computer Engineering, and Engineering Mechanics, is a broad discipline addressing the engineering management of large, complex systems and integration of the many subsystems comprising the larger system. All these components must function together effectively and efficiently to carry out the mission. System engineering managers are “big picture” engineers who design, integrate, and ensure smooth functioning of complex systems typical in today’s high-tech Air Force. They keep their eyes on the design of the overall system ensuring meets the needs of all the system’s stakeholders, including operators, maintainers, commanders, and even our ultimate customer – the American public!

System engineering managers consider elements of system development, verification, manufacturing, deployment, training, operations, support, and disposal. The entire life cycle of the system is considered in a holistic fashion early in the development cycle. Systems engineers managers accomplish this difficult job, by having broad interdisciplinary knowledge across many areas of study.

The Academy’s system engineering management program emphasizes a systems-of-systems approach integrating a rigorous engineering and management curriculum augmented with studies in human systems, operations research analysis, program management, and the core curriculum. Students learn that this process is an interdisciplinary one which evolves, verifies, and documents an integrated, life-cycle-balanced set of system solutions that satisfy customer needs.

Cadets successfully completing the Systems Engineering Management major are awarded a Bachelor of Science in Systems Engineering Management degree.

The goal of the Systems Engineering Management program is to prepare students to become leaders of character who:

- Possess breadth of integrated, fundamental knowledge in the basic sciences, engineering, humanities, and social sciences; and depth of knowledge in systems engineering management.
- Can communicate effectively.
- Can work effectively with others.
- Are independent thinkers and learners.
- Can apply their knowledge and skills to solve Air Force engineering and management problems, both well- and ill-defined.
- Know and practice their ethical and professional responsibilities as embodied in the Air Force core values.

Upon completion of the Systems Engineering Management program each graduate shall demonstrate satisfactory:

- Application of the fundamental concepts of systems engineering to solve systems engineering problems.
- Breadth of knowledge and analysis skills in systems engineering, engineering design, test, human systems, information systems, operations research, management, and other related disciplines; depth of knowledge in management.
- Synthesis and integration of the above knowledge to effectively identify and solve the types of complex, multidisciplinary problems encountered as Air Force systems engineering managers.
- Balancing cost, schedule, performance, and risk factors in decision making.
- Laboratory techniques including procedures, recording, and analysis.
- Design, fabrication, and testing techniques.
- Written and oral communication skills.
- Knowledge of ethical and professional responsibilities.
- Knowledge of the benefits and the skills needed to engage in life-long learning.
- Ability to be effective multidisciplinary team members.
- Skills to be an independent learner while knowing when to seek assistance.
- Knowledge of the role of Air Force engineering and management officers in our global society.
- Knowledge of contemporary social, political, military, and engineering issues.

### Suggested Course Sequence

3rd-Class Year	2nd-Class Year	1st-Class Year
Chem 200	Aero Engr 315	Academy Opt
Econ 201	Beh Sci 310	Astro Engr 410
El Engr 315/231	Biology 315	Beh Sci 373
English 211	Depth Opt	English 411
Engr Mech 220	History 302	Mgt 400
Law 220	Math 356	Mgt 437
Math/Comp Sci Opt	Mgt 303	Mgt 477
MSS 200	Mgt 342	MSS 400
Physics 215	Mgt 345	Philos 310
Pol Sci 211	Sys Engr 301	Soc Sci 412
Sys Engr 290	Sys Engr Mgt Opt 1	Sys Engr 491
Sys Opt Ops Rsch 310	Sys Engr Mgt Opt 2	Sys Engr 492

### SYSTEMS ENGINEERING MANAGEMENT (Sys Engr Mgt)

Administered by the Department of Management with participation by the Departments of Aeronautical Engineering, Astronautical Engineering, Behavioral Sciences, Computer Sciences, Electrical Engineering, and Engineering Mechanics.

**Sys Engr Mgt 495. Special Topics in Systems Engineering Management.** Selected topics in systems engineering management. All other applicable systems engineering management course descriptions may be found under the Systems Engineering Major course descriptions.

faculty



## dean of the faculty

### **Dean of the Faculty**

Brig Gen Dana Born—PhD, Pennsylvania State Univ.

### **Vice Dean of the Faculty**

Col John Andrew—PhD, Harvard Univ.

### **Assistant Dean for Curriculum Planning**

Dr. Evelyn T. Patterson—PhD, Univ. of Delaware

### **Commander's Action Group for the Dean**

Lt Col Peter P. Ohotnicky—MS, Univ. of Illinois

### **Executive Officer to the Dean**

Capt Douglas W. Leonard—MA, Florida State Univ.

### **Faculty Director of Staff**

Col Scott C. Blum—MS, Univ. of Texas

### **Director of Education**

Dr. Rolf C. Enger—PhD, Univ. of Minnesota

### **Director, USAF Institute for National Security Studies**

Dr. James M. Smith—PhD, Univ. of Alabama

### **Associate Dean for Student Academic Affairs & Academy Registrar**

Dr. Dean H. Wilson—PhD, US International Univ.

### **Academy (Mcdermott) Library Director**

Dr. Edward A. Scott—PhD, Univ. of South Carolina

## aeronautics

### **Department Head**

Dr. Aaron R. Byerley—DPhil, Oxford Univ.

### **Philip J. Erdle Chair in Engineering Sciences**

Dr. Gary Yale—PhD, Naval Postgraduate School

## astronautics

### **Acting Department Head**

Lt Col Lynnane E. George—PhD, Georgia  
Institute of Technology

### **General Bernard A. Schriever Chair in Astronautics**

Mr. William Saylor—MS, Mass. Institute of Technology

## biology

### **Department Head**

Col John L. Putnam—PhD, Univ. of Maryland

## behavioral sciences

### **Department Head**

Col Gary A. Packard, Jr.—PhD, Univ. of N. Carolina, Chapel Hill

## chemistry

### **Department Head**

Col Michael E. Van Valkenburg—PhD, Univ. of Florida

### **The Holland H. Coors Chair**

Dr. Rick A. Deans—PhD, Univ. of Houston

## civil & environmental engineering

### **Department Head**

Col Gregory E. Seely—PhD, Univ. of California, Berkeley

## computer science

### **Department Head, Basic Sciences Division Chair**

Col David S. Gibson—PhD, Ohio State Univ.

### **Coleman-Richardson Chair**

Dr. Richard F. Sincovec—PhD, Iowa State Univ.

## economics & geosciences

### **Department Head**

Col Richard L. Fullerton—PhD, Univ. of Texas, Austin

### **Maj Gen William A. Anders Chair for the Defense Industrial Base**

Mr. Wayne Sidebottom—MA, Webster Univ.

## electrical & computer engineering

### **Department Head, Engineering Division Chair**

Col Jeffrey Butler—PhD, Air Force Institute of Technology

## engineering mechanics

### **Department Head**

Col Thomas L. Yoder—PhD, Univ. of Colorado, Boulder

## english & fine arts

### **Department Head**

Col Kathleen Harrington—PhD, Univ. of Washington

## foreign languages

### **Department Head, Humanities Division Chair**

Col Daniel Uribe—PhD, Arizona State Univ.

### **Allied Liaison Officers**

Lt Col Ruben Fedinich—Argentine Air Force

Lt Col Roland Runge—German Air Force

Maj Miguel Duran—Spanish Air Force

Maj Victor Lozano—Mexican Air Force

## history

### **Department Head, Humanities Division Chair**

Col Mark K. Wells—PhD, King's College, London

## law

### **Department Head, Social Sciences Division Chair**

Col Paul E. Pirog—JD, Univ. of Michigan Law School

## management

### **Department Head**

Col Andrew P. Armacost—PhD, Massachusetts Institute of Technology

## mathematical sciences

### **Department Head**

Dr. Bradley A. Warner—PhD, Univ. of Colorado

## military strategic studies

### **Department Head**

Col Thomas A. Drohan—PhD, Princeton Univ.

## philosophy

### **Interim Department Head**

Dr. J. Carl Ficarrotta—PhD, Univ. of N. Carolina, Chapel Hill

### **Lyon's Chair—Visiting Professor**

Dr. Jesse Carter—MA, Univ. of Southern California

## physics

### **Department Head**

Col Rex Kiziah—PhD, Univ. of Texas

## political science

### **Department Head, Social Sciences Division Chair**

Col Cheryl A. Kearney—PhD, Georgetown Univ.

### **Distinguished Chair, Center for Space & Defense Studies**

The Honorable Mr. Peter Teets—MS, Mass. Institute of Technology

### **Wesley W. Posvar Chair & Director, Center for Space and Defense**

Ambassador Roger Harrison—PhD, Claremont Univ.

### **Ardi Professor of National Security**

General, USAF (Ret) James P. McCarthy—MA, George Washington Univ.

## commandant of cadets

### **Commandant of Cadets**

Brig Gen Susan Y. Desjardins—MA, Louisiana Technical Univ.

### **Vice Commandant of Cadets**

Col Richard K Williams—MS, Troy State Univ.

### **Vice Commandant of Cadets, Culture and Climate**

Col Gail B. Colvin—MBA, Renesselear Polytechnic Institute

## center for character development

### **Director**

Col John B. Norton, Jr.—MA, National Defense Univ.

## athletics

### **Director of Athletics**

Dr. Hans J. Mueh—PhD, Univ. of Wisconsin

### **Vice Athletic Director**

Mr. Bradley J. DeAustin—JD, Univ. of Missouri

### **Executive Officer, Department of Athletics**

Capt Alison Anders—MBA, Wright State Univ.

## physical education

### **Department Head**

Col William P. Walker—EdD, Univ. of Northern Colorado

## men's intercollegiate athletics

### **Football Head Coach**

Mr. Troy Calhoun—MBA, Oklahoma City Univ.

### **Basketball Head Coach**

Mr. Jeff Reynolds—MS, James Madison Univ.

### **Ice Hockey Head Coach**

Mr. Frank Serratore—MS, North Dakota

### **Baseball Head Coach**

Mr. Mike Hutcheon—MS, Wayne State

### **Boxing Head Coach**

Mr. Eddie Weichers—MS Univ. of Denver

### **Cheerleading Coach**

Ms. Laura Hutcheon—BS, Mississippi State Univ.

### **Cross Country Head Coach**

Mr. John Hayes—BS, Univ. of Georgia

### **Fencing Head Coach**

Dr. Abdelmonem H. Salem—MD, Univ. of Alexandria

**Golf Head Coach**

Mr. George Koury—MBA, St. Mary's Univ.

**Gymnastics Head Coach**

Mr. Kip Simons—BS, Ohio State Univ.

**Indoor and Outdoor Track and Field Head Coach**

Mr. Ralph Lindeman—MS, Arizona State Univ.

**Lacrosse Head Coach**

Mr. Fred Acee—MA, Adelphi Univ.

**Rifle Head Coach**

Ms. Launi Meili—MS, Univ. of Idaho

**Soccer Head Coach**

Mr. Douglas Hill—MA, Univ. of Southern Colorado

**Swimming Head Coach**

Mr. Robert Clayton—BS, Univ. of Wyoming

**Tennis Head Coach**

Mr. Richard F. Gugat—MA, Univ. of Denver

**Water Polo Head Coach**

Mr. Jeff Ehrlich—BS, California State Univ., Long Beach

**Wrestling Head Coach**

Mr. Joel Sharratt—MEd, Minnesota Univ.

**women's intercollegiate athletics****Basketball Head Coach**

Ms. Ardie McNelly—MA, Weber State Univ.

**Cheerleading Coach**

Ms. Laura Hutcheon—MS, Mississippi State Univ.

**Cross Country Head Coach**

Mr. John Hayes—BS, Univ. of Georgia

**Fencing Head Coach**

Dr. Abdelmonem H. Salem—MD, Univ. of Alexandria

**Women's Gymnastics Head Coach**

Mr. Doug Day—MS, Springfield Coll.

**Indoor and Outdoor Track and Field Head Coach**

Mr. Ralph Lindeman—MS, Arizona State Univ.

**Soccer Head Coach**

Mr. Marty Buckley—MA, St. Mary's Coll.

**Swimming Head Coach**

Mr. Casey Converse—MA, Univ. of Northern Colorado

**Diving Head Coach**

Mr. Stan Curnow—MA, Brigham Young Univ.

**Tennis Head Coach**

Ms. Kim Gidley—MS, Univ. of West Virginia

**Volleyball Head Coach**

Ms. Penny Lucas-White—BS, Univ. of Memphis

**306th flying training group  
(air education and training command)****Commander**

Col Patrick O. Moylan—MAS, Air War Coll.

**Deputy Commander**

Lt Col Gregory C. Johnson—MS, Embry-Riddle Aeronautical Univ.

**306th operations support squadron****Commander**

Lt Col Edward A. Lombard—MBA, Naval Post Grad School

**94th flying training squadron****Commander**

Lt Col Lawrence E. Pravecsek—MBA, Naval Post Grad School

**98th flying training squadron****Commander**

Lt Col Aldru T. Aaron—MAS, Embry-Riddle Aeronautical Univ.

**557th flying training squadron****Commander**

Lt Col Paul Szostak—MS, Univ. of California

**1st flying training squadron****Commander**

Lt Col Alan Thiemann—MAS, Embry-Riddle Aeronautical Univ.

**70th flying training squadron****Commander**

Lt Col Scott A. Sauter—MAS, Embry-Riddle Aeronautical Univ.

physical education & fitness



## physical education and fitness testing program

As an integral part of the core curriculum, every cadet is required to take a total of ten physical-education courses. The physical-education department requires that each cadet take the six core courses, two core electives and two open electives. The course offerings are divided between six disciplines (see physical education-curriculum chart).

It is important to note that the core classes, such as water survival, are not chosen in an arbitrary way or as a rite of passage. Rather, all of the required core courses were specifically chosen for their value to officer development and their usefulness to a military career.

To fulfill the Physical Education (PE) requirements, every cadet takes a minimum of 1.0 semester hours of PE courses in each of his or her four academic years. Additionally, participation in intramurals, limited on-season mission clubs or intercollegiate athletics is required in each of the eight academic semesters. You are also required to complete successfully both the Aerobic Fitness Test (AFT) and the Physical Fitness Test (PFT) each semester of your cadet career. Athletic proficiency for graduation is demonstrated by meeting the minimum standard of a 2.00 cumulative physical-education average (PEA). PEA is a weighted 4.0 grading scale (50% PFT + 35% PE courses +15% AFT).

### dr. hans j. mueh

#### Director of Academy Athletics



Dr. Hans J. Mueh (USAF Ret) graduated from the United States Air Force Academy with the Class of 1966 where he earned a bachelor's degree in chemistry. From the University of Wisconsin in Madison Dr. Mueh earned a master's and a doctoral degree in chemistry as a distinguished graduate. While on active duty, Dr. Mueh served as an intelligence analyst in Virginia, a special assistant on technical matters in the Pentagon, and an intelligence officer in both Vietnam and Thailand. He was also an associate professor, tenure professor, Permanent Professor and Head of the Department of Chemistry and Vice Dean of the Faculty at the Air Force Academy. Dr. Mueh became the ninth Director of Academy Athletics in August 2004.

*“Athletic competition tests an individual's ability to operate under stress, against adversity, and as a selfless member of a team. The stresses encountered in highly competitive athletic contests are very similar to those encountered in combat. It is critically important to ensure that the leaders of tomorrow are prepared for diverse and challenging situations. The Directorate of Athletics staff is committed to producing the best officers possible for tomorrow's Air Force. Every cadet is challenged physically and mentally to develop the skills and abilities critical to being an aggressive team player with the will to win.”*

“Never give in. Never, never, never, never! Never yield in any way great or small, except to convictions of honor and good sense. Never yield to force and the apparently overwhelming might of the enemy.”  
—Sir Winston Churchill

# physical education curriculum

	<b>CORE(6)</b>	<b>CORE ELECTIVES (2)</b>	<b>OPEN ELECTIVES (2)</b>
<b>Combatives</b>	Boxing Self-Defense (female) Unarmed Combat I Unarmed Combat II		
<b>Developmental</b>	Physical Development		
<b>Aquatics</b>	Swimming Water Survival		SCUBA
<b>Team</b>		Basketball Soccer Softball Volleyball	2nd Team Basketball Soccer Softball Volleyball
<b>Lifetime</b>		Golf Racquetball Tennis	2nd Lifetime Golf Racquetball Tennis
<b>Academic</b>			Exercise Physiology Art & Science of Coaching Independent Study*

\*Forty-two lesson, full semester academic elective courses. These courses do not count towards completing the physical-education core curriculum.

The fitness testing program serves many purposes including:

- Promoting maximum fitness among the cadet wing.
- Developing a foundation for a lifetime of fitness.
- Recognizing cadets who excel in maintaining their personal fitness.

The PFT and AFT test standards are as follows:

## Physical Fitness Test

Event	Men		Women	
	Min	Max	Min	Max
Pull-ups	7	21	1	8
Standing Long Jump	7'0"	8'8"	5'9"	7'2"
Crunches	58	95	58	95
Push-ups	35	72	18	48
600-yard Run	2:03	1:35	2:23	1:53

## Aerobic Fitness Test

Event	Men		Women	
	Min	Max	Min	Max
1.5 Mile Run	12:25	7:45	14:17	8:55

Those members of the cadet wing who achieve the maximum point total on either the PFT or AFT belong to the prestigious "500 Club." Those few cadets who maximize their scores on both fitness tests belong to the exclusive "1000 Club."

# intramural program

“Every cadet is an athlete, but not every athlete is a cadet.”  
—Colonel John J. Clune  
USAFA Director of Athletics  
1975-1991

In following the service-academy tradition that every cadet is an athlete, it is mandatory for all members of the cadet wing to participate either in intercollegiate athletics or in the intramural program. The intramural program not only provides cadets with an enjoyable way to exercise it is also one of the best leadership opportunities the Air Force Academy has to offer. With over three thousand cadets participating each season among ninety contests every afternoon, this cadet-run program generates nearly one thousand additional leadership positions each year. These positions include coaching, officiating, and administrative duties. Intramural athletes compete or practice at least twice a week in a variety of sports during each season of competition.

The sports offered are:

### **Fall Intramurals:**

Basketball  
Flag Football  
Men's Boxing (voluntary)  
Rugby (Men's)  
Rugby (Women's)  
Tennis (Doubles)  
Ultimate Frisbee  
Wally Ball

### **Spring Intramurals:**

Cross Country  
Flicker Ball  
Soccer  
Softball  
Team Handball  
Volleyball

The main purpose of the intramural program is to emphasize team before self. The competition is centered on the cadet squadron, with squadron success, not individual accomplishment as the ultimate goal.

For those who are up to the challenge, the Air Force Academy offers an expansive intercollegiate program. The twenty-nine men's and women's sports sponsored by the Academy include:

### **Men's Intercollegiate Athletics**

#### **Fall**

Cheerleading  
Cross Country  
Football  
Soccer  
Water Polo

#### **Winter**

Basketball  
Boxing  
Cheerleading  
Diving  
Fencing  
Gymnastics  
Ice Hockey  
Rifle  
Swimming  
Wrestling  
Indoor Track and Field

#### **Spring**

Baseball  
Cheerleading  
Lacrosse  
Outdoor Track and Field  
Tennis

### **Women's Intercollegiate Athletics**

#### **Fall**

Cheerleading  
Cross Country  
Volleyball  
Soccer

#### **Winter**

Basketball  
Cheerleading  
Diving  
Fencing  
Gymnastics  
Indoor Track and Field  
Rifle  
Swimming

#### **Spring**

Cheerleading  
Outdoor Track and Field  
Tennis

"I'm a lucky man... I'm no hero... Things just worked out. I'd been in situations like that in Falcon Stadium."

–Captain Scott Thomas,

F-16 pilot in Operation Desert Storm and Falcon Football Alumnus

The men and women compete in Division I of the NCAA. Most sports are members of the Mountain West Conference comprised of Air Force, Brigham Young University, Colorado State University, New Mexico, San Diego State, Texas Christian University, University of Nevada Las Vegas, Utah and Wyoming. In the past thirty-three years, the football team has claimed the Commander-in-Chief's trophy sixteen times.

Some other intercollegiate highlights include:

### **Academics and Athletics**

- Cadet-athletes have earned 66 NCAA post-graduate scholarships, the second most nationally in Division I athletics.
- Cadet-athletes have earned 10 Rhodes Scholarships, the most recent being Delavane Diaz in volleyball in 2004.
- The football team has won 13 National Football Foundation and College Hall of Fame scholarships.
- Cadet-athletes have earned more than \$300,000 in post-graduate scholarships in the last 15 years.
- Air Force has had six athletes inducted into the Academic All-American Hall of Fame, more than any other school in the country. Athletes inducted include: Brock Strom (football), Rich Mayo (football), Michelle Johnson (women's basketball), Chad Hennings (football), Chris Howard (football) and Lance Pilch (baseball).
- The women's cross country team earned NCAA Academic All-American team honors in 2001, 2002, 2003, 2004 and 2006.
- 88 athletes earned Academic All-Mountain West Conference honors in 2007.
- Collectively, there have been 133 cadet-athletes earn CoSIDA and Coaches Academic All-American honors a total of 181 times.

### **Inside the Numbers**

- The Academy has produced 169 individual national champions, the most recent being fencer Seth Kelsey in the epee in 2003 and track and field star Dana Pounds in the javelin in 2005 and 2006.
- The Academy has had 552 individual athletes achieve athletic All-American status a total of 1,213 times. Over 175 individuals have earned NCBA All-American honors in boxing a total of 265 times since 1979.
- The Academy has produced five consensus football All-Americans. They include: Brock Strom (1959), Ernie Jennings (1970), Scott Thomas (1985), Chad Hennings (1987) and Carlton McDonald (1992).
- Chad Hennings was inducted into the College Football Hall of Fame in 2006, joining Brock Strom from the Academy.
- Women's swimming has produced 70 individual All-Americans a total of 404 times in both Division I and II competition since 1970.
- Men's swimmer Chris Knaute has won nine MWC titles which is tied for the most by an athlete in the conference's history.

### **Team Accomplishments**

- The hockey team won its second straight Atlantic Hockey Association championship and qualified for the NCAA Championships for the second straight year. The hockey team is the first in school history to win consecutive outright conference titles.
- The men's cross-country team won the 2003 MWC title. They went on to finish third in the region and eighth in the nation.
- Wrestler Kevin Hoy earned All-American honors while posting a runner-up finish in the heavyweight division at the NCAA championships.
- The women's cross-country team finished third in the MWC for the fifth straight year in 2004.
- Football returned to its winning ways, posting a 9-4 record and earning a trip to the Armed Forces Bowl vs California. Air Force finished second in the MWC with a school record 6-2 mark. AF improved five games from 2006, the nation's third best turnaround.
- The boxing team earned its sixth consecutive National Collegiate Boxing Association national championship in 2004 and has never finished lower than second in 28 years.
- Women's tennis won five consecutive Gideon Cups titles (dual meet vs. service academy rival Army) from 2000-2004.
- The volleyball team defeated both Army and Navy in 2003 and earned its best record in five years.
- Men's basketball won its first conference championship in 2004, finishing 12-2 in conference play after being picked to finish eighth. The team won a then-school record 22 games and advanced to its first NCAA tournament in 42

years. Then head coach Joe Scott was named coach of the year while sophomore center Nick Welch earned co-conference player of the year honors, becoming the first men's basketball player ever to earn the award.

- The fencing team has sent individuals to the NCAA fencing championships 15 consecutive years.
- The men's basketball team earned its second NCAA tournament appearance in three years in 2006, finishing second in the conference and posting a then-record 24 wins. The following season, the team finished third in the conference and advanced to the National Invitational Tournament. After winning three straight NIT home games, the team advanced to the
- NIT Final Four and ended the season with a school-record 26 wins.
- Men's golf has won 12 consecutive Service Academy Classic tournaments, a military academy tournament featuring Army, Navy and Air Force.
- The ice hockey team won its first-ever conference championship in 2007, winning the Atlantic Hockey tournament title and advancing to the NCAA tournament for the first time in school history.

### **Individual Accomplishments**

- Football player Chad Hall was named the Mountain West Conference's Offensive Player of the Year and earned third-team All-American honors.
- Football coach Troy Calhoun was named the Mountain West Conference Coach of the Year and Region 5 Coach of the Year by the AFCA.
- Fencer Elia Burrill was named 2003 NCAA Woman of the Year for Colorado for her accomplishments on and off the field of play.
- Men's tennis player Shannon Buck advanced to the NCAA singles championship tournament in 2006 after a 25-2 season record and conference player of the year honor. Buck defeated the No. 3-ranked player in the country during the regular season and finished his career with a 65-5 singles mark, a 91 percent winning mark.
- Track and field coach Ralph Lindeman is named MWC coach of the year in 2001, 2003 and 2004. He also served as a coach on the 2004 Olympic track and field team.
- Men's basketball player Nick Welch was named MWC co-player of the year in 2004 as a sophomore.
- Marcus Sagastume was named Mountain Pacific Sports Federation co-player of the year in 2004.
- Track and field's Dana Pounds became the Academy's first Division I individual All-American in 2004, earning the honor in the javelin. Pounds would repeat with All-American honors in 2005 and 2006. She became the first female NCAA national champion in school history in the javelin in 2005. She repeated in 2006 becoming the first back-to-back NCAA champ in school history. Pounds was named NCAA Woman of the Year for Colorado in 2005 and 2006, becoming the first-two time winner in Academy history. In 2007, while a member of the Air Force's World Class Athlete program, Pounds became the American champion in the javelin.
- Volleyball player Delavane Diaz won the 2004 Mountain West Conference female athlete of the year award.
- Gymnastics coach Lou Burkel earned coach of the year honors and a special service award by the Collegiate Gymnastics Association. Burkel retired after the 2005 season.
- Track and field's Paul Gensic earned All-American honors in the pole vault with a third-place finish at the 2004 NCAA championships.
- Men's swimmer Chris Knaute earned the 2007 Mountain West Conference male swimmer of the year award. The honor was the second of Knaute's career, as he also won it as a sophomore in 2005. He also received the MWC senior recognition award. He closed his AF career with nine individual MWC titles.
- Wrestling coach Wayne Baughman earned the state's distinguished American Award from the Colorado Chapter of the National Wrestling Hall of Fame in 2006. The coach retired following the 2006 season with a career record of 183-134-3.
- Men's tennis player Shannon Buck was ranked 15th nationally in 2006, the highest individual NCAA rank in school history.
- Hockey player Brooks Turnquist earned the MWC's scholar-athlete award in 2006. Hockey is not an MWC-sponsored sport, but he was eligible because he attends an MWC institution.
- Junior hockey player Eric Ehn was a first-team All-American selection in 2007 while leading the Falcons to their first NCAA tournament appearance in school history. Ehn became the first player in school history to become a finalist for the Hobey Baker Award, given annually to the top player in the nation.
- Junior fencer Eliza Enyart became the first Academy women's fencer to earn NCAA All-American honors in 2006. She qualified for the NCAA tournament, where she placed 19th, becoming the West Region champion. She also qualified in 2007, placing 19th.
- Baseball player Karl Bolt was selected in the 15th round by the Philadelphia Phillies in the Major League Baseball draft in 2007. He is the fourth Falcon to be selected in the MLB draft.
- Air Force's 2007 sprint medley relay team of Kellen Curry, Travis Picou, Nick Luina and Kevin Hawkins broke a 41-year-old Academy track and field record, which was the longest standing sports record in school history. In addition, Picou crushed a 23-year-old mark in the 60-meter hurdles. Sara Neubauer and Olivia Korte broke the school's 23-

year-old shot put record three times between them in 2007.

- Olivia Korte set a school record in the shot put while earning all-MWC and All-American honors in 2007. She holds three Academy records.
- Women's swimmer Blair Leake was named the MWC female scholar-athlete of the year in 2007. She also won an NCAA post-graduate scholarship. Men's swimmer Matt Karmondy was named MWC male scholar-athlete and won a NCAA post-graduate scholarship in 2006.
- Boxer William Lloyd became just the 11th boxer to claim four straight Wing Open titles in the 49-year history of the Academy boxing program.
- Men's tennis coach Rich Gugat became the fourth head coach in Division I history to post 700 career victories in 2006. He is ranked second among active Division I coaches with over 700 career wins.

If you want to be a part of the athletic tradition at the Air Force Academy, write to the coach of your sport at:

HQ USAFA/AD  
2168 Field House Drive, Suite 409  
USAF Academy, Colorado 80840-9500

“On the fields of friendly strife are sown the seeds that on other fields on other days bear the fruits of victory.”  
—General MacArthur

## facilities

The athletic facilities at the Air Force Academy are some of the finest in the nation. The athletic complex includes the Cadet Gymnasium, the Cadet Field House, the Falcon Athletic Center and 150 acres of outdoor athletic fields.

The five-level Cadet Gymnasium is the standard by which other collegiate athletic complexes are judged. Among the facilities found within the Gym are:

- Three basketball gyms that contain 10 practice and three regulation-size courts.
- Four indoor tennis courts with indirect lighting and permanent seating for 380 spectators.
- An Olympic-size swimming pool with one and three-meter boards with five and ten-meter platforms and permanent seating for 1,200 spectators.
- A water-polo pool measuring 60 feet by 125 feet by 7 feet deep.
- Three squash and 19 racquetball/handball courts.
- Two weight-training rooms, each 10,000 square feet or more with state-of-the-art equipment. One training room contains a 30-yard rubberized sprint track.
- The East gym is used for wrestling matches with seating for 1,000 spectators and Physical Education classes.
- The Center gym is used for basketball practices and Physical Education classes.
- The West gym houses the fencing and gymnastics programs.
- One 3,325-square-foot training room and a Human Performance Laboratory complete with hydrostatic weighing equipment, sports psychology and vision-testing capabilities, and aerobic testing equipment.

The Cadet Field House, located across the street from the Gymnasium and next to the Falcon Athletic Center, is equally impressive with:

- A three hundred yard, six-lane Tartan surface indoor track with seating for 925.
- A synthetic turf playing field used for inclement weather football, lacrosse, soccer, and baseball practice.
- An ice-hockey arena with seating for 2,502.
- A 5,900-seat basketball/volleyball arena, (Clune Arena), dedicated on December 6, 1993, in honor of past Director of Athletics Colonel John J. Clune.

The Falcon Athletic Center, a 120,000 square-foot athletic and administrative complex, was completed in 2003. The facility is located between the Cadet Gym and the Cadet Field House and includes the following facilities:

- A 23,000 square foot, Astroturf weight room with a four-lane Astroturf 40-yard sprint track.
- Equipment management office/storage area.
- A combined sports-medicine area that includes offices, taping and treatment, rehabilitation and hydrotherapy, rehabilitation and health maintenance to all cadets, singular programs for each individual, individual counseling, team building, and sports specific programs.
- State-of-the-art team meeting rooms along with a 250-seat auditorium.

- The “Hall of Excellence” which includes athletic and leadership accomplishments by graduates in the areas of intercollegiate athletics, intramurals and physical education.
- The first six inductees into the “Hall of Fame” occurred in the fall of 2007.
- The Directorate of Athletics administration offices houses the Director of Athletics and his staff and a new ticket office.

The outdoor playing fields and facilities are a fine complement to the Academy with:

- The 46,156-seat Falcon Stadium, home to the Air Force Falcon football team.
- The Eisenhower Golf Course that includes two championship par 72, 18-hole courses.
- A soccer stadium that seats eight hundred.
- An intercollegiate baseball diamond with AstroTurf a synthetic turf infield and seating for 600.
- Thirty outdoor tennis courts (12 for intercollegiate competition), six outdoor team handball courts and six outdoor basketball courts.
- A track and field facility complete with a 400-meter Tartan surface track and 1,500 seat bleacher section for spectators.
- One hundred fifty acres of practice and intramural fields including up to football fields (one AstroTurf and two under lights), 2 rugby fields, and 22 soccer fields.

Overall, the athletic facilities at the Air Force Academy are as fine as any school-anywhere. When you are a cadet at the Academy, your opportunities to better yourself physically are never limited by resources, but only by your will.

## **PHYSICAL EDUCATION** (Phy Ed)

Offered by the Department of Physical Education under the Director of Athletics.

**Phy Ed 100. Basic Physical Training.** Preparation for strenuous physical education and athletics by development of physical strength, endurance, agility, and coordination through conditioning exercises, sports competition, and the physical-fitness and aerobics tests. Special training in conditioning as needed.

**Phy Ed 110. Boxing (Males Only).** Taught to fourth-class male cadets in order to develop an understanding of the physiological and psychological aspects of boxing. In addition to physical conditioning, boxing will also develop and intensify the military leadership attributes of quick reaction, coordination, accurate timing, cool judgment, aggressiveness, and determination. Boxing quickly acclimates the mind and body to adapt and overcome stress and fear which is a trait that is absolutely essential to fighting men. Teaches the ability to keep calm and poised under pressure, thus developing emotional control. Calmness under pressure can mean the difference between a right or wrong decision. Course includes eight lessons of skills to develop self-confidence, with safety, rules, and scoring emphasized prior to the graded review lessons.

**Phy Ed 111. Swimming.** An individual sport that teaches cadets how to swim a variety of strokes and skills and to aid in learning to handle themselves in a swimming emergency. Class provides sufficient aerobic and anaerobic activity and stroke skills so an individual is able to maintain and improve physical fitness in an aquatic environment as a cadet and officer. Students are graded on stroke skills, a timed 250-yard or -meter swim, underwater swim, 5-meter scenario, treading water and drown proofing.

**Phy Ed 112. Physical Development.** Primary purpose of this course is to teach the basic information necessary to design effective training programs so that he or she can maintain a good level of fitness while a cadet, later as an officer, and throughout their lifespan. Class is also meant to provide the information necessary to perform at an acceptable level on the Aerobic Fitness and the Physical Fitness Tests. Students are graded on a written exam (40 points), technique demonstrated on eight exercises (40 points), an exercise logbook (10 points), and 10 instructor points.

**Phy Ed 114. Self Defense (Females Only).** Taught to all female fourth-class cadets at the Academy to develop an understanding of the physiological and psychological aspects of self-defense. In addition to the physical aspects of self-defense, female cadets are lectured on the sexual awareness involved with rape and date rape. Female cadets are taught how to be aware of their environmental surroundings, avoid dangerous situations, and to be assertive if necessary due to an unwanted confrontation. The value of self-defense is in not only the physical skills that are acquired, but also the acclimation of the body and mind in adapting and overcoming a fearful and stressful situation. Course teaches the cadet to think and react under pressure and develops self-confidence, courage, stamina and agility, all necessary characteristics of a strong military presence. Cadets are taught how to fall to the ground in an attack situation or running from an assailant. Defensive techniques including kicking and striking are taught, as well as specific defenses against common attacks such as a one or two hand wrist grab, lapel grab, rear choke, rear bear hug, rear hammerlock and full nelson.

**Phy Ed 119. Basic Swimming I.** Course is designed for cadets with little exposure to aquatics or those needing work on specific swimming endurance. Because these cadets typically need more time to acclimate to swimming, the course is 16 lessons. Entry into the class is determined by a student's aquatic ability assessment, a 250-yard timed swim and input from aquatics instructors. The first eight lessons focus largely on technique. The final eight lessons focus on building swimming endurance with continued work on technique. Cadets are introduced to survival skills in preparation for the 200 level aquatics course. Cadets are encouraged to move on to regular water survival. However, more typically, they move on to Basic Water Survival for their 200 level aquatics. Replaces Phy Ed 111 if required.

**Phy Ed 152. Intercollegiate Sports.** Fall or spring.

**Phy Ed 211. Basic Water Survival.** Course continues the development of the basic swimmer and teaches basic aquatic survival skills that last a lifetime. These survival methods serve officers well throughout their careers. Class provides sufficient aerobic and anaerobic activities that challenge the cadets to maintain an above average level of fitness while having fun through aquatics. Cadets learn to save their own lives and assist others in a water emergency, survive in the water for long periods, and build confidence to swim long distances. Cadets experience situations that develop self-confidence, emotional control, persistence and courage. A variety of skills challenge cadets to move beyond their current skill and comfort levels. Cadets are evaluated in each one of the skills taught throughout the course. Replaces Phy Ed 222.

**Phy Ed 215. Unarmed Combat I.** Introduces students to basic self-defense. Students are taught a combination of karate, aikido, and judo techniques to use in attack situations. Students are taught to defend themselves from a standing position incorporating hand strikes, kicks, and throws. Students are put in pressure situations to apply class techniques to defend themselves. Students are tested in an attack situation to evaluate their ability to protect themselves.

**Phy Ed 219. Basic Swimming II.** Replaces Phy Ed 119 if required.

**Phy Ed 222. Water Survival.** Introduction to basic personal water survival skills and lifesaving techniques. Primary objective is to learn personal water survival skills needed in a water emergency. Secondary objective is to learn basic lifesaving skills to assist someone else involved in a water emergency. Work to increase cardiovascular and muscular endurance is also part of the course.

**Phy Ed 252. Intercollegiate Sports.** Fall or spring.

**Phy Ed 315. Unarmed Combat II.** Introduces basic unarmed offensive and defensive, grappling, choking, and joint locking skills. Includes live contact combative grappling designed to instill confidence, the ability to think and react quickly under pressure, and the ability to defend oneself in a hand-to-hand combat situation. Students are expected to demonstrate the aggressive mind set, mental toughness and warrior spirit required to survive and prevail in an unarmed combat situation.

**Phy Ed 340. Racquetball.** Class is designed to introduce the essential fundamentals of racquetball including the introductory skills and rules of the game. It offers the opportunity for students to develop a lifetime sport that can be used to stay physically fit and provides a recreational sport to play during intramural competition and throughout their Air Force careers.

**Phy Ed 341. Tennis.** An individual sport that teaches cadets the fundamentals of tennis so that they will achieve sufficient skills to participate in a game while a cadet, later as an officer, and throughout their life. Cadets will learn and be tested on the forehand, backhand, and the serve. Their physical fitness will be maintained and improved through drills and match play. Single and doubles match play will be evaluated and graded. Each cadet will learn enough about the game so that he or she will have a newfound appreciation for the sport and be able to appreciate the game.

**Phy Ed 342. Golf.** Introduces the sport of golf and is designed to give students confidence by teaching the fundamental golf mechanics through repetitive drill techniques. Emphasizes skills improvement and understanding, a respect for the game of golf, its traditions, rules, and etiquette. Basic golf swing technique demonstration and practice of putting, short irons, long irons, proper setup, and grip are the foundation of the course. Emphasizes the need for practice discipline and mental concentration.

**Phy Ed 352. Intercollegiate Sports.** Fall or spring.

**Phy Ed Aca 440. Exercise Physiology.** The study of body functions before, during, and after an exercise session. Class also looks at the short-term and long-term changes that result from exercise training. Includes both academic classes and laboratory experiences where the students learn about their body composition, strength, anaerobic power, and aerobic capacity.

**Phy Ed 452. Intercollegiate Sports.** Fall or spring.

**Phy Ed Aca 460. Art and Science of Coaching.** An integrated course—applying organizational management, sports law, leadership and motivation, sports psychology, ethics and philosophy, exercise physiology, nutrition, and physical principles of motion to the world of college coaching.

**Phy Ed 477. Independent Exercise.** Fall or spring.

**Phy Ed 479. Cadet Instructor.** Fall or spring.

**Phy Ed 483. SCUBA.** Offers unique activities cadets may rarely have experienced prior to attending the Academy. As individuals and “buddy teams”, cadets are exposed to both physical and mental challenges while being sustained underwater by a life support system. Skills mastered remove any pre-conceived fears of the water. Course instills a more sound confidence level in future warrior officers and leaders. Upon completion, cadets can pursue their SCUBA activities as a Certified Open water SCUBA diver. SCUBA is a life long activity that can be utilized wherever there is a body of water.

**Phy Ed 484. Volleyball.** A lifetime team sport that teaches the fundamentals of volleyball so cadets achieve sufficient skills to participate in a game while a cadet, later as an officer, and throughout their life. Class provides a history of volleyball, instruction on rules and theory, and basic, intermediate, and advanced technical skill development. Each cadet learns enough about the game so that he or she can appreciate volleyball at the college and professional level. Students are graded on a skills test to include underhand and overhand passing, serving, setting and attacking, as well as a play evaluation in scrimmages grading the cadet's ability, attitude, and effort.

**Phy Ed 486. Basketball.** Introduces the sport of basketball and is designed to broaden each player's understanding, knowledge, and appreciation for the game. Instruction in fundamental skills and basic drills each player can use for further skill development. Areas covered: passing, ball handling, shooting, individual offense, individual defense, rebounding, screens, team offense, team defense, and transition. Course provides maximum time for players to compete on the court. Emphasizes skill development and teamwork.

**Phy Ed 487. Soccer.** A lifetime team sport teaching the fundamentals of soccer so cadets achieve sufficient skills to participate in a game while a cadet, later as an officer, and throughout their life. Class provides sufficient aerobic and anaerobic activity so that each cadet's physical fitness will be maintained or improved, while having fun through athletics. Cadets learn enough about the game so that they can appreciate soccer at the college and professional level. Students are graded on rules of the game (written 20 question test), a skills test to include juggling, dribbling, passing, and shooting, and play evaluation in scrimmages grading their ability, attitude, and effort.

**Phy Ed 488. Softball.** A team sport teaching the fundamental skills required to play the game while a cadet, later as an officer, and throughout their life. Cadets learn both the fundamental skills it takes to be successful in the sport, and the rules by which the game is governed. Students learn the mechanics for throwing, hitting, fielding, and base-running, and are evaluated on their progression throughout the class. Teaches the relationship between individual performance and overall team success through team building and leadership opportunities.

**Phy Ed 499. Independent Study.** Independent study focused on physical exercise.

**Phy Ed Aca 499. Independent Study.** Individual research and study in the physical education field under the direction of a faculty member. Emphasizes the use of laboratory facilities.

appendix



The Department of Defense Medical Examination Review Board (DODMERB) is responsible for determining if you are medically qualified for admission into the Academy. DODMERB or a civilian contractor will contact you to schedule these medical-examination appointments. The government will pay for a complete medical examination. After you have completed a medical and optometric (eye) examination, DODMERB will inform you and the Academy of your medical status. If there is a need for additional medical tests and/or evaluations, DODMERB will send you a letter requesting the additional tests and/or evaluations, otherwise known as remedials. Remedials are classified as either Administrative or Medical. All costs associated with Administrative remedials are the responsibility of the candidate. The candidate has three options for completing medical remedials unless specifically requested to be completed at a Military Treatment Facility. Option 1, at no cost to the candidate and the preferred option, is to complete the requested medical remedial through a civilian examination center contracted by DODMERB and managed by Concorde. Option 2, at no cost to the candidate, is to complete the requested medical remedial at a Military Treatment Facility that has the resources for completing the test and/or evaluation. Option 3, all costs associated with this option are the responsibility of the candidate, is to complete the requested medical remedial with a private medical provider or physician. Applicants may visit <https://dodmerb.tricare.osd.mil> to access information about DODMERB and then go to “Frequently Asked Questions” (option tab “FAQs”), or for tracking your medical status click on option tab “Applicant.” You should use this Web site as your first method of obtaining information from DODMERB.

Before you take the medical examination, review your medical history with your parents or your family physician. You must compile your medical history with care and in detail, including on the medical history form provided by DODMERB complete documentation of all illnesses, injuries, and operations. You must bring photo identification to your examination. If you are under eighteen years of age, contact the examining facility to see if it requires your parent or guardian to accompany you to the examination.

As part of their medical examination, all applicants will undergo an external visual inspection of the genitalia to determine if any abnormalities are present; you may have this part of the examination done by your private physician at your own expense. If accomplished by your private physician, a copy of the results must be mailed to DODMERB.

Following your acceptance by the Air Force Academy and within seventy-two hours after your arrival at the Academy, you will undergo drug and alcohol-abuse testing as required by Public Law (Title 10, US Code, Section 978). HIV testing will also be accomplished at this time. Photo identification is required.

You may view the progress of your medical examination online at any time by logging on to the DODMERB secure website at: <https://dodmerb.tricare.osd.mil>. Refer questions concerning your medical status or examination scheduling to DODMERB, 8034 Edgerton Drive, Suite 132, USAF Academy, CO 80840-2200 (please include a daytime phone number and/or e-mail address).

## vision requirements

All candidates admitted to the Air Force Academy must meet the vision requirements for commissioning in the United States Air Force. However, there are three levels of qualification determined by DODMERB. Those levels of qualification status are: “Commission” Qualified, “Potential Pilot” Qualified, and “Potential Navigator” Qualified. This status is used solely as a selection tool by the Admissions Office. “Actual” commission or pilot/navigator qualified status will be determined during your graduation year.

Nearsightedness (myopia) commonly develops in the late teenage years. It is possible you could meet the vision requirements for a “Potential Pilot” Qualified status upon admission but not at graduation, thereby precluding you from ultimately being pilot or navigator qualified. Procedures to reverse the nearsightedness—including radial keratotomy (RK) and similar surgical and non-surgical alterations to the cornea such as (orthokeratology), photorefractive keratectomy (PRK) or laser in situ keratomileusis (LASIK)—could disqualify you for all military programs.

If you wear contact lenses, you must remove hard lenses (to include gas-permeable lenses) at least twenty-one days, and soft lenses at least three days, before the vision examination. An examination conducted without the required removal of contact lenses for the designated time is invalid and will delay your medical examination processing. If you wear prescription eyeglasses, bring them with you at the time of your optometric examination. After you enter the Academy, periodic vision care and counseling will be provided at the optometry clinic.

## medical standards

All candidates admitted to the Air Force Academy must meet the medical and weight standards for a commission in the Air Force. If you don't maintain the standards as a cadet, you may be disenrolled. DODMERB has included a general list of medical standards that apply to all applicants.

## potential pilot and navigator

### Visual Acuity

Qualification for potential flying duties requires uncorrected distant visual acuity no worse than 20/50 (pilot) and 20/200 (navigator), correctable to 20/20 in each eye. Uncorrected near visual acuity worse than 20/20 (pilot) and 20/40 (navigator) must be correctable to 20/20 in each eye.

### Refractive Error

The refractive error limits to qualify for potential flying duties are +2.00/-1.00 in any meridian and 0.75 astigmatism (pilot) and +3.00/-2.25 in any meridian and 2.00 astigmatism (navigator).

### Color Vision and Depth Perception

Successfully pass color vision via the Pseudoisochromatic Plates or Farnsworth Lantern color vision tests. Successfully pass depth perception via the Vision Test Apparatus-Near and Distant, Titmus Stereofly, Randot Stereo or Verhoeff test. These standards are the same for both pilot and navigator qualification.

### Hearing Standards

H-1 Profile. The H-1 profile qualifies applicants for potential pilot and navigator.

Definition: Unaided hearing loss in either ear no greater than:

<b>Frequency</b>	500	1000	2000	3000	4000	6000
<b>Loss</b>	25	25	25	35	45	45

### Standing Height

You must stand at least sixty-four inches minimum and not more than seventy-seven inches maximum for both pilot and navigator qualification.

### Sitting Height

You must be at least thirty-four inches minimum (pilot) and thirty-three inches minimum (navigator) to forty inches maximum (both).

## commission

### Visual Acuity

Distant: correctable to 20/40 in one eye and 20/70 in the other, or 20/30 in one eye and 20/100 in the other, or 20/20 in one eye and 20/400 in the other.

### Refractive Error

Farsightedness (hyperopia) no greater than +8.00 diopters and nearsightedness (myopia) no greater than -8.00 diopters spherical equivalent.

### Standing Height

Not less than fifty-eight inches to eighty inches maximum.

### Weight

See the height/weight chart.

## Height-Weight Standards

Weight standards are indicated in the following Weight Table. If you exceed the Air Force weight standards, you must undergo a procedure to determine your percent body fat. The maximum allowable body fat is 20% for males and 28% for females. Once the maximum weight standard has been exceeded, the body-fat standard becomes the entry requirement unless you subsequently meet the weight standard.

### Weight Table

MAXIMUM ALLOWABLE WEIGHT (regardless of age or sex)

HEIGHT (in)	WEIGHT (lbs)	HEIGHT (in)	WEIGHT (lbs)
58	131	70	191
59	136	71	197
60	141	72	202
61	145	73	208
62	150	74	214
63	155	75	220
64	160	76	225
65	165	77	231
66	170	78	237
67	175	79	244
68	180	80	250
69	186	79	244
		80	250

## Hearing

Pure tone at 500, 1000, and 2000 cycles per second of not more than 30 dB on the average (either ear), with no individual level greater than 35 dB at these frequencies; and level not more than 45 dB at 3000 cycles per second each ear, and 55 dB at 4000 cycles per second each ear.

## Medical Waivers

The Air Force Academy Surgeon General (Waiver Authority) may grant a limited number of waivers for medical disqualifications from DODMERB. A medical waiver will allow you to be admitted to the Academy with a medical disqualification. You may request a waiver by writing a letter to HQ USAFA/RRS, 2304 Cadet Drive, Suite 2300, USAF Academy, CO 80840-5025.

## Medical Disqualification

The following is a list of some of the medical conditions that are disqualifying. This is not intended to be a complete or comprehensive list but only a guideline of the most common medical disqualifications. If you are found to be medically disqualified, you may request a medical waiver through the Air Force Academy Admissions Office.

## Vision Disqualification

Procedures to change the refraction including RK, PRK, LASIK and similar surgical and non-surgical alteration to the cornea (orthokeratology) and experimental operations may disqualify you for all military programs. LASIK may be permanently disqualifying for any flying or special-duty career field.

## Dental Disqualification

Diseases of the jaw or associated tissues, which are not easily remediable and will incapacitate the individual or otherwise prevent satisfactory performance of duty, can cause disqualification.

## Respiratory System Disqualification

History of asthma, including reactive airway disease, exercise-induced broncho-spasm, or asthmatic bronchitis, reliably diagnosed or treated after the thirteenth birthday is disqualifying. History of recurrent wheezing requiring medication after the thirteenth birthday is also disqualifying. Immunotherapy for allergies within the past year is disqualifying.

## Heart and Vascular System Disqualification

Any abnormalities of the heart valves, major vessels, heart rate or rhythm may require additional examination procedures.

### **Genitourinary System Disqualification**

Persistence of abnormal findings on urinalysis, a history of bedwetting into adolescence, or physiologic or anatomic abnormalities.

### **Gastrointestinal System Disqualification**

Chronic disease of the abdominal organs. Chronic or recent hepatitis including hepatitis B carriers. Inflammatory bowel disorders.

### **Skin Disqualification**

Chronic diseases of the skin such as psoriasis, atopic dermatitis and eczema are cause for disqualification. Waivers may be considered for some mild conditions.

### **Musculoskeletal System Disqualification**

Ununited fractures, history of instability of a major joint, certain retained orthopedic fixation devices, and severe scoliosis are disqualifying. Any condition that could interfere with daily participation in rigorous physical training or athletic programs, or with wearing of military equipment, or could detract from military bearing and appearance is disqualifying. History of ACL reconstruction is potentially disqualifying.

### **Neurological and Psychiatric Disorders**

Seizure disorders (except febrile convulsions in childhood) or recurrent or severe headaches are disqualifying. History of mental illness, learning disorders, and/or any other disorders that may interfere with performance of military duties are disqualifying.

## candidate fitness assessment (cfa)

The Candidate Fitness Assessment (CFA) was developed to measure and evaluate a candidate's potential to successfully engage in the physical program at the United States Service Academies. The CFA consists of six physical- or motor-fitness events collectively designed to measure muscular strength and endurance, cardio-respiratory endurance, power, balance, and agility. When administered as a single battery, these events will help determine if a candidate possesses the stamina and movement skills required to complete successfully a Service Academy physical program and upon graduation perform duties required of commissioned officers in the uniformed services.

The test must be properly administered to reflect fairly and accurately a candidate's physical and motor fitness. The CFA **MUST** be administered by the candidate's Academy Liaison Officer or high-school PE teacher (Test Administrator). The test **MUST** be administered per directions with strict adherence to the time schedule. After testing, both candidate and Test Administrator must sign the score card. By signing the CFA score card, both are affirming that the test was properly administered and the scores accurately reflect the candidate's physical performance. Practice tests are encouraged. However, the officially reported score **MUST** come from a single test administration.

The test sequence will follow the order in which the events are listed below. The order of events cannot be changed. There are no exceptions to this sequence or timing.

**Basketball Throw:** measures ability to generate shoulder girdle power and total body coordination and balance in a stationary position.

The candidate must keep knees parallel to and behind the baseline and on the floor during the event. A mat may be used to cushion the knees. In an overhand throwing motion, throw a men's basketball as far as possible. The non-throwing hand may be used to steady the ball before throwing, but only one hand can be used to throw the ball (no two-handed throws). Execute three trials within a two-minute time period. Candidate must not touch the floor beyond the baseline with any part of the body until the basketball has landed.

**Cadence Pull-ups:** measures muscular strength and endurance of the shoulder and back.

The candidate must mount the bar with a pronated grip (back of the hands facing the candidate) and arms fully extended in a "dead hang." Candidate must not swing, kick, or bicycle legs during upward movement. Raise the body until the jaw line is parallel to the ground and above the bar. Return to a "dead hang" position to complete each repetition. Execute each repetition on cadence (command).

**Flexed Arm Hang:** an alternative measure of muscular strength and endurance for women who are unable to execute one correct cadence pull-up. If a woman can successfully perform one correct cadence pull-up, it is to her advantage on the scoring scale to take the Cadence Pull-up test. The scale score (0-100) for one cadence pull-up is higher than any length of Flexed Arm Hang.

The candidate must step up on a box, platform, or ladder (or may be boosted up to the bar by an assistant) until chin is above the bar. Mount the bar with a pronated grip (back of the hands facing the candidate) with chin parallel to the floor and above the bar. Step off the platform. Candidate must not swing, kick, or bicycle legs during the event. Maintain a flexed arm position with chin above the bar and the jaw line parallel to the ground throughout the event.

**Shuttle Run:** measures the ability to move rapidly while changing directions; indicator of anaerobic power, agility, and quickness.

The candidate must begin the test with entire body behind the start/finish line. On the “GO” command sprint thirty feet four consecutive times. Sprint the first thirty feet, bend to recover “block” one, return thirty feet to the S/F line and place “block” one on or beyond the S/F line (the trial will stop if candidate throws or slides the “block”) then sprint thirty feet to recover “block” two and finish by sprinting across the S/F line on the second ‘lap’ (not required to place “block” two on the floor).

EVENTS	TEST START TIME	TESTING	TIME REST
Basketball Throw	0 min.	2 min.	3 min.
Cadence Pull-ups	5 min.	2 min.	3 min.
Shuttle Run	10 min.	2 min.	3 min.
Modified Sit-ups	15 min.	2 min.	3 min.
Push-ups	20 min.	2 min.	8 min.
One-Mile Run	30 min.	Until Completed	

Execute two trials within the two-minute exercise period.

**Modified Sit-ups (Crunches):** measures abdominal/core body muscular strength and endurance.

The candidate must assume a supine (back on floor), bent-knee position (approximately 90 degrees) on a mat with arms crossed, fingers extended and touching the top of the shoulder, with shoulder blades touching the floor/mat. Upon the command “GO” flex from the hip, raising the elbows so that they touch the front midpoint (or higher) of the thigh with the finger tips staying in contact with the top of the shoulders at all times; then recover by extending from the hip until the shoulder blades touch the floor/mat. Once the test begins, candidates may only rest in the “up” position with finger tips in contact with the shoulders at all times.

**Push-ups:** measures upper-body muscular endurance.

The candidate must assume a prone position supported on one knee on a mat or floor. On the command “GET SET” assume the front-leaning rest position (arms extended) by placing hands just outside the shoulders with fingers facing forward; feet may be together or up to twelve inches apart; when viewed from the side, body will form a straight line from shoulders to ankles. On the command “GO” begin the push-up by bending elbows and lowering entire body as a single unit until upper arms are at least parallel to the ground. Return to the starting position by extending arms and raising entire body as a single unit until arms are fully extended. Rest only in the up position. Flexing or bowing the back is permitted as long as no hand or foot is lifted from the floor. Return to the straight-body front-leaning rest position before attempting another repetition.

**One-Mile Run:** measures aerobic capacity, the ability to use oxygen to do physical work.

The candidate must run continuously for one mile (walking is allowed although strongly discouraged).

See [academyadmissions.com](http://academyadmissions.com) for more information.

# questions & answers



## what is the cadet equivalent to a student in a civilian university?

The Academy uses the class system rather than the equivalent designation characteristic of civilian universities. The comparison is Fourth-class =Freshman; Third-class =Sophomore; Second-class =Junior; First-class =Senior.

## i have a tattoo, a brand, or a piercing can i be admitted?

While having a tattoo or brand does not automatically disqualify you from consideration, it does open the door for rejection based on a more subjective evaluation. Non-removable piercings are not allowed and must be removed prior to admission. Air Force policy stipulates that tattoos or brands must not be excessive, nor may they contain inflammatory, obscene, racist, sexist, or similar content. Tattoos or brands that fall into any of these categories will cause you to be disqualified for admission. The Department of Defense Medical Examination Review Board (DODMERB) will notify the Admissions Office of any tattoos, brands, or non-removable piercings noted during your medical exam. We will then require that you provide us a color snapshot of each. Assuming your tattoo or brand falls within acceptable limits, you will be allowed to continue in the application process. You should keep the following in mind. Those who review the picture of your tattoo, brand or piercing are of an older generation and may not view body art in the same manner as you. So... if you don't already have a tattoo or brand, think long and hard as to whether the risk of possibly losing out on an Academy appointment is worth it.

## what is a cadet's day like?

During the academic year, from early August through May, you'll have a busy schedule of classes, study periods, military training, and athletic participation. You'll awake in time to be at breakfast formation at 6:30 a.m. You'll rise in time to put your room in order and dress in the cadet uniform of the day. After breakfast you'll attend morning classes, which begin at 7:00 a.m. You'll attend classes or study until 11:10 a.m., when you'll go to your squadron area for professional military-training time on Tuesdays from 11:20 a.m. until 12:25 p.m. On Wednesdays during this time you'll participate in a parade. Several times each week you'll march to lunch with the cadet wing and have twenty minutes to eat. Afternoon classes begin at 1:00 p.m. and finish at 4:05 p.m. An optional evening mealtime buffet is offered from 5:00 to 7:00 p.m., and academic call to quarters is from 7:10 p.m. to 11:00 p.m. Tuesday through Thursday military call to quarters is from 7:10 p.m. to 7:40 p.m. Some military activities will be required in the evening, but most of the time will be devoted to studying in your room or in the library. Your day ends with taps (the final bugle call of the day) at 11:00 p.m. The daily schedule will vary during the summer, according to the military-training activity in which you're involved, but you'll be busy throughout the day.

## what is a cadet room like?

Rooms in the two dormitories, Vandenberg Hall and Sijan Hall, are similar. Each room, which is approximately thirteen feet wide and eighteen feet long, is designed for two or three cadets. The room contains two large closets, a counter with a built-in sink, a large mirror, and a medicine cabinet. Every cadet room also has a twin-size modular bed, dresser, and desk for each cadet. There is a proper location for everything you're allowed to have in your room, and you'll be expected to keep your room in perfect order.

## how is a cadet assigned to a room and roommate?

Each cadet is assigned to one of forty squadrons. Male and female cadets have separate rooms and female cadets have separate bathroom facilities within assigned squadron areas. You'll be assigned a roommate during Basic Cadet Training (BCT). Twice during the academic year you may be assigned to a new room with roommates according to squadron policies. You'll always room with a member of the same sex and usually the same class. You may keep or change a roommate at these times, depending on your squadron's policy. If a cadet has significant problems, he or she may request and most likely be granted a change of roommate, if necessary. Siblings are assigned to different squadrons.

## what items are cadets allowed to have in their rooms?

You'll not be permitted to bring your personal possessions with you when you enter the Academy (except for a few items listed in the cadet appointee instruction booklet). All basic necessities—such as uniforms, bedding, and linens—will be furnished when you enter. During the academic year you'll be permitted to have additional items when authorized by the Cadet Wing Commander. You'll be issued a personal computer while at the Academy. You may be permitted to have a radio or stereo equipment in your room midway through the spring semester of your fourth-class year; you must wait until your first-class year to have a television in your room. You may, at certain times, watch TV in the squadron activities room. You must wait until the second-class year to have most electrical appliances.

## what are the cadet dining facilities like?

Also called Mitchell Hall, the Cadet Dining Facility is the largest of its kind in the Air Force. During the academic year, the entire cadet wing assembles to eat family-style breakfast and lunch meals in Mitchell Hall, with buffet-style service provided for dinner meals. The facility provides complete food-service support for cadets ranging from wing tailgate parties at Falcon Stadium and organizational picnics to box lunches for official travel.

## do basic cadets get plenty to eat?

Yes, you'll have the opportunity to eat three nutritious meals a day and with all the physical activities required, you're encouraged to eat well and consume plenty of water.

## are special dietary meals provided?

Preparation and service of the twelve thousand meals served daily in the Cadet Dining Facility prohibits offering special dietary menus based on religious faiths or individual convictions. However, during the lunch meal, cadets are offered the opportunity to sit at "lite tables" where low-fat, low-calorie meals are served. Vegetarian tables at lunch are available upon request, and the evening buffet also provides vegetarian fare.

## what is the rate of pay for cadets?

Cadets at the Air Force Academy are currently entitled to basic pay of over \$890.00 per month. Cadets are also entitled to a basic allowance for subsistence of \$6.50 per day, which is used for food served at the Cadet Dining Hall. Medical and dental care is provided at no expense to cadets. Your pay is considered sufficient for you to be self-supporting, provided you are economical. The pay is not sufficient to cover any debts contracted prior to entrance, to send money home, or to spend for luxury entertainment or expensive personal items.

## are cadets required to pay income taxes?

Yes, they are. Federal income withholding tax, state tax if applicable, and FICA (social security) are deducted from cadet pay. Each cadet must file appropriate federal and state tax returns.

## what types of uniforms do cadets wear?

During the academic year cadets wear uniforms of blue trousers and either long- or short-sleeved blue shirts or blouses. Other uniforms are: service dress uniforms with blue jacket and trousers and mess dress for social functions. Female cadets wear either skirts or slacks with the dress uniform. Male and female cadets wear the battle dress uniform (BDUs) for military training.

## what is the purpose of basic cadet training (bct)?

The five-week BCT program tests your mental and physical abilities and helps you make the transition from civilian to military life. You'll develop alertness, physical endurance, emotional stability, self-reliance, and individual initiative. You'll be subjected to rigorous discipline, attention to detail, and punctuality. This training lays the foundation for becoming a leader of character—which is why you're here.

## what type of training does bct include?

BCT consists of two phases, both administered by upper-class cadets with commissioned and noncommissioned officers serving as advisors. The Commandant of Cadets, an Air Force brigadier general, supervises the program. The first phase of BCT (1st BCT) takes place in the cadet area and is devoted to military-orientation programs. Emphasis is placed on learning basic military skills and responsibilities, improving physical conditioning, and adapting to teamwork through competitive sports. The second phase of BCT (2nd BCT) consists primarily of field-training activities conducted at the Jacks Valley encampment site, five miles north of the cadet area. You'll march to the campsite, erect a tent city, and live there for eighteen days while you're in training. The activities expand your military orientation, teach you skills of weapons use, and develop your physical and mental confidence through challenging obstacles. This training demands the utmost in stamina, determination, and resourcefulness. More specific information on BCT is contained in the brochure "The Academy Experience," which the Academy provides to candidates selected for admission. You should read this brochure thoroughly.

## how can i feel assured that i am physically prepared for bct?

The cadet appointee kit includes specific instructions on physical preparation. The Cadet Fourth-Class Council has also prepared the following advice:

Looking back on how we could have better prepared ourselves for entrance to the Academy, physical conditioning stands out first of all. The everyday strenuous conditioning activities can become discouraging and tiring if you're not in shape. If you can accomplish the 1 hour daily workout, including running at least two miles and performing the other aerobics, you should be prepared for the physical demands that will be placed upon you. However, if you have not met all of the recommended standards before arrival, you will have the opportunity to increase your physical abilities in order to keep pace with your classmates.

Blisters and tendonitis are problems experienced frequently by basic cadets. It is very important that your shoes and combat boots are fitted to provide proper support. You might want to purchase a pair of combat boots during your orientation and break them in before you arrive for Basic Cadet Training. Through a regular running program you can build up your leg and ankle strength and general foot toughness before arriving. You should also be able to do pull-ups, standing long jump, push-ups, and crunches, and run six hundred meters one after the other within cadet Physical Fitness Test (PFT) standards. You'll also be required to run 1.5 miles within the Cadet Aerobic Fitness Test (AFT) standards.

## do new cadets enter the bct program immediately upon entering the academy?

Yes. The first day is devoted to inprocessing which includes clothing issue, room and squadron assignments, completing forms, a medical review, and a swearing-in ceremony. You will be asked to take the Oath of Allegiance to support and defend the Constitution of the United States and faithfully discharge your duties as a cadet. If your parents come with you, they may want to stay for the public swearing-in ceremony on the second day.

## will i be tested on my physical condition when i enter the academy?

Yes. Testing will be done soon after arrival to measure your physical fitness and endurance. The Physical Fitness Test (PFT) is a timed five-event test consisting of pull-ups, pushups, crunches, standing long jump, and a six hundred-yard run. The Aerobic Fitness Test (AFT) is a one and one-half mile run.

## why is it necessary for basic cadets to have their hair cut short?

Basic Cadet Training is the transition from civilian to military life. Part of that transition is the uniformity of hair standards for the basic cadets. The rigors of BCT put great demands on personal hygiene. The time allocated for personal hygiene needs to be maximized and short hair helps. Since the typical female inprocessing haircut takes more than fifteen minutes to accomplish, you should consider having your hair cut short (the bottom of the hairline cannot touch the top of the collar or must be worn "up" in a braid or bun) and styled prior to your arrival at the Academy. During fall and spring semesters, hair is cut and styled in the cadet barbershops for men and the cadet beauty shop for women. After BCT female cadets are allowed to wear hair a little longer.

## i've heard basic cadets referred to as "doolies." what does this mean?

This is a term adopted by the Academy's first cadet class, the Class of 1959, when they were in BCT. Doolie is a derivative of the Greek word *dulos*, which means "subject." Most graduates and outsiders use the colloquial term, although the cadets themselves do not typically use it.

## do basic cadets have any free time?

Yes, but very little. You may get up as early as 4:30 in the morning and go to bed no later than 9:00 at night. However, sufficient time for relaxation is built into the daily schedule. Each evening there is time to shower and attend to personal hygiene. In addition, a period, just before taps (the last bugle call before lights out), is available to study, write letters, or rest. Adequate time is allowed for sleep, meals, breaks, and religious worship.

## if i have problems adjusting to cadet life, can i seek help?

If you experience adjustment problems, you'll be encouraged to seek assistance from counseling sources. Professionally trained officers are always available as well as upper-class cadets designated for this purpose in each squadron.

## are parents permitted to contact cadets by phone during bct?

No. Your parents should refrain from calling you directly during the difficult BCT adjustment. You will write home soon after BCT starts and give your parents the name and home and duty phone numbers of your Air Officer Commanding (AOC) who directly supervises your squadron. The first opportunity you'll have to phone home will be during Doolie Day Out, which is approximately halfway through BCT. Cadets and parents are strongly encouraged to communicate through cards and letters. If an AOC cannot be directly reached in the event of an emergency, call the Cadet Command Center at 719-333-2910/2911.

## what events are scheduled for parents' weekend?

During Parents' Weekend (Labor Day weekend), a falcon demonstration and a parade—as well as briefings by the Superintendent, Director of Admissions, Commandant of Cadets, Dean of the Faculty, Director of Athletics, and the Command Chaplain—are scheduled. While adults attend the briefings, young guests may attend free movies. There are also airmanship, dormitory, dining-hall, academic-area and Jacks Valley Training Complex open houses scheduled during the weekend. Guests may attend some meals in Mitchell Hall, but tickets are required.

## what happens after basic cadet training is completed?

The Acceptance Parade, with the entire cadet wing participating, marks the completion of BCT. You receive your cadet shoulder boards and become a member of the cadet wing. You can truthfully say to yourself “I did it... I thought my limitations might keep me from achieving my goal, but I overcame them and performed beyond even my own expectations.” Now you enter the fourth-class academic year, which extends through May. But even though the stringent BCT program has ended, you must take a rigorous schedule of classes and live under the fourth-class system.

## what is the four-class system?

This system is part of a four-class system to train all cadets to be officers. Each class receives training commensurate with their level of cadet experience. The training received during the fourth-class year continues the cadet conversion from civilian to military life. The training prescribes the manner in which fourth-class cadets behave toward other cadets and officers. It defines those things you can and cannot do within the cadet area (dormitories, classrooms, dining hall, and other facilities). It makes you responsible for learning Fourth-Class Knowledge, including information about the Academy and the Air Force, which is contained in a booklet called “Contrails.” It defines responsibilities toward keeping your personal appearance, uniforms, room, and equipment neat at all times. It requires you to display prompt obedience, proper conduct, unfailing courtesy, unqualified honor, and uncompromising character. This training is for a definite purpose: to teach you to accomplish delegated tasks in a professional manner, thus paving the way for progression to becoming an Air Force officer. Cadets develop leadership and command skills by carrying out this program. During the spring semester of the fourth-class year, there is some relaxation of the restrictions in order to prepare you for greater privileges and different responsibilities in the third-class year.

## does the four-class system interfere with academic studies?

No. The training received during the four-class portion of the four-class system aids and complements the academic environment. The Academy mission is a concentrated, focused process aimed at developing leaders of character through military, academic, and athletic endeavors. Your progress in all areas will be carefully monitored during all four years.

## how can parents help their son or daughter to excel in the cadet wing?

Parents can encourage cadets to put forth their best efforts in all areas and, particularly, to abide by the cadet-wing regulations, take responsibility for their actions, and be accountable to themselves and their supervisors. Parental support has been found to be a strong motivator toward good performance. Conversely, parents who condone violations will undermine the Academy’s efforts and leave their son or daughter open to punishment and possible disenrollment. For example, statistics show that most cadets found guilty of violating the regulation that only first- and second-class cadets may own, maintain, and operate a personal motor vehicle were given a car, or received some financial assistance toward one, from their parents.

## does the cadet honor code apply to all cadets in the wing?

Yes. Cadets are instructed during BCT that they must agree to live by the Honor Code if they want to enter the Cadet Wing. The Academy’s first cadet class adopted the Honor Code in 1956, and since its acceptance, the cadet wing has exercised guardianship over it. The current version of the Honor Code, which defines a minimum standard for the Cadet Wing, serves as a basis upon which each cadet can build a personal code of ethical behavior. The Honor Code states: “We will not lie, steal, or cheat, nor tolerate among us anyone who does.” The Cadet Wing has established a Cadet Honor Committee to help maintain high ethical standards within the wing and extend the ideals of the Honor Code.

## what is meant by the term “toleration”?

The Honor Code clearly states that cadets will not tolerate a violation of the code by another cadet. Experience with the code has proven that this is the strong point in maintaining its effectiveness. The Academy’s major honor problems have grown out of minor ones. Other cadets tolerated isolated individual honor violations, and this encouraged the spread of more honor violations within the Cadet Wing. The necessity for intolerance of such violations becomes even clearer when one considers the purpose of our training: to produce officers who will responsibly serve their country rather than their personal interests. The non-toleration clause represents the spirit within the Cadet Wing to hold its standards high and to protect them. A cadet who suspects or knows of an Honor Code violation is first encouraged to speak with the suspected cadet. However, if the cadet has difficulty in coping with the situation, the person is encouraged to talk with a cadet honor representative.

## how does the honor code operate?

The administration of the Honor Code is accomplished by a joint effort between cadets and Academy leadership, faculty, and staff. Each possible Honor Code violation, if not cleared up during a clarification of the allegation, is thoroughly investigated. A cadet is considered honorable until a Cadet Wing Honor Board has determined, beyond a reasonable doubt, that the cadet has violated the Honor Code. The primary sanction for a cadet found in violation of the Honor Code at a Wing Honor Board is disenrollment. Disenrollment, as well as other sanctions such as probation and remediation, are options for cadets who admit to violating the Honor Code. The main concern in the administration of the code is that fairness and equity be maintained while teaching the importance of personal responsibility, and the rights of the cadets are fully protected during this process. Cadets are taught the specifics of the administration of the Honor Code throughout their Academy experience.

## what comprises the academy’s leadership program?

The Academy Leadership Development Program is the “road map” to cadet development and a continuous aspect of life at the Academy from BCT to graduation. This program focuses on the Academy Core Values: integrity first, service before self, and excellence in all we do. You must internalize these Core Values in order to prepare yourself for a career of military service to the nation. As a cadet, you’ll be held accountable to your cadet and officer chain of command. You’ll gain experience through numerous, diverse, coordinated activities that contribute to your leadership development.

## what military courses are required?

Several military courses are required during the academic year. All cadets take a three to six-week tour of duty with an operational Air Force unit each of their final three years to gain insight into Air Force operations, the working environment and a nine-day bare-base deployment-training course. First- and second-class cadets are also required to assume at least one leadership position in summer training courses, such as BCT.

## do cadets earn air force flying ratings?

Cadets do not earn Air Force “wings” at the Academy. However, cadets who complete several airmanship and navigation courses during their four years can gain sufficient flight experience, which serves as excellent preparation for pilot or navigator training after graduation.

## what flying courses are available?

Qualified cadets who wish to attend pilot training after graduation are required to complete the Academy Flight Screening (AFS) Program during their first-class year or prior to attending Undergraduate Pilot Training (UPT). Cadets may also enroll in additional courses in flight test, avionics, astronomy, special topics in aviation, and Air Force operations.

## are extracurricular flying courses available?

Yes. Cadets may participate in flying through extracurricular programs such as soaring, parachuting, and the Cadet Aviation Club. Soaring training is held on a year-round basis and is available to every cadet. The basic course includes dual and solo instruction involving approximately fifteen flights. Upper-class cadets can compete for selection to Soaring Instructor Pilot Training. Once qualified, the cadet instructors, who are supervised by rated Air Force officers, instruct other cadets. Some selected upper-class cadets who have completed advanced flying programs may earn a Federal Aviation Administration (FAA) certificate through the rating of flight instructor and join the Soaring Society of America. All soaring is conducted in either Academy sailplanes or powered gliders. Parachute training is also available to selected cadets who volunteer and meet stringent physical requirements. The basic parachuting course involves five freefall jumps. Some selected cadets from the basic course will take advanced courses to become parachute instructors for other cadets. These instructors, known as jumpmasters, may become members of the "Wings of Blue" parachute team and may qualify for a U.S. Parachute Association rating. The Cadet Aviation Club is open to all cadets who are interested in pursuing flying as an extracurricular activity. As members of the club, cadets can earn FAA ratings from private pilot through instructor pilot. Also, selected cadets may become members of the Cadet Competition Flying team.

## when do cadets first enter the academic program?

After you've completed BCT and have been admitted to the cadet wing, you'll be scheduled for classes at the beginning of the academic year in early August. The year is divided into two semesters, each containing approximately seventeen weeks of instruction, with breaks scheduled for holidays and leave periods.

## do all cadets take the same classes?

The Academy requires all cadets to take a core curriculum. This core curriculum covers a broad spectrum of classes in humanities, social sciences, engineering, basic sciences, and physical education. This core load makes up ninety-six semester hours of the academic program and is the foundation for a cadet's future service as an officer in the Air Force. Cadets then receive further specialization in one of thirty-two Academy majors currently offered.

## are cadets counseled on the selection of a major?

Most definitely. Cadets are advised by Academic Advisors who discuss the academic majors in relation to career areas and opportunities in the Air Force. After selecting a major, you'll be assigned to a faculty advisor from an academic department who will assist you with course selections, schedules, and other academic matters.

## can cadets transfer credits or validate courses?

When you enter the Academy, you'll take several validation tests offered by the various academic departments. Successful completion of a test will enable you to be placed in an accelerated or advanced course or perhaps to receive validation credit and substitute another course. Representatives from each department review transcripts of new cadets who have prior college credit. Credit may be awarded for any college course satisfactorily completed that is equivalent to a course in the Academy curriculum. A cadet who passes a validation examination or who makes an acceptable score on a College Board Advanced Placement examination may also earn validation credit. Departments certify this credit to the Office of Registrar, Customer Service.

## can cadets take elective courses?

Many electives are offered, and cadets who receive transfer or validation credit may substitute electives for those particular courses. Cadets with a prescribed Grade Point Average (GPA) may also overload during most semesters, allowing them to take other non-prescribed courses. Every cadet, however, must remain at the Academy for four years, no matter how many extra course credits are earned. Every cadet, also, must take a certain number of classes each semester. He or she will usually take six academic courses per semester (except for fourth-class cadets who take only five courses their first semester).

## how are cadets graded on their courses?

A computerized grading system enables instructors to keep a continuous evaluation of each cadet's performance on quizzes, examinations, homework, or classroom recitations. A progress grade report is published at mid-semester, and a final grade report is issued at the end of the semester. Most courses are graded by means of letter grades (A, A-, B+, B, B-, C+, C, C-, D, F) with equivalent grade-point averages (4.0, 3.7, 3.3, 3.0, 2.7, 2.3, 2.0, 1.7, 1.0, 0). An incomplete (I) grade is given to a cadet who does not complete the academic requirements because of incapacity, emergency, or failure to finish an essential assignment. Some courses are graded pass/fail and have no effect on grade-point averages.

## do parents receive transcripts of cadet grades?

Most parents are curious about their cadet's grades and academic progress at the end of each semester. The Federal Family Educational Rights and Privacy Act of 1974 dictate the policy regarding the release of student grades to parents. This law specifies that educational records of the students may not be released without (1) the written consent of the student specifying those educational records to be released and to whom or (2) judicial order or subpoena of the student's educational records. In the latter situation, the student must be notified of the institution's compliance with the order or subpoena. Based upon this policy, the United States Air Force Academy provides grade reports directly to the cadet and will provide grade reports to the parents at the written direction of the cadet. We understand and appreciate the concern and interest of parents; however, parents must receive this information either directly from the cadet or by the cadet's written request that a grade report be mailed to the parent.

## can cadets with marginal grades seek help?

Cadets are encouraged to contact their instructors at any time to request extra instruction outside the classroom. Faculty instructors want to assist cadets who need individual tutoring. An Academic Review Committee (ARC), consisting of several officers from various organizations, interviews cadets having academic difficulty and recommends remedial action. The Student Academic Services Center has programs, facilities, and personnel dedicated to assist cadets interested in improving their performance.

## where can cadets of all performance levels go to receive additional assistance?

The Student Academic Services Center provides a full range of instruction to improve cadet-learning techniques. The benefits of being an independent and confident learner are immeasurable. Resources available are the writing center, one-on-one academic tutoring, advising, seminars, handouts, and enrollment in Strategies for Academic Success or Reading Enhancement Courses. Cadets are welcome to drop by and pick up literature on topics such as time management, procrastination avoidance, note taking, effective textbook reading, better listening skills, and test strategies.

## when is a cadet considered academically deficient?

A cadet is considered deficient in academics if one or more F or I grades are received on a grade report or if the cumulative, core, or most recent semester GPA falls below 2.0. A first-class cadet is also deficient if the major GPA falls below 2.0. At mid-semester, most deficient cadets will be placed on academic probation and will be reviewed by an academic review committee. In addition, cadets on probation will be assigned certain weekend study periods. At the end of the semester, if seriously deficient, the cadet's record will be reviewed. The board may recommend either dismissal of the cadet or continuation on academic probation with appropriate remedial actions. The board can direct attendance at the academic summer school held at the Academy.

## are cadets graded on their military performance?

Yes. All Academy personnel who instruct, supervise, or coach cadets may submit a military-performance appraisal on each cadet. These inputs are used to create the Military Performance Average (MPA) similar to the academic GPA. Militarily deficient cadets may be placed on Conduct and/or Aptitude probation for serious rules violations or a history of violations. Placement on Conduct and/or Aptitude probation will result in an MPA below 2.0. Cadets who fall below a 2.0 MPA may meet a Military Review Committee (MRC) similar to an ARC, which reviews academic deficiencies. The MRC may place a cadet on aptitude probation, initiate corrective action, or make recommendations to the Commandant or the Academy Board.

## do cadets receive special recognition for outstanding performance?

Cadets who achieve at least a 3.0 GPA, MPA or PEA are allowed to wear merit badges on their uniform. Cadets who are recognized by the Dean of the Faculty for outstanding Academic Performance wear a small silver star on their uniform. Cadets who are recognized for achievement in military performance by the Commandant of Cadets wear a silver wreath. Cadets who are recognized for excellence in physical education by the Director of Athletics wear a silver lightning bolt. Those cadets on all three lists are recognized by the Superintendent and wear the star enclosed in the wreath between two small lightning bolts.

## when do cadets study?

Study periods are scheduled during the day when cadets do not have classes. After dinner each evening, from Sunday through Thursday, cadets are expected to study in their rooms or in the library. Second-class squadron academic noncommissioned officers arrange cadet tutors for cadets experiencing academic problems.

## what type of faculty does the academy have?

The Academy has a military and civilian faculty. The military faculty is composed primarily of Air Force officers with a few officers from the other branches of the U.S. Armed Forces and from the military forces of allied nations who serve in a liaison capacity. The civilian faculty is composed of both government employees and visiting faculty. The civilian government employees are on renewable term appointments and hold all academic ranks as well as several administrative positions. The civilian visiting faculty members come to the Academy from academic institutions, government agencies, and industry and are assigned to academic departments for one or two years. The faculty is organized by academic divisions and departments, similar to other institutions of higher education. The Dean of the Faculty and all Professor USAFA positions have been established by law.

## what type of instruction does the faculty provide?

The average class is small, fifteen to twenty students, allowing the instructor to establish a rapport with each cadet and to recognize a student's strengths and weaknesses. The faculty uses the seminar approach to instruction, when possible, keeping lectures to a minimum. Cadets are expected to prepare for their lessons and participate in classroom activities.

## what library facilities are available?

The Academy Library, with a collection of over 1.5 million volumes, supports the academic, research, and recreational needs of all cadets and faculty members. The library has accumulated one of the most outstanding aeronautical collections in the nation. Other useful features of the library are the current periodical and newspaper collections, the microform collections, and listening rooms for musical and narrative records and tapes. With a seating capacity for one thousand readers, the library has open book stacks to afford complete access to materials.

## how does the academy's academic program compare with other institutions?

The Air Force Academy has instituted many new concepts in service academy instruction and is recognized as an outstanding educational institution. Academy graduates have won an impressive number of Rhodes and Truman Scholarships, National Science Foundation Fellowships, and other major competitive awards. We feel that this record reflects the excellence of the Academy's academic program. In 2006, *Princeton Review's* "The Best 357 Colleges" rated the Academy a "best value" undergraduate institution, while the *US News and World Report's* "Best Colleges 2008" ranking was #2 in the nation for Aerospace/Aeronautics/Astronautics, for Best Undergraduate Engineering schools with a bachelor's degree.

## do all cadets participate in the athletic program?

Yes. All cadets are required to participate in the athletic program, which includes physical education courses and competitive sports. Athletic participation contributes greatly to those attributes normally associated with the development of Air Force leadership skills. Participation helps you develop courage, initiative, and the will to win. Most cadets find that they enjoy sports as a release from academic schedules, and many become skilled beyond their expectations.

## what does the athletic program include?

During your first summer in BCT, you'll undergo strenuous physical training to develop strength, endurance, agility, and coordination. Conditioning exercises, an obstacle course, and a confidence course are part of this training. During fall and spring semesters, you'll take physical-education courses, which are part of the curriculum. The physical-education instruction includes six core courses, two core electives and two open electives, divided among academic, aquatic, combative and developmental skills, as well as lifetime and team sports. All cadets also receive extensive instruction in competitive athletics either through varsity athletics or intramural programs. Additionally, each cadet will take the Physical Fitness Test (PFT) and Aerobic Fitness Test (AFT) every semester.

## can a cadet be disenrolled for poor athletic performance?

Yes. Cadets with a cumulative Physical Education Average (PEA) below the minimum 2.00 (on a 4.00 scale) are reviewed by a Physical Education Review Committee (PERC). Deficient cadets are automatically placed on Athletic Probation and enrolled in a rehabilitation program, but the PERC may recommend disenrollment to the Director of Athletics for cadets with multiple deficient semesters.

## does the athletic program differ for men and women?

All PE courses are coed except boxing for men and self-defense for women. All intramural teams are coed except boxing (men only) and rugby (separate men's and women's teams). Women have their own intercollegiate teams in basketball, cross country, diving, fencing, gymnastics, indoor and outdoor track, rifle, soccer, swimming, tennis, and volleyball. Women can also compete for places on the varsity rifle team.

## why is the falcon the academy mascot?

The falcon possesses characteristics, that typify the U.S. Air Force: speed, graceful flight, courage, alertness, and noble carriage. Several prairie falcons, which are native to Colorado, and one white gyrfalcon are housed at the Academy. Cadet falconers who teach them to perform demonstrations during half-time activities at football games train the falcons. The Academy's intercollegiate athletic teams are known as "The Falcons."

## will i be able to travel into town or abroad?

The Academy refers to passes as permission for cadets to leave the Academy during off-duty periods. Your individual passes on Friday evening and Saturday will depend on your class and on your overall squadron performance. As a basic cadet, you'll not be permitted to have visitors except for a scheduled cadet function. You'll also be permitted to dine out in the homes of Academy personnel on certain occasions and to attend home athletic events and other scheduled activities of the cadet wing. Authorizations and liberties are gradually increased by class in recognition of added maturity and responsibility.

## what leave periods do cadets have?

Cadets have a leave period over Thanksgiving, two-and-a-half weeks for winter break, and one week in the spring semester. During the summer cadets take required leadership programs, which are held at the Academy or other installations. Either before or after a leadership program, most cadets in the upper three classes have approximately three weeks of leave. There are exceptions for cadets who volunteer or who are required to attend summer school; in these cases leave periods must be forfeited.

## are cadets permitted to wear civilian clothes away from the academy?

Fourth-class cadets may wear civilian clothes during leave periods, such as Thanksgiving and winter break, and when authorized by the Commandant of Cadets. This authorization usually occurs during the spring semester. Cadets who are representing the Academy on special programs, such as speaking appearances in their hometowns, must wear their uniforms.

## where do cadets go on weekends?

Colorado Springs is the nearest city, approximately eight miles south, and has a population of more than 300,000. Denver, fifty-five miles to the north, has over one million population. Both cities are located in the heart of the Rocky Mountain tourist area, known as "Ski Country, USA." Because of their tourist attractions, these cities have many advantages and recreational facilities including a variety of restaurants, museums, theaters, nightclubs, shopping centers, athletic facilities and sporting events. Colorado Springs is an important training site for athletes who practice yearly for the Olympics. Denver is the primary access city leading to many mountain resorts, ski areas, and scenic drives. The cities of Boulder and Fort Collins also offer many cadets the opportunity to "get away from it all." Many cadets go to ski resorts for a day or weekend of skiing and fun. The Cadet Ski Club provides free transportation and inexpensive ski equipment for these outings. River rafting, mountain climbing and horseback riding are some of the other popular recreational activities available in the area. After BCT Air Force families, participating in the sponsor program, host one or more cadets for periods of relaxation—an opportunity to enjoy a home-cooked meal and telephone your parents.

## what type of recreation is available to cadets?

The Academy provides opportunities for you to enjoy a change of pace through participation in cadet activities and social functions. This participation comes as a welcome break from the military activities, academic requirements, and athletic participation of the busy school week. You'll find the Arnold Hall social center a relaxing place to enjoy dancing, games, movies, entertainers, and television. The snack bar in the Richter Lounge is popular with cadets. The cadet-wing social committees arrange coed dances, both formal and informal.

## are cadets expected to attend certain social functions?

Yes. Cadets are expected to dress in formal uniforms and to attend scheduled dinners with their squadron or their class in Mitchell Hall. Attendance at these functions will give you experience in social situations that may be expected of you as an officer. You'll receive a Decorum handbook, that contains information on proper etiquette for various social occasions. Decorum is taught in cadet-squadron military training classes.

## when do cadets attend chapel services?

Attendance is on an optional basis. Many cadets attend Sunday or Sabbath services in the Cadet Chapel, which has Protestant, Catholic, Jewish, and Muslim worship spaces, along with several all-faiths worship rooms. Cadets are permitted to attend a church of their choice in the local community, and many volunteer to teach Sunday-school classes. Cadets participate in several other religious activities including choirs, study groups, daily worship, and fellowship organizations. Early morning daily Chapel is also available.

## will i have an opportunity to become a pilot or navigator?

Yes. While at the Academy cadets obtain a solid background in all phases of aviation. Male and female cadets are considered for flying training if they meet the flying physical qualifications and are selected to fill available openings. Undergraduate Flying Training (conducted after graduation at several U.S. bases) prepares qualified graduates for flying careers in airlift, bomber, fighter, multirole, special ops, or transport aircraft.

## do graduates have a chance to obtain an advanced degree?

A few graduates will obtain scholarships to attend civilian graduate schools immediately after graduation. Graduates in the top fifteen percent of their class on overall performance average will normally be assured of future graduate education for a master's degree, provided they have performed well as officers and the Air Force needs the degree program they wish to pursue. These graduates will be eligible for attendance after three years on active duty. Other graduates may also have opportunities for graduate education through the Air Force Institute of Technology (AFIT) program. Most degree-granting programs are conducted in conjunction with civilian universities. In addition, many Academy graduates attend one or more of the armed forces professional military schools during their careers.

## can graduates enter medical school?

Cadets may compete for the opportunity to attend medical school directly upon graduation. These graduates complete their medical training through the Armed Forces Health Professions Scholarship Programs or the Uniformed Services University of the Health Sciences. These same two programs are available to all active-duty officers. Selection for these programs is on a competitive basis, and the number of students will be based on the needs of the Air Force.

## can graduates enter law school?

The Air Force currently has no provision for graduating cadets to enter directly into law school. Congress has authorized the Air Force to enter a small number of active duty Air Force officers into law school each year. An Academy graduate, as well as any other Air Force officer, must complete two years of active duty before becoming eligible for consideration. Selection for sponsorship to law school is on a competitive basis among all active-duty officers who apply.

## what are some of the benefits of an air force career?

The pay and allowances of a new officer compare favorably with starting salaries in business, industry, and the professions. An officer advances in rank according to the needs of the Air Force and professional performance. The Air Force puts a high premium on leaders with character, vision, dedication, and ability. It offers a stimulating challenge and an interesting future in a wide spectrum of fields for Academy graduates to employ their leadership talents. There are opportunities for advanced education. All career officers are eligible to apply for further education through AFIT at civilian colleges and universities. Selected officers attend on a full-time basis, receive pay and allowances, have their tuition and fixed fees paid, and receive some reimbursement for books and thesis expenses. During each move, reimbursement for transportation costs, an extra allowance for incidental expenses of moving, and free shipment of household goods are provided. Additional benefits are: medical and hospital expenses, commissary and base-exchange privileges, officers' club privileges, VA and FHA mortgage loan insurance, group life insurance, and thirty days of vacation with pay each year. The current law enables an officer to retire after completing twenty years of active service.

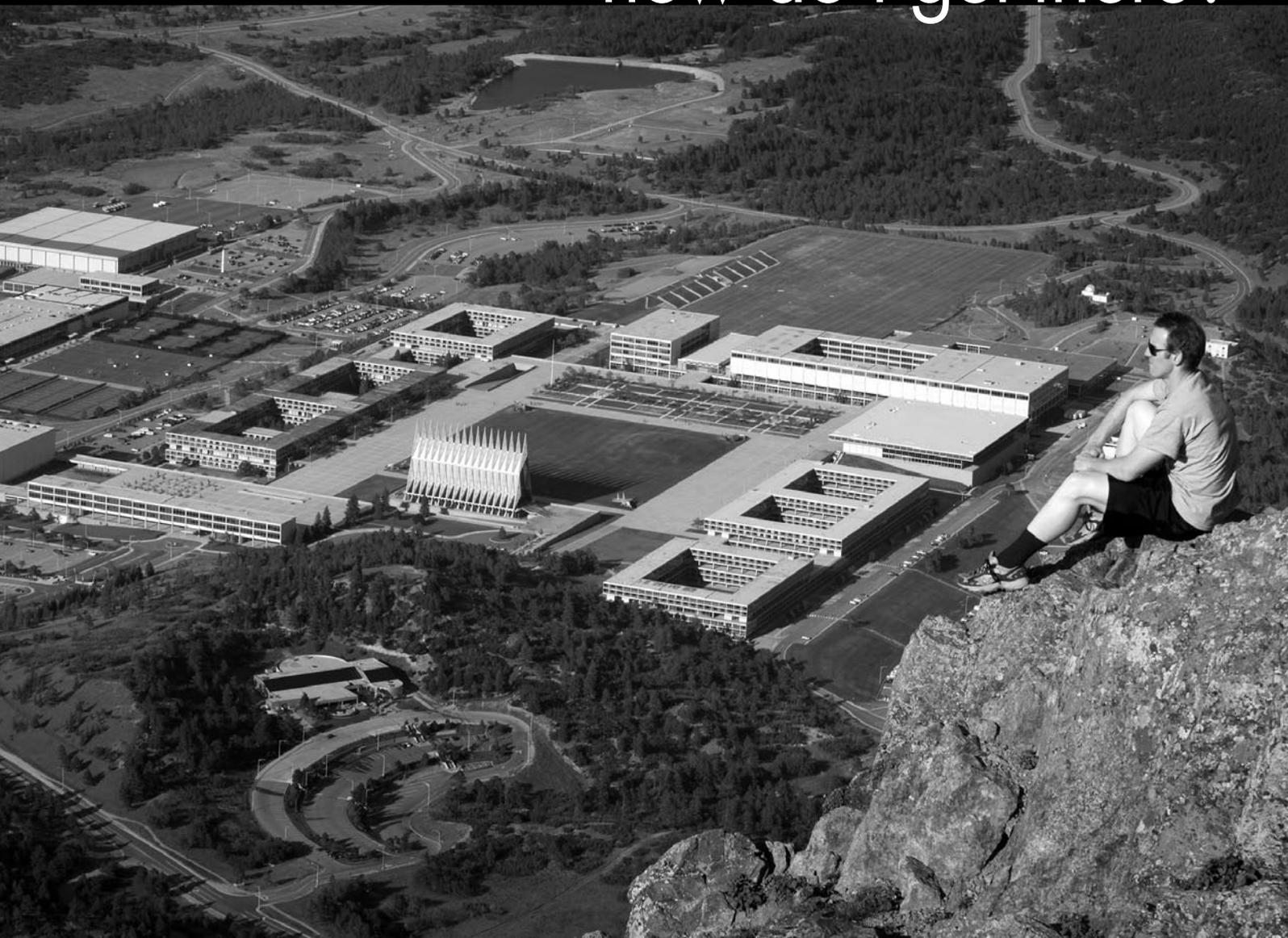
who can i call?



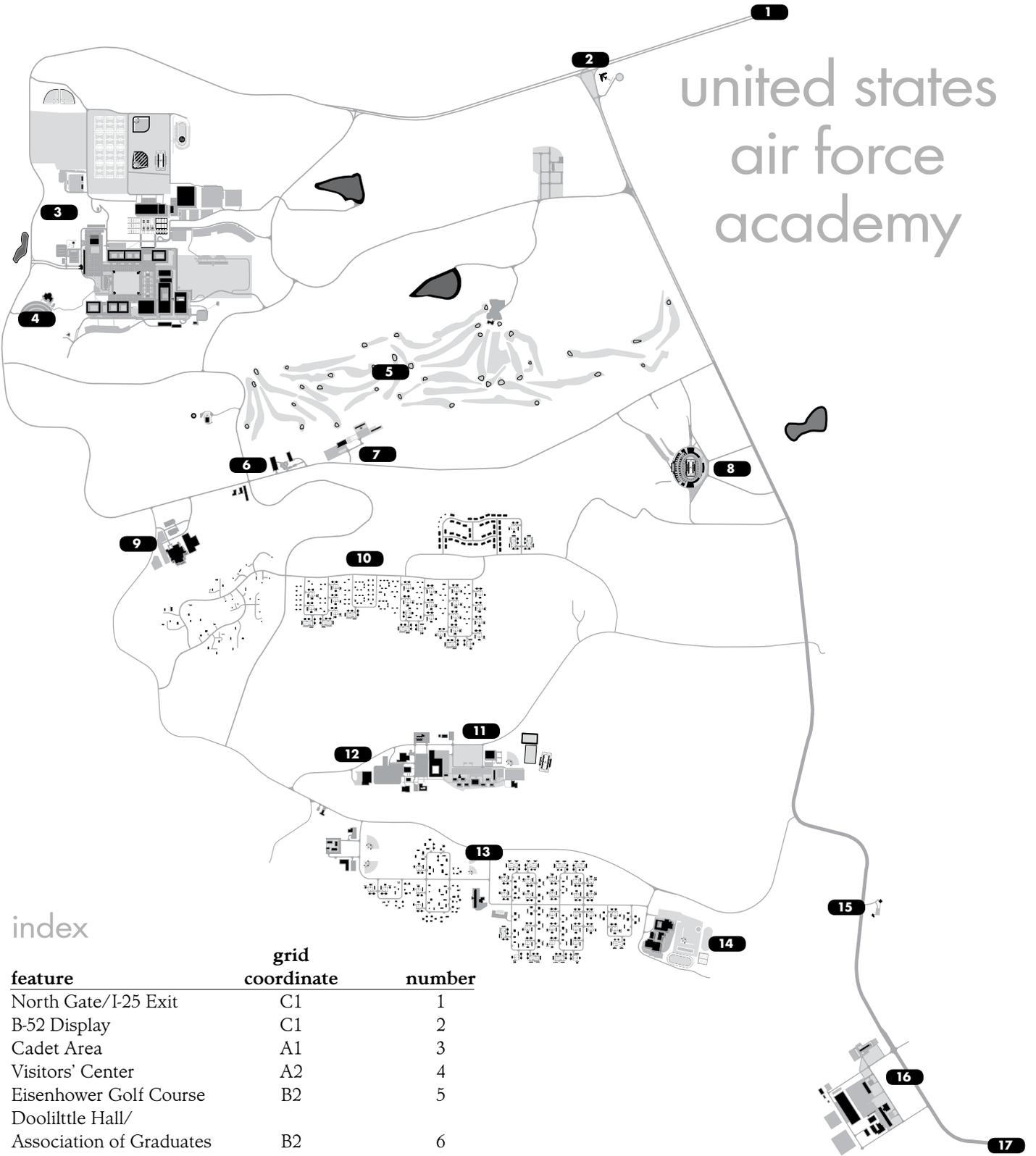
Prospective students may select from the list below to get answers to specific questions.

topic	scenario/point of contact
Academics	Enrollment in college bound courses. For guidance, you will be directed to your Preparation USAFA counselor. Your last name and address (Student's) will be required to determine your counselor. 800-443-9266.
Athletics	Local athletic contact officer (the POC with USAFA). USAFA POC, Status Mr. William (Trapper) Carpenter is available as liaison for the coaches and for questions or concerns from ALOs concerning a candidate's athletic status at USAFA. 719-472-1897.
Applications	Requesting an application to USAFA 800-443-9266.
Internet	The Academy admissions home page is available through the World Wide Web. The internet address is <a href="http://academyadmissions.com">academyadmissions.com</a> .
Medical Status	Contact the Department of Defense Medical Examination Review Board (DODMERB) 719-333-3562 and follow the menu directions. Medical waiver status should also be referred to DODMERB (same number as above).
Parents' Club	All parent-related matters are handled by the Development/Alumni Programs office. 719-333-3828.
Preparatory School	Call your regional area counselor 800-443-9266 for admission questions. Your name and address will be requested to determine the counselor.
Record Status (Student)	Call your regional area counselor 800-443-9266. Your name and address will be requested to determine the counselor.
ROTC	You may apply for an AFROTC scholarship at <a href="http://afrotc.com">afrotc.com</a> or you may call AFROTC direct at 1-866-423-7682.
Summer Seminar	Program for high school juniors entering their senior year. Call 719-333-2236 or <a href="http://academyadmissions.com">academyadmissions.com</a> , click on Admissions Center and follow the link to Summer Seminar.
Sports Camp	Programs for students aged 8–18. Call 719-333-2116 or visit <a href="http://goairforcefalcons.com">goairforcefalcons.com</a> and follow the link to Camps.
Tours of USAFA	Managed by the Diversity Recruiting Division on Monday, Thursday and Friday except for final exams, holidays and Spring Break. (One tour daily at 9:00 a.m.) Parents attend a briefing and are given a guided tour while the candidate/student is escorted by a USAFA cadet. The candidate/student attends a class and eats lunch at the cadet dining facility (Mitchell Hall). 800-443-3864, option 1. Ten days advance notice is required.
Group Tours	Civilian group, Distinguished Visitor (DV), and VIP tours are managed by Visitor Services, a division of Public Affairs. Call 719-333-7470.

how do i get there?



# united states air force academy



## index

feature	grid coordinate	number
North Gate/I-25 Exit	C1	1
B-52 Display	C1	2
Cadet Area	A1	3
Visitors' Center	A2	4
Eisenhower Golf Course	B2	5
Doolittle Hall/ Association of Graduates	B2	6
Officers' Club	B2	7
Falcon Stadium	C2	8
Hospital	A2	9
Base Housing	B2	10
Prep School	B3	11
Community Center	B3	12
Base Housing	B3	13
Air Academy High School	C3	14
Airmanship Display	D3	15
Services & Supply Area	D3	16
South Gate/Academy Blvd	D4	17

A

B

C

D

# index

feature	grid coordinate	number	feature	grid coordinate	number
Softball Practice Fields	E2	18	Arnold Hall	F3	31
Rugby Field	E2	19	Planetarium	F3	32
Lacrosse Field	F2	20	Vandenberg Hall	G3	33
Softball Diamond	G2	21	Terrazzo	F3	34
Track	G2	22	McDermott Library	G3	35
Baseball Diamond	G2	23	Harmon Hall	F3	36
Football Practice Field	G2	24	Visitors' Center	E4	37
Field House	G3	25	Cadet Chapel	F4	38
Athletics Hall of Excellence	G3	26	Aircraft Displays & Spirit Hill	F4	39
Cadet Gym	G3	27	Air Garden	G4	40
Tennis Courts	G3	28	Stillman Parade Field	H3	41
Basketball Courts	G3	29	Fairchild Annex	G4	42
Flickerball Courts	G3	30	Observatory	H4	43
			Sijan Hall	F4	44
			Fairchild Hall	G4	45
			Aeronautics Laboratory	G4	46
			Mitchell Hall	G4	47



E

F

G

H

cadet area close-up

# traveling to the air force academy

The Academy is located fifty-five miles south of Denver and just north of Colorado Springs on Interstate 25. If you travel to the Academy by car, you will find entrances to the Academy clearly marked. You may enter the Academy at either Exit 156 (the North gate) or Exit 150 (the South gate) from Interstate 25.

The Academy is open to visitors between 8:00 a.m. and 6:00 p.m. daily. If you do **NOT** have active duty or retired military identification you **MUST** show driver's license, registration, and proof of insurance. Your vehicle will be searched before you're allowed entry to the Academy.

## Air

The Colorado Springs Airport is convenient to the Academy. Taxi and auto rentals are available at the airport. As you depart the airport, go west on Drennan Road to Academy Boulevard; turn right (north) and continue directly to the south entrance of the Academy (approximately 15 miles).

From Denver International Airport, go south on Peña Boulevard to I-70; go west to I-225, southwest to I-25, and south to the Academy.

## Rail

Amtrak serves Denver. Taxi, auto-rental, and bus service is available to Colorado Springs.

## Bus

Greyhound serves Colorado Springs. Taxi and auto rentals are available. There is no city bus service to the Academy.

