

in structures, so these students will be given a choice of four different classes (ASE 365, ASE 357, ASE or EM 339, or COE 321K) to fulfill this requirement. This change will allow a reduction in the frequency of offering ASE 365 and thus reduce the need for adjunct faculty to cover teaching load.

3. THIS PROPOSAL INVOLVES: (Please check all that apply)

- | | | |
|--|--|--|
| <input type="checkbox"/> Courses in other colleges | <input type="checkbox"/> Courses in proposer's college that are frequently taken by students in other colleges | <input type="checkbox"/> Flags |
| <input type="checkbox"/> Course in the core curriculum | <input type="checkbox"/> Change in course sequencing for an existing program | <input checked="" type="checkbox"/> Courses that have to be added to the inventory |
| <input type="checkbox"/> Change in admission requirements (external or internal) | <input type="checkbox"/> Requirements not explicit in the catalog language (e.g., lists of acceptable courses maintained by department office) | |

4. SCOPE OF PROPOSED CHANGE:

- a. Does this proposal impact other colleges/schools? Yes No
If yes, then how would you do so?
- b. Do you anticipate a net change in the number of students in your college? Yes No
If yes, how many more (or fewer) students do you expect?
- c. Do you anticipate a net increase (or decrease) in the number of students from outside of your college taking classes in your college? Yes No
If yes, please indicate the number of students and/or class seats involved.
- d. Do you anticipate a net increase (or decrease) in the number of students from your college taking courses in other colleges? Yes No
If yes, please indicate the number of students and/or class seats involved.

If the proposal has potential budgetary impacts for another college/school, such as requiring new sections or a non-negligible increase in the number of seats offered, at least one contact must be at the college-level.

How many students do you expect to be impacted?
Impacted schools must be contacted and their response(s) included:
Person communicated with:
Date of communication:
Response:

- c. Does this proposal involve changes to the core curriculum or other basic education requirements (42-hour core, signature courses, flags)? If yes, explain:
No.
- d. Will this proposal change the number of hours required for degree completion?
Yes; from 126 to 127.

4. COLLEGE/SCHOOL APPROVAL PROCESS

Department approval date: May 12, 2017	Approved by whom: Dr. Noel Clemens, Chair
May 11, 2017	ASE/EM Faculty
April 27, 2017	COE Undergraduate Curriculum Committee (section regarding change from COE 211K to COE 311K)
April 20, 2017	ASE/EM Undergraduate Curriculum Committee

College approval date: May 24, 2017 Approved by whom: CSE Degrees & Courses Committee

Dean approval date: Sept. 18, 2017 Approved by whom: CSE Faculty; Sharon L. Wood, Dean

PROPOSED NEW CATALOG TEXT:⁴

BACHELOR OF SCIENCE IN AEROSPACE ENGINEERING

The field of aerospace engineering developed because of humanity's desire for aircraft systems for military, commercial, and civilian purposes; it was first called aeronautical engineering or aeronautics. When the space age began, it was natural for aeronautical engineers to participate in the development of spacecraft systems for space exploration. This branch of engineering became known as astronautical engineering or astronautics, and the combined field is called aerospace engineering or aeronautics and astronautics. Because of the diverse nature of the work, the aerospace engineer must have a basic knowledge of physics, mathematics, digital computation, and the various disciplines of aerospace engineering: aerodynamics and propulsion, structural mechanics, flight mechanics and orbital mechanics, and control. Because of their extensive education in fundamental disciplines, aerospace engineers can work in areas other than aerospace engineering and are employed in a wide range of careers.

The objectives of the aerospace engineering degree program are to prepare students for professional practice in aerospace engineering and related engineering and scientific fields; to prepare students for such postbaccalaureate study as their aptitudes and professional goals may dictate; to instill in students a commitment to lifelong education and to ethical behavior throughout their professional careers; and to make students aware of the global and societal effects of technology. To meet these objectives, the faculty has designed a rigorous curriculum that emphasizes fundamentals in the basic sciences, mathematics, and the humanities, and integrates classroom and laboratory experiences in the engineering disciplines of aerodynamics and propulsion, structural mechanics, mechanics of materials, flight and orbital mechanics, controls, computation, electromechanical systems, design, and technical communication. The curriculum requires students to use modern engineering tools, to work individually, and to practice teamwork.

The first two years of the aerospace engineering curriculum emphasize fundamental material along with engineering sciences, while the third year introduces concepts in the areas of fluid mechanics, structural mechanics, system dynamics and control, and experimentation. The fourth year provides further depth in aerospace engineering, with emphasis on design and laboratory courses. During the junior year, the student elects to pursue one of two technical areas, atmospheric flight or space flight. Both area options are complemented by general education courses and courses offered in other engineering disciplines. In addition, the student may choose technical electives that increase the breadth of the program or that provide additional depth within one or more subdisciplines within the department. All of the following subdisciplines are also represented in the required courses for both technical area options.

Aerodynamics and Propulsion

This subdiscipline involves fluid motion, propulsion, lift and drag on wings and other bodies, high-speed heating effects, and wind tunnel investigation of these problems. Topics of study include fluid mechanics, gas dynamics, heat transfer, aerodynamics, propulsion, computational fluid dynamics, and experimental fluid mechanics.

Structural Mechanics

This subdiscipline includes the study of airplane, spacecraft, and missile structures, the materials that make them efficient, and methods for testing, analysis, and design of new structural systems. Course topics include structural analysis, structural dynamics, materials (including advanced composites), aeroelasticity, experimental structural mechanics, and computer-aided design of structures.

Flight Mechanics and Orbital Mechanics

Flight mechanics involves the analysis of the motion of aircraft, missiles, rockets, reentry vehicles, and spacecraft that are subjected to gravitational, propulsive, and aerodynamic forces; the study of uncontrolled motion of satellites and coasting spacecraft is usually referred to as orbital mechanics. Subject matter in these areas includes trajectory

analysis and optimization; attitude dynamics, stability, and control; flight test; orbit determination; orbital operations; systems engineering; sensors; satellite hardware applications; and simulation.

Flight Control

Control theory is applied in aerospace engineering to the development of automatic flight control systems for aircraft (autopilots and stability augmentation systems), attitude control systems for satellites, and guidance and control systems for missiles, rockets, reentry vehicles, and spacecraft. Course topics include linear system theory, classical control theory, digital control, and probability theory.

Portable Computing Devices

Students entering aerospace engineering are required to have access to a portable computing device capable of running the software tools required for undergraduate engineering analyses (~~MatLab~~ MATLAB, SOLIDWORKS, Word, Excel, etc) and access to the remote server for the department. This device does not need to be brought to campus on a daily basis, but individual courses may require that the device be brought to certain lectures, labs, and/or exams. ~~Once admitted, students will be informed by the Aerospace Engineering and Engineering Mechanics Department office about specific device requirements.~~ Minimum and recommended specifications may be found on the department website.

Curriculum

Course requirements include courses within the Cockrell School of Engineering and other required courses. In addition, each student must complete the University’s Core Curriculum. In some cases, a course that fulfills one of the following requirements may also be counted toward Core Curriculum or flag requirements; these courses are identified below.

In the process of fulfilling engineering degree requirements, students must also complete coursework to satisfy the following flag requirements: one independent inquiry flag, one quantitative reasoning flag, one ethics and leadership flag, one global cultures flag, one cultural diversity in the United States flag, and two writing flags. The independent inquiry flag, the quantitative reasoning flag, the ethics and leadership flag, and both writing flags are carried by courses specifically required for the degree; these courses are identified below. Courses that may be used to fulfill flag requirements are identified in the *Course Schedule*.

Courses used to fulfill technical elective requirements must be approved by the aerospace engineering faculty before the student enrolls in them.

The student must take all courses required for the degree on the letter-grade basis and must earn a grade of at least C- in each course, except for those listed as Remaining Core Curriculum courses. He or she must also maintain grade point averages of at least 2.00 in the major area of study and in required technical courses as described in Academic Standards, and a cumulative University grade point average of at least 2.00 as described in *General Information*.

Requirements		Hours
Aerospace Engineering Courses		
ASE 120K	Low-Speed Aerodynamics Laboratory	1
ASE 211K	Engineering Computation	2
ASE 301	Introduction to Computer Programming	3
ASE 320	Low-Speed Aerodynamics	3
ASE 324L	Aerospace Materials Laboratory	3
ASE 330M	Linear System Analysis	3
ASE 333T	Engineering Communication (writing flag and ethics and leadership flag)	3
ASE 362K	Compressible Flow	3
ASE 365	Structural Dynamics	3

ASE 366K	Spacecraft Dynamics	3
ASE 367K	Flight Dynamics	3
ASE 370L 370C	Flight Feedback Control Systems	3
ASE 375	Electromechanical Systems	3
ASE 376K	Propulsion	3
Chemistry		
Computational Engineering		
COE 311K	Engineering Computation	3
COE 301	Introduction to Computer Programming	3
Engineering Mechanics		
E M 306	Statics	3
E M 311M	Dynamics	3
E M 319	Mechanics of Solids	3
Mathematics		
M 408C	Differential and Integral Calculus (mathematics; quantitative reasoning flag)	4
M 408D	Sequences, Series, and Multivariable Calculus	4
M 427J	Differential Equations with Linear Algebra (quantitative reasoning flag)	4
or M 427K	Advanced Calculus for Applications I	
M 427L	Advanced Calculus for Applications II	4
Physics		
PHY 103M	Laboratory for Physics 303K	1
PHY 103N	Laboratory for Physics 303L	1
PHY 303K	Engineering Physics I (part I science and technology; quantitative reasoning flag)	3
PHY 303L	Engineering Physics II (part I science and technology; quantitative reasoning flag)	3
Rhetoric and Writing		
RHE 306	Rhetoric and Writing (English composition)	3
Other required courses		
Technical area courses		13
Approved technical electives		6
Structures elective		3
M E 210	Engineering Design Graphics	2
M E 320 310T	Applied Thermodynamics	3
Remaining Core Curriculum Courses		
E 316L	British Literature (humanities; in E 316L, 316M, 316N, and 316P some sections carry a cultures or cultural diversity flag)	3
or E 316M	American Literature	
or E 316N	World Literature	

or E 316P	Masterworks of Literature	
American and Texas government (some sections carry a cultural diversity flag)		6
American history (some sections carry a cultural diversity flag)		6
Social and behavioral sciences (some sections carry a cultural diversity flag)		3
Visual and performing arts (some sections carry a cultural diversity flag)		3
UGS 302	First-Year Signature Course (in UGS 302 all sections carry writing flag; in UGS 303 some sections carry a writing flag)	3
or UGS 303	First-Year Signature Course	
Total Hours		<u>127+26</u>

Technical Area Options

The technical area option allows the student to choose 13 semester hours of technical area courses in either atmospheric flight or space flight. Each student should choose a technical area by the end of the first semester of the junior year and plan an academic program to meet the area requirements in the next three semesters. Many students choose technical electives that will strengthen their backgrounds in one specialty area, but this is not required. It should be noted that a student may choose the technical area courses in the other technical area as technical electives.

Area 1, Atmospheric Flight

Also called aeronautics, this area provides the student with a well-rounded program of study emphasizing the major disciplines of aerodynamics, propulsion, structures, design, performance, and control of aircraft. These subjects are treated at a fundamental level that lays a foundation for work in a broad variety of specialties in the aircraft industry. This option is intended for the undergraduate student whose primary interest is aircraft.

~~Aerospace~~ Computational Engineering 321K, Computational Methods for Structural Analysis Aerospace Engineering 361K, *Aircraft Design I* (carries an independent inquiry flag) Aerospace Engineering 361L, *Aircraft Design II* (carries a writing flag)

Aerospace Engineering 162M, *High-Speed Aerodynamics Laboratory*
Aerospace Engineering 364, *Applied Aerodynamics*

Area 2, Space Flight

Also called astronautics, this area offers a well-rounded program of study that provides a background in the traditional areas of fluid mechanics, materials, structures, propulsion, controls, and flight mechanics, while also giving the student a chance to learn about the space environment, attitude determination and control, orbital mechanics, mission design, and spacecraft systems engineering. These subjects are treated at a fundamental level that lays a foundation for work in a broad variety of specialties in space-related industries. This option is intended for the undergraduate student whose primary interest is space and spacecraft.

Aerospace Engineering 366L, *Applied Orbital Mechanics*

Aerospace Engineering 166M, *Spacecraft Systems Laboratory* Aerospace Engineering 372K, *Attitude Dynamics*

Aerospace Engineering 374K, *Space Systems Engineering Design*

Aerospace Engineering 374L, *Spacecraft/Mission Design* (carries an independent inquiry flag and a writing flag)

Structures Elective

The degree requires all students to take 3 semester hours of an approved structures elective. Students pursuing Technical Area 1, Atmospheric Flight, must take Aerospace Engineering 365, Structural Dynamics, to fulfill this requirement. Students pursuing Technical Area 2, Space Flight, will choose one of four options to fulfill this requirement: Aerospace Engineering 365, Structural Dynamics, Aerospace Engineering 357, Mechanics of Composite Materials, Aerospace Engineering 339 or Engineering Mechanics 339, Advanced Strength of Materials.

or Computational Engineering 321K, *Computational Methods for Structural Analysis*.

Special Projects Laboratories

The department offers students the opportunity to participate in special projects such as student-built radio-controlled aircraft competitions and student satellite-building projects. These time-intensive projects are open to all aerospace engineering students with at least 15 semester hours of University credit toward the degree and a grade point average of at least 2.50. Academic credit for participation in departmentally approved student projects is available on the pass/fail basis through the course Aerospace Engineering 128. Three such laboratory courses can be combined to count as one three-hour technical elective; one such laboratory course can be combined with a two-hour cooperative program to count as one three-hour technical elective.

SUGGESTED ARRANGEMENT OF COURSES

First Year

First Term	Hour	Second Term	Hour
UGS 302 or 303	3	ASE-COE 301	3
CH 301	3	M 408D	4
M 408C	4	PHY 303K	3
RHE 306	3	PHY 103M	1
Social and behavioral sciences or visual and performing arts	3	American and Texas government	3
		American history	3
	16		17

Second Year

First Term	Hour	Second Term	Hour
E M 306	3	ASE-COE 211K-311K	3
M 427J or 427K	4	E M 311M	3
PHY 303L	3	E M 319	3
PHY 103N	1	M 427L	4
M E 210	2	ASE 333T	3
M E 320-310T	3		
	16		<u>16</u> 15

Third Year

First Term	Hour	Second Term	Hour
ASE 320	3	ASE 362K	3
ASE 120K	1	ASE 367K	3
ASE 330M	3	Social and behavioral sciences or visual and performing arts	3
ASE 365 Structures Elective	3	Technical area courses	7
ASE 366K	3		
E 316L, 316M, 316N, or 316P	3		
	16		16

Fourth Year

First Term	Hour	Second Term	Hour
ASE 375	3	ASE 324L	3
ASE 376K	3	ASE 370L-370C	3
Technical area courses	6	American history	3
Technical elective	3	American and Texas government	3
		Technical area elective	3

Total credit hours: ~~126~~
127

¹ See <https://facultycouncil.utexas.edu/degree-program-changes> for detailed explanations.

² Submit required Texas Higher Education Coordinating Board forms to the provost's office (lydia.cornell@austin.utexas.edu); downloadable from URL <https://facultycouncil.utexas.edu/theCb-forms>

³ **EXCLUSIVE:** of *exclusive* application and of primary interest only to a single college or school ("no protest" period is *seven calendar days*); **GENERAL:** of *general* interest to more than one college or school (but not for submission to the General Faculty) ("no protest" period is *fourteen calendar days*); *major* legislation must be submitted to the General Faculty for adoption ("no protest" period is *fourteen calendar days*).

⁴ The proposed text should be based on the text of the current catalog available at: <http://catalog.utexas.edu/undergraduate/>

Strike through and replace (with underlines) only the specific language to be changed. Do NOT use track changes, and do not include hyperlinks in the catalog copy. Submit form electronically to the Office of the General Faculty and Faculty Council at fc@austin.utexas.edu. For questions on completing this section, please contact Victoria Cervantes, fc@austin.utexas.edu, 471-5934 or Brenda Schumann, brenda.schumann@austin.utexas.edu, 475- 7654.

¹ See <https://facultycouncil.utexas.edu/degree-program-changes> for detailed explanations.

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