PennState College of Engineering | AEROSPACE ENGINEERING

2024-2025

UNDERGRADUATE CURRICULUM GUIDE

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INTRODUCTION

The purpose of this handbook is to:

1. Familiarize students and visitors with the Penn State Department of Aerospace Engineering.

2. Provide each Aerospace Engineering student with a central source of information about the Department and its programs.

3. Provide students with a checklist of requirements for graduation so they can track their progression in the program.

This major field of study is designed primarily for those students who are interested in the analysis, design, and operation of aircraft and space vehicles.

The first two years of study are similar to those of other engineering majors and provide the student with a basic education for the engineering profession. Because engineering practice changes rapidly, emphasis is placed upon those physical and scientific principles and methods that form the soundest and broadest base for future work in aerospace engineering.

Depending upon the technical course selections made in the senior year, a student may emphasize aeronautics or astronautics, and specific technical areas within these fields, including aerodynamics, structural mechanics, flight mechanics, propulsion, and controls.

Students who intend to graduate in four years must successfully complete EMCH 212, CMPSC 201 (or 121, or 131, or 200), and MATH 220, 230, and 250 (or 251) prior to the start of the 3rd year in order to meet graduation requirements in the following two years. Six of the nine technical-elective credits taken in the senior year must be aerospace engineering courses.

On behalf of the entire department, we welcome you to Aerospace Engineering! The faculty and staff will do everything possible to make your studies interesting and productive. We strongly urge you to periodically review your Degree Audit (or Academic Requirements) on LionPath and meet with your academic advisor to discuss course scheduling, career opportunities, or other matters. Feel free to contact us about any matter you wish to discuss.

Best wishes for your success,

Robert G. Melton
Professor of Aerospace Engineering and
Director of Undergraduate Studies

Susan W. Stewart
Teaching Professor of Aerospace Engineering and
Associate Director of Undergraduate Studies

Information Resources

Advising

Each student is assigned an official advisor to help with scheduling, career planning, or other academic matters. **Your advisor's name appears on your LionPath account in your student center.** Do not hesitate to see your advisor if you have any questions or problems. If your advisor is not available, ask one of the Department staff assistants to identify another advisor who can meet with you. You should seek guidance from an advisor each semester regarding scheduling and checking your Academic Requirements progress.

Dr. Robert G. Melton (rgmelton, 308L ECoRE) and Dr. Susan W. Stewart (sstewart, 385 ECoRE) serve as principal advisors, and may also be consulted, particularly on complex scheduling problems. During the beginning of the semester and during the registration timetable, you may find appointments available in Starfish.

Coursework Consultation

Professors, graduate teaching assistants, and undergraduate teaching interns hold scheduled office hours for student help. If you cannot meet during the scheduled office hours, arrange for a special appointment by emailing or calling the professor or TA. Some faculty also have advising times available in Starfish.

Aerospace Undergraduate Canvas Community

As students are assigned to Aerospace Engineering advisors in the department upon entering their 3rd year in the program, they are also added to a Canvas Community dedicated to the Undergraduate program. Important announcements will be shared through this medium to all of our 3rd & 4th year students.

Engineering Library

The Engineering Library has recently moved to 203 ECoRE. It houses thousands of volumes of engineering texts, periodicals, and literature. Most material can be checked out of the library upon presentation of the student's identification card. Several photocopy machines are available, as well as areas to study.

Tutoring/Help Sessions

One-on-one tutoring for 300-level aerospace engineering courses will be provided by Sigma Gamma Tau members during scheduled times. Group help sessions will be arranged if warranted by substantial interest on a particular subject. Scheduled tutoring hours will be announced in class, via the UG Canvas Communities and via an email to aerospace students.

UNDERGRADUATE PROGRAM OBJECTIVES FOR AEROSPACE ENGINEERING

Revised 8/17/18

The Pennsylvania State University
Aerospace Engineering Undergraduate Program

Program Educational Objectives

This major emphasizes the analysis, design, and operation of aircraft and spacecraft. Students learn the theories and practices in the fundamental subjects of aeronautics, astronautics, aerodynamics and fluid dynamics, aerospace materials and structures, dynamics and automatic control, aircraft stability and control and/or orbital and attitude dynamics and control, air-breathing and rocket propulsion, aircraft systems design and /or spacecraft systems design. All of these place significant weight on the development and use of teamwork and communications skills for effective problem-solving.

Within a few years after graduation, we expect graduates of our program will be:

- Engaged in careers in the discipline of aerospace engineering, and in related disciplines where aerospace engineering knowledge and skills are beneficial, that applies the knowledge and skills for precise engineering analysis and open-ended problem solving and design.
- Pursuing continued professional development through multiple pathways including graduate programs in aerospace engineering, and in related disciplines where aerospace engineering knowledge and skills bring a useful perspective, with the skills needed for engineering research and more advanced studies.
- Acting as professionals representing aerospace engineering concerns with effective communication and teamwork skills, awareness of current issues, and ethical decision making.

Student Outcomes

The undergraduate program will provide students with:

(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
(3) an ability to communicate effectively with a range of audiences
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Detailed Student Outcomes

Aerospace engineering B.S. graduates will be able to

1. Analyze the dynamics and control characteristics of aerospace vehicles, including the basic translational and rotational dynamics, and the basic theory and practice used to control these motions,

2. Analyze fluid dynamics, including the regimes of subsonic, transonic, and supersonic flows, inviscid and viscous flows, and laminar and turbulent flows,

3. Apply knowledge of the fundamentals of aeronautics, including aerodynamic characteristics of aircraft, propulsion systems, airplane performance, and elementary aircraft stability & control,

4. Apply knowledge of the fundamentals of astronautics, including orbital mechanics, attitude dynamics & control, rocket propulsion, and the space environment,

5. Predict performance, and conduct preliminary design, of gas turbine and rocket-based propulsion systems and their components,

6. Analyze the detailed dynamics, stability and control of either aircraft or spacecraft,

7. Analyze and design structural elements such as bars, beams, plates and thin-walled structures,

8. Make measurements to test hypotheses or to characterize the performance of physical systems (aerodynamic, structural, and control), and analyze and interpret the data in written reports,

9. Complete the successive stages of conceptual, preliminary, and detailed design of an aircraft or spacecraft mission and the associated vehicle(s),

10. Function effectively on teams to solve problems in complex aerospace systems that require knowledge of multiple disciplines,

11. Apply an understanding of professional and ethical responsibility to realistic situations,

12. Make effective oral and written presentations in the format appropriate for the setting,

13. Explain how this profession affects society as a whole, and to demonstrate an appreciation of how technical issues guide societal actions,

14. Demonstrate an awareness of the need to stay abreast of technical developments throughout their working careers, and demonstrate that they are able to maintain and extend their learning, and

15. Make appropriate and effective use of computer software, hardware, and state-of-the-art laboratory instrumentation.

EXPECTATIONS OF ACADEMIC INTEGRITY

Professional conduct, especially with regard to honesty and integrity, is a lifetime requirement for those pursuing an engineering career. The students in the Aerospace Engineering curriculum are expected to practice good ethics in every aspect of their educational studies. Students who violate this requirement will be subject to disciplinary action as determined by the University Faculty Senate Policy 49-20. (senate.psu.edu/)

University Faculty Senate Policy 49-20 – Academic Integrity

Definition and expectations: Academic integrity is the pursuit of scholarly activity in an open honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

To protect the rights and maintain the trust of honest students and support appropriate behavior, faculty and administrators should regularly communicate high standards of integrity and reinforce them by taking reasonable steps to anticipate and deter acts of dishonesty in all assignments (Senate Policy 44-40: Proctoring of Examinations). At the beginning of each course, it is the responsibility of the instructor to provide students with a statement clarifying the application of University and College academic integrity policies to that course.

Committee on Academic Integrity: Each College Dean (or Chancellor as determined by College policy) shall appoint a Committee on Academic Integrity made up of faculty, students, and academic administrators with faculty being the majority. This committee shall:

1. Promote expectations for academic integrity consistent with the definition in this policy.
2. Ensure fairness and consistency in processes and outcomes. To ensure University-wide consistency, College Committees will work with the Office of Student Conduct and the Office of the Provost of the University to develop procedures for handling and sanctioning dishonesty infractions.
3. Review and settle all contested cases in which academic sanctions are applied. If necessary, further disciplinary action will be taken by the Office of Student Conduct.
4. Record all cases of academic dishonesty within a college and report them to the Office of Student Conduct.

AEROSPACE ENGINEERING CURRICULUM

Aerospace Engineering Curriculum Starting at University Park

NOTE: *Many AERSP courses are offered only once a year in the semester shown on the schedule, except for AERSP 305W & 424.*

1st Semester

ECON 102 or 104(GS)	Micro or Macro-economics	3
•CHEM 110	***Chemical Principles***	***3***
•MATH 140	***Calculus I***	***4***
•PHYS 211	***Mechanics***	***4***
First-Year Seminar (AERSP 1, 97 or other)		1
		15

2nd Semester

ENGL 15,30H or ESL 15 Rhetoric & Composition		3
•MATH 141	***Calculus II***	***4***
+PHYS 212	**Electricity & Magnetism**	**4**
•EDSGN 100	***Intro. to Engr. Design***	***3***
GEN ED REQUIREMENT		3
		17

3rd Semester

+MATH 250	**Ordinary & Differential Eqns**	**3**
MATH 220	Matrices	3
EMCH 210 [A]	Statics & Str. of Materials	5
*CMPSC 201	Programming with C++	3
GEN ED REQUIREMENT		3
		17

4th Semester

MATH 230	Calculus and Vector Analysis	4
M E 201	Thermal Science	3
CAS 100 A/B	Effective Speech	3
+EMCH 212	**Dynamics**	**3**
EMCH 315 & 316	Mech. Response of Materials	3
		16

5th Semester

+AERSP 301	**Aerospace Structures I**	**3**
+AERSP 309	**Astronautics**	**3**
+AERSP 311	**Aerodynamics I**	**3**
+AERSP 313	**Aerospace Analysis**	**3**
ENGL 202C	Technical Writing	3
GenEd Health & Wellness (GHW)		1.5
		16.5

6th Semester

AERSP 304	Dynamics & Control	3
+AERSP 306	**Aeronautics**	**3**
AERSP 305W	Aerospace Tech. Lab (or move to 7th sem. and swap with AERSP 424, EE 210 or EE 212 or AERSP Tech elective)	3
AERSP 312	Aerodynamics II	3
PHYS 214	Waves & Quantum	2
GEN ED REQUIREMENT		3
		17

7th Semester

** AERSP 401/402/403 A	Vehicle Sys. Design I	3
AERSP 410	Aerospace Propulsion	3
AERSP 413 or 450	Flight Vehicle Control	3
GenEd Health & Wellness (GHW)		1.5
AERSP Technical Elective (or AERSP 305W, AERSP 424, EE 210 or EE 212)		3
~General Technical Elective or Limited Elective		3
		16.5

8th Semester

** AERSP 401/402/403 B	Vehicle Sys. Design II	2
AERSP 424, EE 210 or EE 212	Programming or electronics (or AERSP Tech Elective)	3
AERSP Technical Elective		3
~Limited Elective or General Technical Elective		3
GEN ED REQUIREMENT		3
GEN ED REQUIREMENT		3
		17

Total Credits – 132

• Courses listed in ***boldface italic type*** require a grade of C or better for entrance into this major

+ Courses listed in **boldface type** require a grade of C or better for graduation in this major.

[A] Students may substitute **EMCH 211** and **213** for **EMCH 210**

* CMPSC 121, 131 or 200 may be substituted.

** Students may schedule either the spacecraft design sequence (401A & B), the aircraft/rotorcraft design sequence (402A & B) or autonomous vehicle sequence (403A &B). The appropriate controls course (450 or 413) should be scheduled accordingly.

~ Up to 6 credits of Co-op, upon completion of the program, may be substituted for three technical elective credits and three limited elective credits. For those students who complete the ROTC Program, 3 ROTC credits may be used to substitute for a limited elective and 3 ROTC credits may be used to substitute for the GHW requirement.

Aerospace Engineering Curriculum
Starting at Other Penn State Campuses

NOTE: *Many AERSP courses are offered only once a year in the semester shown on the schedule, except for AERSP 305W & 424.*

1st Semester

ENGL 015 or 030	Rhetoric & Composition	3
•CHEM 110	***Chemical Principles***	***3***
•MATH 140	***Calculus I***	***4***
•EDSGN 100	***Intro. to Engr. Design***	***3***
First-Year Seminar ♦		1
		14

2nd Semester

ECON 102 or 104 (GS)	Micro or Macro-economics	3
•MATH 141	***Calculus II***	***4***
MATH 220	Matrices	3
•PHYS 211	***Mechanics***	***4***
GEN ED REQUIREMENT		GEN ED
		17

3rd Semester

MATH 230	Calc. & Vector Analysis	4
* CMPSC 201	Programming with C++	3
+PHYS 212	**Electricity & Magnetism**	**4**
CAS 100 A/B	Effective Speech	3
EMCH 211	Statics	3
		17

4th Semester

+MATH 250	**Ordinary Diff. Eqns.**	**3**
EMCH 213	Strength of Materials	3
** M E 201	Thermal Science	3
+EMCH 212	**Dynamics**	**3**
ENGL 202C	Technical Writing	3
GEN ED REQUIREMENT		3
		18

5th Semester

+AERSP 301	**Aerospace Structures I**	**3**
+AERSP 309	**Astronautics**	**3**
+AERSP 311	**Aerodynamics I**	**3**
+AERSP 313	**Aerospace Analysis**	**3**
EMCH 315, 316	Mech. Response of Materials	3
GenEd Health & Wellness (GHW)		1.5
		16.5

6th Semester

AERSP 304	Dynamics & Control	3
+AERSP 306	**Aeronautics**	**3**
AERSP 305W	Aerospace Tech. Lab (or move to 7th sem. and swap with AERSP 424, EE 210 or EE 212 or AERSP Tech elective)	3
AERSP 312	Aerodynamics II	3
PHYS 214	Waves & Quantum	2
GEN ED REQUIREMENT		3
		17

7th Semester

++AERSP 401/402/403 A	Vehicle Sys. Design I	3
AERSP 410	Aerospace Propulsion	3
AERSP 413 or 450	Flight Vehicle Controls	3
AERSP Technical Elective (or AERSP 305W, AERSP 424, EE 210 or EE 212)		3
~ General Technical Elective or Limited Elective		3
GenEd Health & Wellness (GHW)		1.5
		16.5

8th Semester

++ AERSP 401/402/403 B	Vehicle Sys. Design II	2
AERSP 424, EE 210 or EE 212	Programming or electronics (or AERSP Tech Elective)	3
AERSP Technical Elective		3
~Limited Elective or General Technical Elective		3
GEN ED REQUIREMENT		3
GEN ED REQUIREMENT		3
		17

Total Credits – 133 ◦

• Courses listed in ***boldface italic type*** require a grade of C or better for entrance into this major

♦ Students at other Penn State campuses should confer with an adviser to determine if First Year Seminars are offered there.

+ Courses listed in **boldface type** require a grade of C or better for graduation in this major.

* CMPSC 121, 131 or 200 may be substituted.

** M E 300 (Engineering Thermo. I) may be used as a substitute if ME 201 is not offered.

++ Students may schedule either the spacecraft design sequence (401A & B), the aircraft/rotorcraft design sequence (402A & B) or autonomous vehicle sequence (403A &B). The appropriate controls course (450 or 413) should be scheduled accordingly.

~ Up to 6 credits of Co-op, upon completion of the program, may be substituted for three technical elective credits and three limited elective credits. For those students who complete the ROTC Program, 3 ROTC credits may be used to substitute for a limited elective and 3 ROTC credits may be used to substitute for the GHW requirement.

◦ 132 credits includes 3 credits of EMCH 211 and 3 credits of EMCH 213 instead of EMCH 210 for 5 credits available at UP.

Aerospace Engineering Academic Requirements Check Sheet

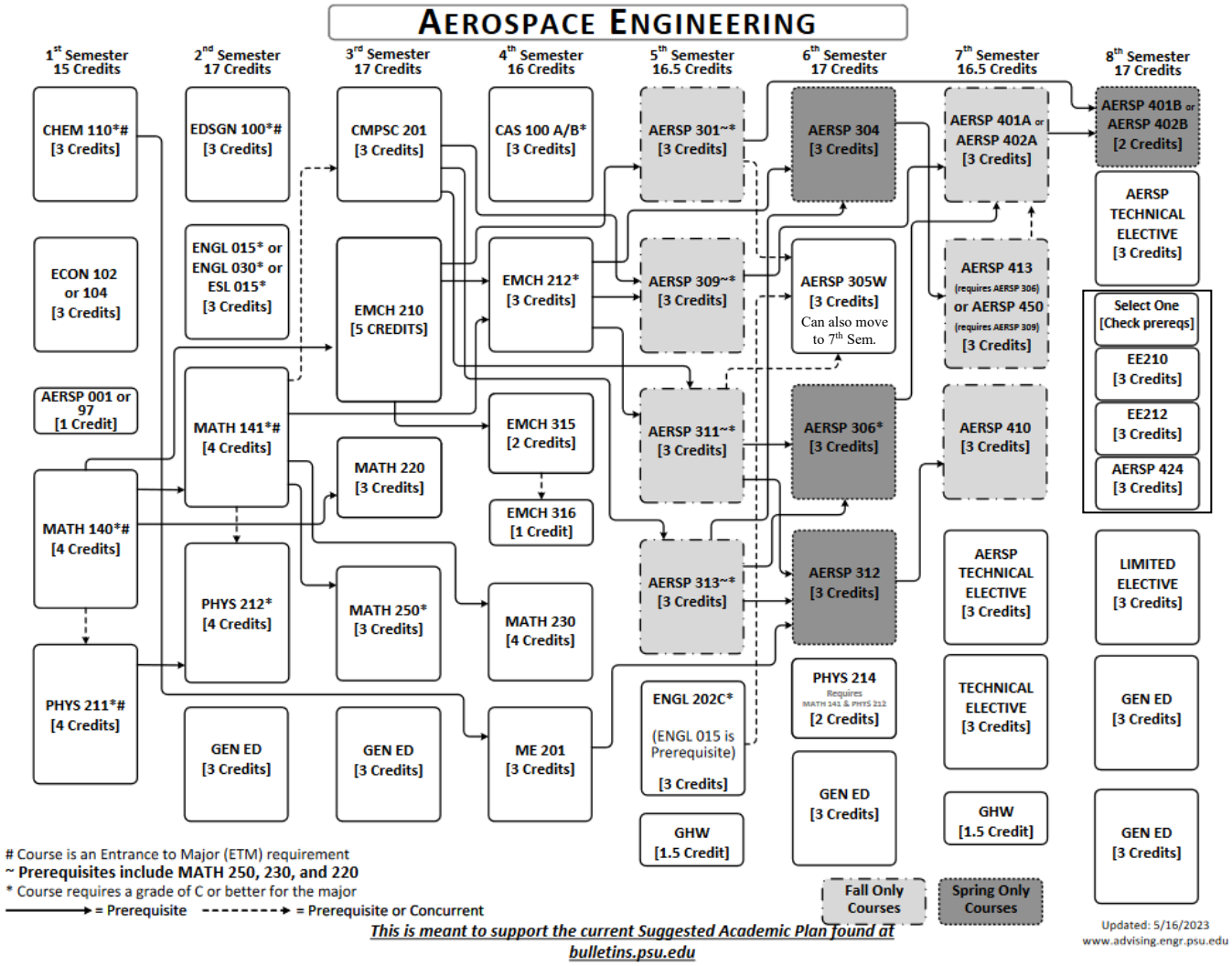
Name				
Student ID number				
Anticipated graduation semester				
Semester completed	Sem. planned/ or Grade		**Entrance to Major Requirements: Require a grade of C or better before entering major**	
			CHEM 110	Chemical Principles I	3
			EDSGN 100	Cornerstone Engineering Design	3
			MATH 140	Calculus With Analytic Geometry I	4
			MATH 141	Calculus with Analytic Geometry II	4
			PHYS 211	General Physics: Mechanics	4
Semester completed	Sem. planned/ or Grade		**Additional courses likely completed in 1st year**		
				FYS (must be a unique 1 cr not used for other requirements)	1
			Select 3 credits from the following:		3
			ECON 102	Introductory Microeconomic Analysis and Policy	
			ECON 104	Introductory Macroeconomic Analysis and Policy	
			ECON 14	Principles of Economics	
			Require a grade of C or better to graduate		
			ENGL 15 (or 30)	Rhetoric and Composition	3
			Select 3 credits from the following (note Air Force ROTC students may petition for AIR 352):		3
			CAS 100A	Effective Speech	
			or CAS 100B	Effective Speech	
Semester completed	Sem. planned/ or Grade		**Prerequisite courses necessary to complete before Fall of 3rd year**		
			Select 3 credits from the following:		3
			CMPSC 121	Introduction to Programming Techniques	
			CMPSC 131	Programming and Computation I: Fundamentals	
			CMPSC 200	Programming for Engineers with MATLAB	
			CMPSC 201	Programming for Engineers with C++	
			Select 5-6 credits of the following:		5-6
			EMCH 210 (5)	Statics and Strength of Materials	
			or EMCH 211 (3)	Statics	
			& EMCH 213 (3)	and Strength of Materials	
			MATH 220	Matrices	2-3
			MATH 230	Calculus and Vector Analysis	4
			Require a grade of C or better to graduate		
			EMCH 212	Dynamics	3
			Select 3-4 credits of the following:		3-4
			MATH 250 (3)	Ordinary Differential Equations	
			or MATH 251 (4)	*Ordinary and Partial Differential Equations*	
			Select 3 credits from the following (pre-requisite for AERSP 312 in **SP of 3rd year**):		3
			ME 201	Introduction to Thermal Science	
			ME 300	Engineering Thermodynamics I (for students at CWC campuses)	
			EMCH 302H	*Thermodynamics, Heat Conduction, and Principles of Modeling*	
Semester completed	Sem. planned/ or Grade		**Prescribed Courses: Require a grade of C or better to graduate**		
		FA only	AERSP 301	Aerospace Structures	3
		FA only	AERSP 309	Astronautics	3
		FA only	AERSP 311	Aerodynamics I	3
		FA only	AERSP 313	Aerospace Analysis	3
		SP only	AERSP 306	Aeronautics	3
			Select 3 credits from the following:		3
			ENGL 202C	Effective Writing: Technical Writing	
			AERSP 397	*Fundamentals of Technical Writing* (pilot, must be taken at same time as 305W)	
			PHYS 212	General Physics: Electricity and Magnetism	4

Semester completed	Sem. planned/ or Grade		**Additional Major Course Requirements**		Credits
		SP only	AERSP 304	Dynamics and Control of Aerospace Systems	3
		FA/SP	AERSP 305W	Aerospace Technology Laboratory	3
		SP only	AERSP 312	Aerodynamics II	3
		FA only	AERSP 410	Aerospace Propulsion	3
			Select 3 credits from the following (see prerequisites for Capstone courses)		3
		FA only	AERSP 413	Stability and Control of Aircraft	
		FA only	or AERSP 450	Orbit and Attitude Control of Spacecraft	
			Select one of the following Capstone sequences:		5
		FA only	AERSP 401A	Spacecraft Design--Preliminary	
		SP only	& AERSP 401B	and Spacecraft Design--Detailed	
		FA only	AERSP 402A.1	Aircraft Design--Preliminary	
		SP only	& AERSP 402B.1	and Aircraft Design--Detailed	
		FA only	AERSP 402A.2	Rotorcraft Design--Preliminary	
		SP only	& AERSP 402B.2	and Rotorcraft Design--Detailed	
		FA only	*AERSP 403A*	*Autonomous Aerospace Vehicle Design--Preliminary*	
		SP only	*AERSP 403B*	*and Autonomous Aerospace Vehicle Design--Detailed*	
			Select 3-4 credits from the following:		3-4
			AERSP 424 (3)	Advanced Computer Programming	
			EE 210 (4)	Circuits and Devices	
			EE 212 (3)	Introduction to Electronic Measuring Systems	
			EMCH 315	Mechanical Response of Engineering Materials	2
			EMCH 316	Experimental Determination of Mechanical Response of Materials	1
			PHYS 214	General Physics: Wave Motion and Quantum Physics	2

Semester completed	Sem. planned/ or Grade		**Supporting Courses and Related Areas**		
			(lionpath won't automatically place AERSP 496, 497, 424, or 430 in the ATE category)		
				Aerospace Technical Elective (ATE) - must be AERSP 400-level elective	3
				Aerospace Technical Elective (ATE) - must be AERSP 400-level elective	3
				General Technical Elective (GTE) - see curiculum guide	3
				Limited Elective (LE) - see curriculum guide	3

Semester completed	Sem. planned/ or Grade	US or IL ?	**General Education (GQ, GWS, GN + 3 credits of GS already included above)** (must take 1 US & 1 IL course, 6 cr total which can double count with these GenEds)		
			ECON 14/102/104	GS - already accounted for above	
				Interdomain course (any two domains)	3
				Interdomain course (any two domains)	3
				GA - single domain	3
				GH - single domain	3
				GHW - single domain	3
				Additional GA, GH, GS, or Interdomain course^	3
					Total
Legend:		List the course you have or will take to fulfill this requirement			132-135
		C or better required (for ETM or graduation), although a D will meet prerequisite requirements			depending on selections a
		Indent - select from listed options			
		Italicized - if you select this option, it may require a course substitution petition at coursesub.psu.edu			
		^or world language course beyond 12 th credit level.			
Revised 1/10/2025					

Aerospace Engineering Curriculum Flow Chart



This is meant to support the current Suggested Academic Plan found at bulletins.psu.edu

Technical Electives (9 credits)

Students must select 9 credits as follows:

Aerospace Technical Electives -- 6 credits -- must be 400-level AERSP courses.

- 400-level Aerospace courses not used to meet other program requirements.
- AERSP 204/404 may be used for a maximum of 3 cr. of Aerospace Technical Electives, see section on "CREDITS EARNED AND AWARDED FOR PARTICIPATION IN AERSP 204H/404H PROGRAM."
- AERSP 494 and 496 involve research or projects agreed upon by both the student and faculty before registering for these credits. A maximum of 3 credits in any combination of AERSP 494 and 496 can be earned for one subject. Students who do additional independent study or research in a different subject can earn an additional maximum of 3 cr. in any combination of AERSP 494 and 496. A Department Registration Form should be completed at the beginning of each semester in which AERSP 494 or 496 credits are scheduled in consultation with the faculty advisor. See Appendix A for these forms.

General Technical Elective -- 3 credits – In general, these may be 400-level technical courses chosen from the following programs:

ACS, AE, AERSP, A B E, ASTRO, BIOE, CH E, CE, CMPSC, CSE, EE, EMCH, ESC, FSC, IE, IST, MATH, M E, METAL, METEO, NUCE, PHYS. Also permitted in this category, Co-op/Internship credit[1]. Note that learning assistant credit, or non-technical offerings from these programs would not count in this category.

A list of common General Technical Elective courses taken by Aerospace students is provided below for reference, along with their pre-requisites.

Course Number	Course Title	Prerequisites
ASTRO 291	Astronomical Methods and the Solar System	PHYS 211
ASTRO 292	Astronomy of the Distant Universe	ASTRO 291
PHYS 230	Introduction to Relativity	PHYS 212 and MATH 141, concurrent MATH 220 and Math 230 (or 231)
PHYS 237	Intro to Modern Physics	PHYS 212 or concurrent PHYS 214
EDSGN 468	Engineering Design and Analysis with CAD	EMCH 210 or 211

[1] The first three credits of co-op/internship courses earned apply toward the limited elective. An additional three credits will apply toward the general technical elective.

AE 469	Photovoltaic Systems Design and Construction	E E 210 or E E 211 (or 212)
ASTRO 410	Computational Astrophysics	CMPSC 201 (or 121), PHYS 212, PHYS 213 and PHYS 214
EMCH 400	Advanced Strength of Materials and Design	EMCH 213, EMCH 210
EMCH 407	Computer Methods in Engineering Design	CMPSC 200 (or 201), EMCH 210 (or 213)
EMCH 461/ ME 461	Finite Elements in Engineering	EMCH 213 (or 210), CMPSC 201 (or 200)
EMCH 471	Engineering Composite Materials	(EMCH 213 or EMCH 210) and (CMPSC 200 or CMPSC 201)
EMCH 473/ AERSP 473	Composites Processing	EMCH 471 (or possibly AERSP 470 by prereq override)
ESC 456/EE 456/EGEE 456	Introduction to Neural Networks	(CMPSC 201 or CMPSC 121 or CMPSC 131) and MATH 220
ESC 481	Elements of Nano/Micro-electromechanical Systems Processing and Design	EMCH 213 , or EMCH 315 , or E SC 312
IE 405	Deterministic Models in Operations Research	MATH 220
NUCE 406/ME 406	Introduction to Statistical Thermodynamics	ME 300 (or 201 or 302), MATH 230 (or 231)
METEO 466	Planetary Atmospheres	MATH 141, PHYS 211
EGEE /ME 430	Introduction to Combustion	ME 201 or ME 300
MATH 401	Introduction to Analysis	MATH 230
MATH 405	Advanced Calculus for Engineers and Scientists	MATH 230 and (250 or 251)
MATH 410	Complex Analysis for Mathematics and Engineering	MATH 230
MATH 411	Ordinary Differential Equations	MATH 230 and (250 or 251)
MATH 412	Fourier Series and Partial Differential Equations	MATH 230 and (250 or 251)
MATH 414	Introduction to Probability Theory	MATH 230
MATH 417	Qualitative Theory of Differential Equations	MATH 220 and (250 or 251)

MATH 418	Introduction to Probability and Stochastic Processes for Engineering	MATH 230
MATH 422	Wavelets and Fourier Analysis	
MATH 425	Introduction to Operations Research	MATH 141 and 220
MATH 427	Foundations of Geometry	MATH 230
MATH 430	Linear Algebra and Discrete Models	MATH 220
MATH 441	Matrix Algebra	MATH 220
MATH 449	Applied Ordinary Differential Equations	MATH 250 or 251
MATH 451	Numerical Computations	3 cr. programming, MATH 230
MATH 452	Deep Learning Algorithms and Analysis	MATH 220, 230, CMPSC 121 or 131 or 200 or 201
MATH 455	Introduction to Numerical Analysis	CMPSC 121 or 131 or 200 or 201, MATH 220, 230
MATH 484	Linear Programs and Related Problems	MATH 220, 230
MATH 486	Mathematical Theory of Games	MATH 220
ME 410	Heat Transfer	ME 320 (or request subst. of AERSP 311 & 312), CMPSC 200 or 201, MATH 220
ME 421	Viscous Flow Analysis and Computation	(ME 201 or ME 320 or AERSP 308 or AERSP 311) and (CMPSC 200 or 201) and MATH 220 and (MATH 250 or 251)
ME 455	Automatic Control Systems	Request subst. of AERSP 304 for ME 357, and AERSP 311 & 312 for ME 320
PHYS 419/ MATH 419	Theoretical Mechanics	MATH 230, (250 or 251), PHYS 212, 213, 214
PHYS 462	Applications of Physics in Medicine	PHYS 211

Limited Elective (3 credits)

The Limited Elective can be 3 credits of almost any subject, with some exceptions[2].

Students may select 3 credits from any of the following categories:

- Courses in the Aerospace Technical Elective or General Technical Elective categories
- Courses needed to fulfill requirements for a minor
- Foreign-language courses (at any level)
- Courses in the Engineering Entrepreneurship Program
- Courses in the Engineering Leadership Development Program
- Upon completion of the ROTC program, ROTC students may use 3 cr. of ROTC for GHW and 3 cr. of ROTC as the Limited Elective.
- Co-op/internship students may use 3 cr. of Co-op/Internship courses for the Limited Elective, and 3 cr. of Co-op/Internship as the General Technical Elective.

Some Limited Elective courses (which would **NOT** count as a Technical Elective) to consider include:

Course number	Course Title	Prerequisites
ENGR 405	Project Management for Professionals	
ENGR 407	Technology-Based Entrepreneurship	ECON 102 (or 104)
ENGR 408	Leadership Principles	
ENGR 409	Leadership in Organizations	
ENGR 410	Coaching Skills and Practice for Engineering Leaders	ENGR 408
ENGR 411	Entrepreneurship Business Basics	3 credits in economics
ENGR 415	Technology Launch for Entrepreneurs	ENGR 407 and MGMT 215 or ENGR 310
ENGR 422	Leadership of International Virtual Engineering Teams	ENGR 408
ENGR 425	New Venture Creation	ECON 102 (or 104), CAS 100
ENGR 426	Invention Commercialization	ECON 102 (or 104), CAS 100

[2] Students **MAY NOT** use the following for the Limited Elective:
MATH 001, 002, 003, 004, 005, 006, 007, 021, 022, 026, 030, 036, 040, 041, 100, 198; CHEM 101, 108; PHYS 100, 150, 151, 191, 215, 250, 251, 265; PH SC 007, 008; ENGL 004, 005; KINES (any course); LL ED 005, 010; ESL 004; CAS 126; Technology Courses (those that have a T suffix in the course title)

METEO 469	From Meteorology to Mitigation: Understanding Global Warming	MATH 140
EGEE 405	Renewable Energy in Electricity Markets	EE 210 and ECON 102 (or 104)
ENVSE 400	Safety Engineering	CHEM 110, PHYS 211, MATH 141
ENVSE 420	Fire Safety Engineering	CHEM 110, PHYS 212, MATH 141
ENVSE 440	Industrial Ventilation for Contaminant Control	MATH 141, PHYS 212, CHEM 110
ENVSE 450	Environmental Health and Safety	CHEM 110
ENVSE 470	Engineering Risk Analysis	MATH 251
ENVE 430	Sustainable Engineering	Permission of program
ENVE 460	Environmental Law	Senior standing, Permission of program

Course Series/Elective Recommendations for Areas of Focus

Several areas of focus are identified below, noting the best capstone series selection and any other course options and electives that are suggested to focus your studies in each area. Selecting a focus area is not required. This is for your information only.

Courses Recommended for Students Interested in **Space Systems**
AERSP 401 A/B Capstone and AERSP 450
AERSP 424 Advanced Computer Programming (counts as AERSP Tech Elect. only if EE 210 or 212 also taken)
Technical electives:
AERSP 415 Spacecraft/Environment Interactions
AERSP 430 Space Propulsion and Power Systems
AERSP 458 Advanced Orbital Mechanics
AERSP 460 Aerospace Control Systems
AERSP 470 Advanced Aerospace Structures
Note: You may also be interested in the certificate in Space Systems offered by Electrical Engineering: See details posted in the Canvas Aerospace UG Community.

Courses Recommended for Students Interested in **Aircraft Design**
AERSP 402.1 A/B Capstone (Aircraft) and AERSP 413
AERSP 424 Advanced Computer Programming (counts as AERSP Tech Elect. only if EE 210 or 212 also taken)
Technical electives:
AERSP 497 Design Optimization (recommended to take in 6th semester, before starting capstone)
AERSP 420 Principles of Flight Testing
AERSP 425 Theory of Flight

Courses Recommended for Students Interested in **Rotorcraft Design**
AERSP 402.2 A/B Capstone (Rotorcraft) and AERSP 413
AERSP 424 Advanced Computer Programming (counts as AERSP Tech Elect. only if EE 210 or 212 also taken)
Technical electives:
AERSP 497 Design Optimization (recommended to take in 6th semester, before starting capstone)
AERSP 407 Aerodynamics of V/STOL Aircraft

Courses Recommended for Students Interested in **Autonomous Vehicle Design**
AERSP 403 A/B Capstone (Autonomous Aerospace Vehicle Design)
AERSP 424 Advanced Computer Programming is STRONGLY RECOMMENDED before starting 4th year (counts as AERSP Tech Elect. only if EE 210 or 212 also taken)
Technical electives:
AERSP 462 Aerospace Autonomy REQUIRED CO-REQ for Autonomous Vehicle Capstone
AERSP 460 Aerospace Control Systems

Courses Recommended for Students Interested in **Design Methods**
Any capstone
AERSP 424 Advanced Computer Programming (counts as AERSP Tech Elect. only if EE 210 or 212 also taken)
Technical electives:
AERSP 497 Design Optimization (recommended to take in 6th semester, before starting capstone)
A second AERSP capstone can be taken as a technical elective

Courses Recommended for Students Interested in **Structures and Materials**
Any capstone
Technical electives:
AERSP 470 Advanced Aerospace Structures
EMCH 471 Engineering Composite Materials
AERSP 473 Composite Processes (pre-req of EMCH 471 or AERSP 470 by petition)
Note: You may also consider the EMCH minor.

Courses Recommended for Students Interested in **Aerodynamics**
AERSP 402 A/B Capstone (Aircraft or Rotorcraft) and AERSP 413
Technical electives:
AERSP 423 Intro to Numerical Methods in Fluid Dynamics
AERSP 407 Aerodynamics of V/STOL Aircraft
AERSP 425 Theory of Flight

Aerospace 400-level Course Offerings for 2024-2025

Fall 2024 courses
AERSP 401A - Spacecraft Design - Preliminary
AERSP 402A1 - Aircraft Design - Preliminary
AERSP 402A2 - Rotorcraft Design – Preliminary
AERSP 403A - Autonomous Aerospace Vehicle Design - Preliminary
AERSP 407 - Aerodynamics of V/STOL Aircraft
AERSP 410 - Aerospace Propulsion
AERSP 413 - Stability and Control of Aircraft
AERSP 424 - Advanced Computer Programming
AERSP 425 - Theory of Flight
AERSP 450 - Orbit and Attitude Control of Spacecraft
AERSP 460 - Aerospace Control Systems
AERSP 462 - Aerospace Autonomy
AERSP 470 - Advanced Aerospace Structures
AERSP 490 - Introduction to Plasmas

Spring 2025 Courses
AERSP 401B - Spacecraft Design - Detailed
AERSP 402B1 - Aircraft Design - Detailed
AERSP 402B2 - Rotorcraft Design – Detailed
AERSP 403B - Autonomous Aerospace Vehicle Design - Detailed
AERSP 423 - Introduction to Numerical Methods in Fluid Dynamics
AERSP 424 - Advanced Computer Programming
AERSP 430 - Space Propulsion and Power Systems
AERSP 458 - Orbital Mechanics
AERSP 473 - Composites Processing
AERSP 492 - Space Astronomy and Introduction to Space Science
AERSP 497 - There will be a few “special topic” offerings in the spring, TBD

Please refer to the Undergraduate Bulletin for information on the aerospace program:
http://undergraduate.bulletins.psu.edu/undergraduate/colleges/engineering/aerospace-engineering-bs/

Refer to http://undergraduate.bulletins.psu.edu/university-course-descriptions/undergraduate/aersp/ for aerospace course descriptions.

Petitions for Course Substitutions

Students may request course substitutions by completing a College of Engineering petition form (https://advising.engr.psu.edu/student-resources/petitions.aspx). This can be used for any course, including those needed to meet requirements for General Education and for the major.

If the petition concerns a Department requirement, the Director or Associate Director of Undergraduate Studies will decide whether to approve it. Petitions concerning General Education, or other College or University requirements, must first receive a recommendation from the Department, and then are forwarded to the Assistant Dean for Student Services for a decision.

Procedure

1. Plan to submit the petition and receive a decision before taking the substitute course. (In some cases, this is not possible, but be aware that not all petitions are approved.)
2. Go to https://coursesub.psu.edu and fill out the online petition form. It will then be routed electronically to the Director/Associate Director of Undergraduate Studies, and if needed, to the Assistant Dean for Student Services.
3. You will be notified by email if the petition was approved or denied. If approved, appropriate change(s) will be made to your degree audit.
4. Retroactive adds, drops or withdrawals require different actions, depending upon when they occur. Please contact Amy Custer, Dr. Stewart or Dr. Melton for the details.

Petitions will be placed in your official file after completion by all required authorities.

How to Write the Petition

1. State your request clearly and completely. The evaluators will base their decisions upon your written statements (and the information on your transcript).
2. *Do not ask to waive or set aside a requirement or course*; instead, cast the request in terms of what you wish to *substitute* for a particular course or to meet a particular requirement.
3. Give an adequate justification: explain the circumstances that have led to your request. *Do not simply state "To allow me to graduate on time."*

Common petitions

- If a student begins at a commonwealth campus that does not offer first year seminar, any extra 1 credit (such as from Math 251, or EMCH 211 & 213), can be petitioned to count for this 1 credit.
- Autonomy capstone (if listed as AERSP 497) will need to be petitioned to count as capstone
- If a student takes CMPSC 121, 131 or 200 instead of CMPSC 201, this may be petitioned as a substitution.
- AERSP 424 should be petitioned to substitute for AERSP 440 if not counting for the 424 requirement.
- Some limited electives must be petitioned to count in this category.

Note: The Deans office will not consider petitions in the semester that you graduate; petitions must be submitted prior to the beginning of your final semester.

All Petitions are treated in strict confidence.

PREREQUISITE INFORMATION

Prerequisites for Aerospace Required and Tech Elective Courses

COURSE	PREREQUISITE	PREREQUISITE OR CONCURRENT
ENGL 15	ENGL 004 or Satisfactory Placement Test	
ENGL 202C	ENGL 15 or 30, 4th Semester Standing	
CHEM 110	Satisfactory Placement Test	
MATH 140	Algebra & Trigonometry/Satisfactory Placement Test	
MATH 141	MATH 140	
MATH 220	MATH 110 or 140	
MATH 230	MATH 141	
MATH 250	MATH 141	
PHYS 211		MATH 140
PHYS 212	MATH 140 and PHYS 211	MATH 141
PHYS 214	MATH 141, PHYS 211 and 212	
CMPSC 201, 121, 131, or 200	MATH 140 (for 200 and 201)	MATH 141 (for 200, 201) MATH 140 (for 121, 131)
EDSGN 100		
EMCH 210	MATH 140	
EMCH 212	EMCH 211 or 210, MATH 141	
EMCH 315	EMCH 213 or 210	
EMCH 316		EMCH 315
EE 210	PHYS 212	MATH 250 or 251
E E 212	PHYS 212	
M E 201	CHEM 110	
AERSP 204	Consent of instructor	
AERSP 301	EMCH 210 (or 213), MATH 220, MATH 230 (or 231 and 232), MATH 250 (or 251)	
AERSP 304	AERSP 313, EMCH 212	
AERSP 305W		AERSP 301, 311, ENGL 202C or AERSP 397
AERSP 306	AERSP 311, 313	

COURSE	PREREQUISITE	PREREQUISITE OR CONCURRENT
AERSP 309	EMCH 212, MATH 220, MATH 230 (or 231 and 232), MATH 250 (or 251), CMPSC 201 (or 121, or 131 or 200)	
AERSP 311	EMCH 212, MATH 220 and MATH 230 (or 231 and 232), MATH 250 (or 251), CMPSC 201 (or 121, or 131 or 200).	
AERSP 312	AERSP 311, 313, M E 201 (or 300)	
AERSP 313	CMPSC 201 or 202, MATH 220, 230 (or MATH 231 AND 232), 250	
AERSP 401A	AERSP 309	AERSP 450
AERSP 401B	AERSP 301, 401A	
AERSP 402A	AERSP 306	AERSP 413
AERSP 402B	AERSP 301, 402A	
AERSP 404	Consent of instructor; AERSP 204	
AERSP 405	AERSP 305W	
AERSP 407	AERSP 312	
AERSP 410	AERSP 312	
AERSP 412	One Course in Fluid Mech	
AERSP 413	AERSP 304, 306	
AERSP 415	AERSP 308 or AERSP 312 or ME 420	
AERSP 420	AERSP 306	
AERSP 423	AERSP 312 (or ME 320), CMPSC 200 (or 201),MATH 250 (or 251)	
AERSP 424	MATH 220, CMPSC 201	
AERSP 425	AERSP 306	
AERSP 430	AERSP 410 or ME 432	
AERSP 450	AERSP 304, 309	
AERSP 458	AERSP 450 or EMch 409 or Phys 419	
AERSP 460	AERSP 304	
AERSP 470	AERSP 301	AERSP 304 , EMch 315
AERSP 473	EMCH 471*	
AERSP 490	EE 330 or Phys 400*	
AERSP 492	Phys 400 or EE 330* or METEO 421 and METEO 431	
AERSP 494	7th Semester Standing – permission of advisor for thesis work	

*Consult instructor or director of UG studies on possible substitutions

Prerequisite Override Requests

You must have all of the required pre-requisites completed or co-requisites registered for (or in progress at Penn State) before registering for courses in Lionpath for the next semester. There are situations in which you may have a prerequisite that is not recognized by Lionpath (such as transfer credit which hasn't been processed to your transcript yet, or an approved petition which allows a substitution, for example). In these situations, you may request a prerequisite override in Lionpath. **Justification** should be provided for any prerequisite override request. The Prerequisite Override Request form can be found in the enrollment section of the LionPATH student home base. Step-by-step instructions on how to complete the form can be found on the LionPATH Support website (https://lionpathsupport.psu.edu/files/2022/02/S_Request-Prerequisite-Override.docx). Students are encouraged to consult with their assigned academic adviser before submitting a prerequisite override request.

Common prerequisite override scenarios:

- If you need to take a Math or EMCH course that is a prerequisite for the fall 3rd year AERSP courses at a non-PSU institution over the summer, ***please hold off on submitting the prerequisite override request until you have completed the course and can share an unofficial transcript via the override request process*** (while you send the official transcript to PSU, which can take longer). This will delay you from registering for 3-4 of your Fall 3rd year courses. In the meantime, you may reach out to the Associate Director of Undergraduate Studies to indicate your intent to register so that we can track the course demand and manage seats.
- If you have all of the prerequisites for a course completed, but are not yet in the major due to the credit window (but otherwise meeting all ETM requirements), you may use the override process to request enrollment in AERSP courses.
- Note, if a prerequisite course for a future registered course is late dropped or not successfully completed, a warning will be generated and you may be dropped from courses by the registrar the Friday before the semester begins. You may submit a prerequisite override at this point, but it may not be approved.

SCHREYER SCHOLARS IN AEROSPACE ENGINEERING

Honors Thesis Guidelines and Requirements

Getting Started with Honors Thesis Research

The prospect of identifying a research topic may seem daunting, but students should remember that this effort is intended as part of their honors education, to be guided by a member of the faculty. Students are not expected to conceive of a thesis topic on their own (although good ideas are always welcomed). The thesis supervisor initially helps develop an idea, define the scope of the research, and plan the work, then later, guides the research and the thesis writing.

A good strategy for students to get started is to talk with faculty whose research aligns with their interests. Students may learn about departmental research projects from their aerospace courses, or by asking their honors adviser, but they should also review the faculty webpages at www.aero.psu.edu. It's never too soon to begin this process. Some research projects require completion of specific courses or self-study of background materials before the actual research can begin. Students should expect to spend at least three semesters from start to finish (and summer can be a very productive time for research).

The length and scope of an honors thesis depends upon the particular research project. In general, the thesis should be written with the same level of detail as a journal paper. Aerospace honors theses from recent years can be accessed in the University Libraries' collection.

SHC Thesis Requirements

The Schreyer Honors College provides general guidelines, requirements and deadlines for the honors thesis. Note that two people must approve the final thesis: the honors adviser and the thesis supervisor. If these are the same person, the student must identify a Faculty Reader to be the second approver.

Aerospace-specific Requirement

Scholars majoring in aerospace engineering are required to give a formal presentation of their thesis. The preferred venue for this is the AIAA Regional Student Conference, held in the spring semester. An honors adviser can approve an alternative presentation forum (for example, a research conference or a public seminar with a presentation format similar to that of the AIAA Student Conference).

Integrated Undergraduate/Graduate Program

The Integrated Undergraduate/Graduate (IUG) program in the Schreyer Honors College (SHC) is designed exclusively for Schreyer Scholars who have exceptional academic records; whose progress in the major is so advanced that they would be taking graduate courses in later semesters even without IUG status; whose general education progress and plans indicate a readiness to forge ahead with specialization; and who are ready for the particular challenge of graduate work, research and advancing knowledge. Schreyer Scholars who believe they fit this profile are encouraged to apply to be IUG Scholars. The application process for IUG must begin during the 4th, 5th or 6th semester of study.

More information can be found at http://www.shc.psu.edu/students/iug/program/ or talk with your scholar advisor.

CO-CURRICULAR STUDENT OPPORTUNITIES AND ACTIVITIES

Internships and Co-ops

Aerospace engineering students who secure short-term employment offers related to their degree program may complete internships or co-ops for academic credit through the Career Resources & Employer Relations office in the College of Engineering.

Benefits of internships and co-ops include:

- Experiencing a real-world professional environment and getting an idea of what practicing aerospace engineers do on the job.
- Learning more about areas of interest to pursue in future studies and skills that are professionally essential.
- Earning some money prior to graduation while working in a professional position.

Internships: An internship is a short-term (typically one-semester) major-related work experience with one employer. Internships are open to undergraduate or graduate students who have completed at least one academic year at Penn State. Students may complete multiple internships with multiple employers or, if they have an offer to continue to work beyond one semester with one employer, they may transition to the Co-op Program. Domestic students who opt to receive credit for an internship will be registered for ENGR 195; international students, who are required to register for academic credit while working at an internship, will be registered for either ENGR 185 or ENGR 195.

Co-op Program: A co-op is a short-term major-related rotational work experience with one employer over a minimum of two semesters. Co-ops are open to undergraduate students who have chosen a major and completed entrance-to-major requirements. Most co-op experiences include at least one spring or fall semester in addition to summers. Students considering the Co-op Program should talk to both their prospective employer and their academic adviser about how to schedule their work experiences so they can stay on-track for graduation. All students in the Co-op Program are advised to opt for credit for their experience, which can be used toward degree requirements. Students in their first co-op rotation will be registered for ENGR 295 (1 credit); in their second rotation, ENGR 395 (1 or 2 credits); in their third rotation (if applicable), ENGR 395 (1, 2, or 3 credits). Aerospace engineering students may use up to 6 credits as follows: 3 credits for the Limited Elective and 3 credits for a General Technical Elective.

Students who are registered for credit for any internship or co-op courses will be required to complete some assignments while working. There are no in-class requirements for any internship or co-op courses.

For more information about internships and co-ops in the College of Engineering, visit: https://career.engr.psu.edu/students/intern-coop/index.aspx

Or contact:

Your academic adviser	Amy Custer Undergraduate Program Staff Assistant 308M ECoRE Building 814-865-6432 asm1@psu.edu	Career Resources & Employer Relations 117 Hammond 814-863-1032 career@engr.psu.edu

Aerospace Engineering Suggested Co-op Schedule

YEAR 3

SUMMER		FALL		SPRING	
GenEd Requirement	3	AERSP 301	3	WORK	
EMCH 315-316	3	AERSP 309	3	(ENGR 295A)	1
	6	AERSP 311	3		
		AERSP 313	3		
		GenEd Requirement	3		
		GHW	1.5		
			16.5		

YEAR

SUMMER		FALL		SPRING	
ENGL 202C	3	WORK		AERSP 305	3
E E 212	3	(ENGR 395A)	2	AERSP 304	3
PHYS 214	2			AERSP 306	3
	8			AERSP 312	3
				GenEd Requirement	3
				GHW	1.5
					16.5

YEAR 5

SUMMER		FALL	
WORK		AERSP 401A	3
(ENGR 495A)	3	AERSP 402A	3
		AERSP 410	3
		AERSP 413/450	3
		AERO TECH ELECT	3
		AERO TECH ELECT	3
			18

NOTE: This schedule shows how up to 6 credits of co-op courses could be used toward General Technical and Limited Elective requirements while still completing the degree in roughly 4.5 years. Please review your specific plan with your academic advisor in advance of beginning Co-op rotations. If no Co-op credits are substituted for electives, two additional 3-credit technical electives must be scheduled.

Study Abroad Opportunities

Each fall we typically have a couple of students from the University of Southampton in the UK take Aerospace courses at UP with us while a few of our students spend the spring semester at University of Southampton taking Aerospace courses there. While "exchange" programs like this, specific to Aerospace Engineering are limited, Penn State offers a wide variety of global engagement experiences including study abroad experiences and embedded travel programs which involve shorter trips embedded into courses during PSU breaks (such as the week off around Thanksgiving, during Spring Break, early May or over the summer). Extra fees are involved in these programs. If you are interested in exploring your options, you should reach out to the Global Engineering Engagement program early in your studies so you can identify the best timing and explore how best to integrate courses taken at an international institution in your curriculum. You can also search for specific programs here.

Student Societies and Organizations

American Institute of Aeronautics and Astronautics (AIAA)

The AIAA is the largest American technical society devoted to science and engineering in the fields of space, technology, rocket systems, aerodynamics and marine systems. Students are encouraged to join the Penn State Student Branch of the AIAA. Membership applications and information on the benefits of belonging to this organization may be obtained from the AIAA faculty advisor. Meetings and social events are held regularly during the academic year. Members can also attend the annual student conference for the Mid-Atlantic Region each April. Listen for announcements in class and watch your emails for meeting notices. Dr. Robert G. Melton (rgmelton), 308L ECoRE, is the faculty advisor to the AIAA Student Branch.

Sigma Gamma Tau

Sigma Gamma Tau is the National Honor Society in Aerospace Engineering. The Sigma Gamma Tau Society is established to recognize and honor those individuals in the field of aeronautics who have through scholarship, integrity, and outstanding achievement been a credit to their profession. The Society seeks to foster a high standard of ethics and professional practices and to create a spirit of loyalty and fellowship, particularly among students of Aerospace Engineering.

The students eligible for membership include undergraduate aerospace engineering students in the upper one-quarter of their junior class and the upper one-third of their senior class. Each spring semester, qualified students will be notified of their eligibility to join Sigma Gamma Tau. The advisor for Sigma Gamma Tau is Dr. Sven Schmitz (sus52).

Vertical Flight Society

The Vertical Flight Society (VFS) student chapter is the Department's newest organization, having received its charter from the parent organization in July 1980. Our VFS student chapter is now one of the largest and most active chapters in the country. If you are interested in joining the VFS, please watch your emails for meeting notices or contact Dr. Edward Smith or Dr. Jose Palacios the faculty advisors to the Student Branch. You can reach Dr. Smith (ecs5) and Dr. Palacios (jlp324).

Penn State Soaring Club

The Penn State Soaring Club is an organization open to all members of the University community. It exists to promote the sport of soaring and to give its members an opportunity to fly inexpensively.

The club currently operates three club sailplanes: two L-13 Blaniks and a Schempp-Hirth Standard Cirrus. The soaring season begins in the Spring when the weather begins to clear and generally runs through the end of December, or until snow covers the ground. The club operates on a three-semester per year basis (Spring, Summer and Fall). Professor Mark Maughmer can be contacted for more information at mdm@psu.edu.

Penn State AeroWomen

The Penn State AeroWomen group is a community for undergraduate and graduate women in the Penn State Department of Aerospace Engineering (as well as friends and alumni) that provides opportunities for members to network with faculty, fellow students, alumni, and industry personnel; to learn academic and professional skills; and to support each other. The ultimate goal of the group is to improve the climate for women in STEM—starting within our department. Contact Dr. Namiko Yamamoto (nuy12) or Dr. Susan Stewart (sstewart) for more details.

NOTE: Fun and valuable trips to aerospace industries, local chapters of international organizations, aircraft design and construction classes, and local flying clubs are conducted only through the clubs in the Department of Aerospace Engineering. We strongly encourage you to participate in the societies and organizations listed above. As future aerospace engineers, you can greatly benefit by getting involved in these programs to learn more about your profession of choice, and to experience these activities with your aerospace peers.

Opportunities for Hands-On Experience

Flight Vehicle Design and Fabrication Course (Sailplane)

The Flight Vehicle Design and Fabrication course is a multi-year course administered through the Department of Aerospace Engineering and the Schreyer Honors College. The coursework is vertically integrated to give freshmen and sophomores experience in aerospace engineering principles by working with juniors and seniors on design projects. Students are allowed to explore implications that their design will have in manufacturing the final product by spending lab hours building their part. The current design project is a high-performance sailplane to be constructed of composite materials. The class is broken into several design and manufacturing teams that work interactively to achieve goals that are set at the beginning of each semester, toward the completion of the full-scale sailplane. This course is open to aerospace engineering students in the Honors program, as well as other highly-motivated aerospace engineering students. Consent of the instructor is required for scheduling AERSP 204 or AERSP 404. Not all of the credits earned in these courses can be applied toward requirements of the program. None of the credits earned in the freshman year will apply, and approximately two thirds of the rest can be used. The first such credits normally substitute for the design courses (AERSP 401 or 402) or the lab course (AERSP 305). If sufficient credits are earned to cover these areas, additional ones can be used as a technical elective. For more detailed information, contact the course leader, Dr. Mark Maughmer (863-4485), and refer to the diagram shown in the Appendix of this guide.

Students for the Exploration and Development of Space (SEDS)

The Students for the Exploration and Development of Space (SEDS) group is composed of dedicated students who design, build, and fly rockets. They participate in the annual Spaceport America Cup, the world's largest intercollegiate rocket competition. Teams from around the globe travel to Spaceport America, New Mexico every year to compete in various launch categories ranging from 10,000 to 30,000 feet in altitude. The SEDS advisor is Prof. Sara Lego (ses224). www.sites.psu.edu/sedspennstate/

Student Space Programs Laboratory (SSPL)

The Student Space Programs Laboratory (SSPL) at the Pennsylvania State University allows undergraduate and graduate students the opportunity to design, fabricate, and integrate space systems. The SSPL provides hands-on projects to apply classroom knowledge to real world, interdisciplinary settings. SSPL students experience working through a complete design cycle and must develop a systems engineering mind-set in addition to their component-level experience. SSPL conducts a design-build-launch program to introduce students to space systems engineering fundamentals at the start of each semester. www.sites.psu.edu/sspl

Penn State Wind Energy Club

The Penn State Wind Energy Club competes annually in a national engineering design, business and siting competition. Students design and build a complete wind turbine system including the aerodynamic, generator, structural, electrical and controller design. This involves hands on building, applied engineering, and wind tunnel testing. The team is also tasked with designing a large scale wind project which includes analysis of the wind resource as well and environmental, societal, and economical analyses. The wind energy club provides an opportunity for students interested in wind energy to; 1. Learn about the wind energy industry, 2. Pursue their passion and develop skills to succeed in the wind industry, 3. Compete in a Collegiate Wind Competition to design and build a wind turbine and learn how to site wind projects, 4. Allow a broad variety of majors to gain real experience and solve real world problems, and 5. Engage in K-12 outreach activities associate with wind energy to promote STEM for the next generation. Dr. Susan Stewart (sstewart) or Dr. Mark Miller (mark.a.miller) can be contacted for details on how to get involved. www.wind.psu.edu

SAE AeroDesign Club

The SAE Aero Design competition challenges students to design, build, and fly a radio controlled airplane capable of lifting the maximum amount of internally stored payload while meeting design constraints. The university's team is student organized and is led by graduate students and seniors. Dr. Eric Greenwood is the advisor (eric.greenwood).
www.sites.psu.edu/aerodesign/

Penn State Unmanned Aerial System Club

The Unmanned Aerial System Club is multidisciplinary club focused on the development of unmanned aircraft that will be used to compete in an annual SUAS competition. They provide hands on experience to club members to manage and work in teams and interacting with technology usually priced out of their reach.
www.uas.engr.psu.edu/

AERSP 494 - Aerospace Undergraduate Thesis

An undergraduate thesis is a research project arranged between a student and a professor on a subject of mutual interest, which results in a formal thesis. Up to three credits of AERSP 494 may be scheduled, and applied toward technical electives, during the senior year, for research and writing of the thesis. Typically one credit is taken in the Fall Semester and two in the Spring. In addition to scheduling the course, a Department Registration Form must be completed at the beginning of each semester in which AERSP 494 credits are scheduled. Registration forms may be picked up in the main office (308 ECoRE), a copy is also included in the Appendix.

AERSP 496 - Independent Studies

Independent Studies involves the accomplishment of a project agreed upon by both the student and the advising faculty member. Information regarding ongoing projects may be mentioned in class or distributed via email. In addition to scheduling the course, a Department Registration Form should be completed at the beginning of each semester in which AERSP 496 credits are scheduled. Registration forms may be picked up in the main office (308 ECoRE), a copy is also included in the Appendix.

Minors and Certificates

Minors

Aerospace engineering students can choose from many different minors to complement their degree in aerospace. A minor is defined as an academic program of at least 18 credits that supplements a major. A minor program may consist of course work in a single area or from several disciplines, with at least six but ordinarily not more than half of the credits at the 400-course level. Total requirements are to be specified and generally limited to 18 to 21 credits. Entrance to some minors may require the completion of a number of prerequisites, including courses, portfolios, auditions, or other forms of documentation that are not included in the total requirements for the minor. All courses for the minor require a grade of C or higher. Information on all minors offered can be found at https://bulletins.psu.edu/programs/#filter=.filter_24 or consult the department of your choice via their webpage for entrance to minor information.

The Information Sciences and Technology for Aerospace Engineering minor (ISASP) is available only to aerospace students. Students can enroll in the minor via "update academics" in LionPath. Questions can be directed to Dr. Amy Pritchett, the professor in charge of the ISASP minor, at apritchett@psu.edu .

Space Systems Engineering Certificate

The Space Systems Engineering Certificate Program is primarily designed for students in the College of Engineering who wish to be recognized for completing a core set of courses in space systems engineering-related topics and for participating in a space-systems project. The project work is to be documented through a report. This certificate program, under the direction of, and jointly administered by the electrical engineering department's Communications and Space Sciences Laboratory (CSSL) and the aerospace engineering department, is designed to help prepare students for a career in the space industry. It is also relevant to students with an interest in systems engineering and who wish to bolster their credentials.

More information can be found at: Space Systems Engineering Certificate Guidelines 230510.pdf

Scholarship Information

The University, the College of Engineering, and the Department of Aerospace Engineering annually award a number of scholarships. Students must apply (https://www.engr.psu.edu/scholarships/index.aspx) to be considered for all of these. Some scholarships require a demonstrated financial need; to qualify for these, a student *must* complete the FAFSA form each year (https://studentaid.gov/h/apply-for-aid/fafsa).

For departmental scholarships a committee reviews the relevant information on all eligible students over the summer and notifies the awardees. Some scholarship endowments permit multiple awards each year, but the number and amount will vary depending upon available funds each year. The department scholarships are:

Aero Pioneers Class of 1944 Scholarship
Lou Borges Scholarship in Aerospace Engineering
Brian Chappel and Marion Stone Chappel Scholarship in Aerospace Engineering
Mary Ilgen Memorial Scholarship
Richard W. Leonhard Scholarship
James R. Norris Memorial Scholarship
David J. Peery Scholarship
Carl A. Shollenberger Memorial Scholarship
Donald G. and Jayne L. Steva Scholarship
Kenneth and Leanor Myers Scholarship
Everetts Family Endowed Scholarship
Clay S. Leamer Endowed Memorial Scholarship in Aerospace Engineering

Additional scholarships are offered by the American Institute of Aeronautics and Astronautics (AIAA), Boeing, and the Vertical Flight Foundation, with application information mentioned below.

AIAA Scholarship Program

The national AIAA Scholarship Program provides $2000 yearly awards to deserving undergraduate students. Selection criteria include scholarship (3.3 cum. avg.), ability to apply concepts of science and engineering, personal assessment of career goals (a 500-1000 word essay), and recommendations. Applications must be received at AIAA Headquarters in Reston, VA by January 31 each year.

Further information and application forms may be obtained by writing directly to the Scholarship Program, Student Activities Committee, American Institute of Aeronautics and Astronautics, 12700 Sunrise Valley Drive, Suite 200, Reston, VA 20191-5807. You may also visit their website at www.aiaa.org for more information and an online application form.

Boeing Scholarship

Boeing has traditionally provided scholarships to students in several engineering disciplines, including aerospace. Currently they are offering a total of 17 scholarships to students with an interest in the aerospace industry. **Students must actually apply for these by completing a letter of application, and including their resume and one letter of recommendation.** Details are

posted on the College of Engineering website at https://www.engr.psu.edu/CurrentStudents/Undergraduate/Scholarships/default.aspx
The deadline to apply for this scholarship is usually August 31 each year.

Vertical Flight Foundation

The Vertical Flight Foundation (VFF) is the philanthropic arm of the Vertical Flight Society (VFS). The Foundation is governed by a Board of Trustees and functions as an independent charitable trust for the support of scientific and educational activities related to Vertical Takeoff and Landing (VTOL) flight. Each year, the VFF awards merit-based scholarships, each at a value up to $2,000, to undergraduate or graduate students interested in pursuing engineering careers in the helicopter or vertical flight industry. Applications for the VFF scholarship may be obtained from the VFS faculty advisor, Dr. Edward C. Smith, 377 ECoRE Building, or visit www.vtol.org/education/vertical-flight-foundation-scholarships for an application.

GENERAL EDUCATION REQUIREMENTS

GenEds for students who began before Su '23

Penn State's General Education requirements include a total of 45 credits (only 9 credits of GN can double count with the major). For AERSP majors, some of those credits are pre-determined (Chem, Econ, Math, Physics), while others allow for some choice.

Foundations courses (15 cr.) (for AERSP majors, no choices here)
GWS: must take ENGL 15, ENGL 202C, CAS 100A
GQ: must take MATH 140, 141

Exploration (9 cr.)
6 credits of GN from CHEM 110 and Phys 211 are automatically applied
*3 credits of any single domain from GA, GH, GS, GN, GHW, or an interdomain course, must not be required for the major. A student can also petition to replace this with a 3rd-level or higher language course. (e.g. SPAN 003).

Breadth of Knowledge (15 cr.)
3 credits of a GA-only course
3 credits of a GH-only course
3 credits of Econ 102/104 (either one counts as a GS-only course)
3 credits of GHW-only courses (either a single 3-credit course or two 1.5-credit courses)
3 credits of GN from Phys 212 are automatically applied

Integrative Studies (6 cr.)
Select two, 3 credit, interdomain courses. An interdomain (N) course covers two different knowledge domains (e.g. GA & GH, or GH & GS, or . . .). An interdomain course may appear in both domains in the student's Degree Academic Requirements (aka degree audit).8

2 additional requirements:
US/IL Cultures requirement: At least 3 of these 45 credits must have the US (US cultures) designation and at least 3 of these 45 credits must have the IL (International cultures) designation. Some courses are listed as US/IL, which means that they can be used as US or IL, but not both. Completing one course designated as US/IL will require completion of a second course designated as US or IL or US/IL.

Gen Ed distribution requirement: Select these 45 credits so that, among them, at least two of them have a GA (or partial GA) designation, two of them have a GH (or partial GH) designation, and two of them have a GS (or partial GS) designation. Partial designation refers to interdomain courses (e.g., GN/GA has partial designation in GN and in GA).

Allowed exceptions for flexibility

General Education requirements were updated for students starting college in Summer 2023 or beyond. These guidelines are a bit more straightforward to follow (as seen on page 23) and in general, if you can meet the new requirements, you should be in good shape, but may need to complete a petition (options described below) to officially move things around in your academic requirements in Lionpath.

Move-3: You must 1st take at least one non-interdomain course in each of these categories: GA, GH, GHW, and GS. Then, to balance out your degree audit, a student can petition to avoid taking a second course in **one** category (GA/GH/GS) by taking a third, not required course, in another category (GA/GH/GS/GN/GHW) and submitting a Move-3 petition. (e.g., if a student has taken a single-domain GA course and doesn't want to take another GA course, they can petition to use a GH/GS/GN/GHW course instead, but only if that course is not being used to meet any of the other Gen Ed requirements or degree-program requirements).

Higher-level course: In any Gen Ed knowledge-domain category, a student can petition a higher-level course (200-400 level) to count instead of a designated Gen Ed course, provided that they meet the prerequisites. (e.g. can petition to count HIST 411 - Medieval Britain as a GH course).

Replacing a Gen Ed requirement with a free elective: If a student satisfies **all** General Education distribution requirements prior to taking the *course above, they can petition to replace it with a free elective – a course that can be anything (technical or non-technical) so long as it is not remedial or a repeat of a course. Note: This action doesn't reduce the number of credits needed to graduate, but it gives more flexibility.

Useful websites:

Gen Ed Planning Tool https://genedplan.psu.edu/
University Bulletin https://bulletins.psu.edu/
Also see the checksheet on pages 4-5 of this guide.

Move-3 examples:

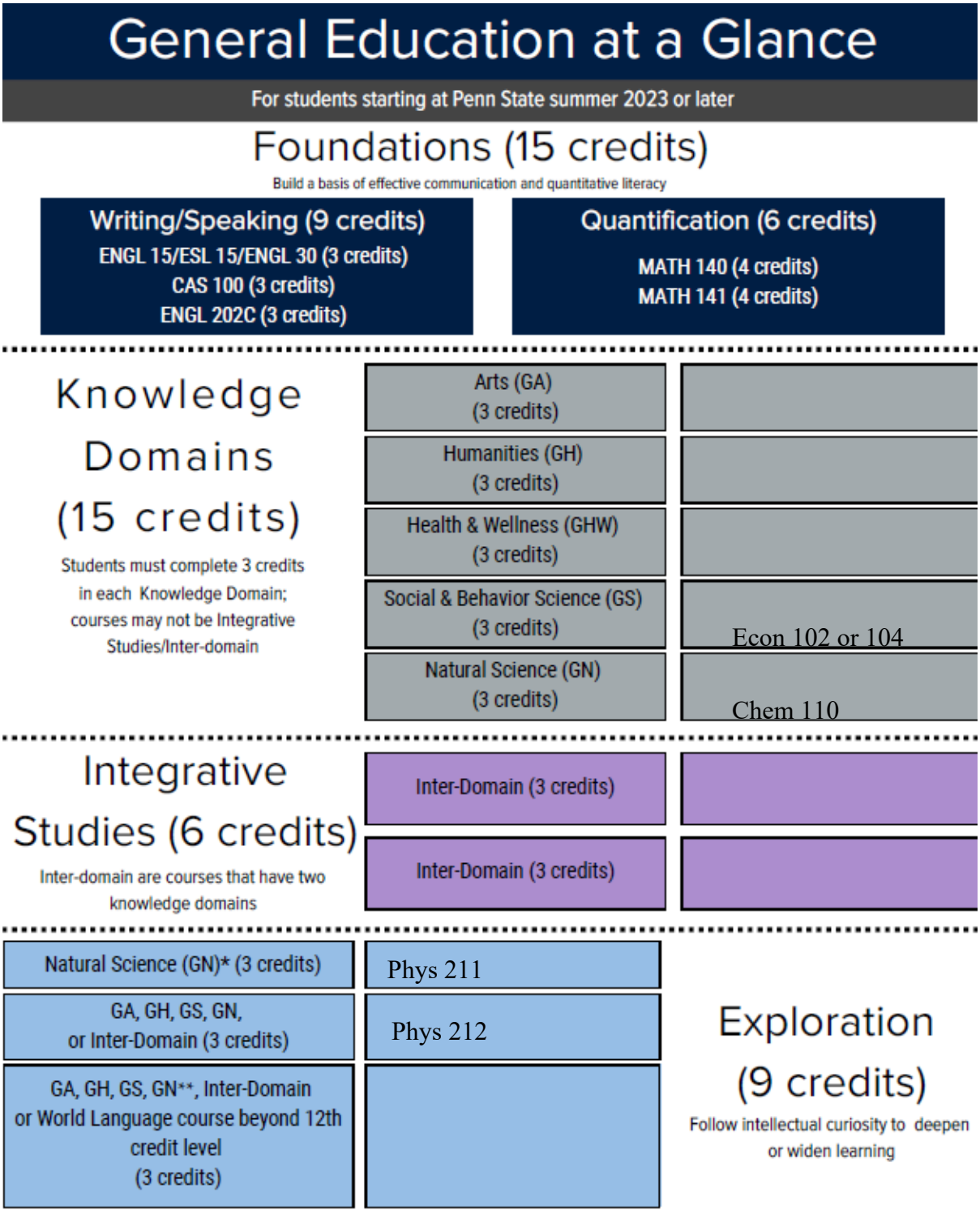
1. A student has these courses:
    a. GA: MUSIC 7 (GA, US), ASTRO 7N (GA/GN)
    b. GH: HIST 10 (GH, IL), ENGR 197E (GH/GN)
    c. GS: ECON 102 (GS)
    d. GN: CHEM 110 (GN), PHYS 211 (GN), PHYS 212 (GN), ASTRO 7N (GA/GN), ENGR 197E (GH/GN)
    e. GHW: NUTR 100 (GHW)

    They **can** use Move-3 to put ENGR 197E in the GS category.

2. A student has these courses:
    a. GA: ASTRO 7N (GA/GN)
    b. GH: HIST 10 (GH, IL), HIST 21 (GH, US)
    c. GS: ECON 102 (GS), SOC 119N (GH/GS)
    d. GN: CHEM 110 (GN), PHYS 211 (GN), PHYS 212 (GN)
    e. GHW: NUTR 100 (GHW)

    They **could not** use Move-3 to substitute exploratory course GER 3 for the single-domain course in GA.

GenEds for students who started Su '23 or later



*may be completed with an additional inter-domain course not used to complete the Integrative Studies Requirement
**For GN to count in this space, the GN course can't also be meeting a degree requirement for the major

US/IL Cultures requirement: At least 3 of these 45 credits must have the US (US cultures) designation and at least 3 of these 45 credits must have the IL (International cultures) designation. Some courses are listed as US/IL, which means that they can be used as US or IL, but not both. Completing one course designated as US/IL will require completion of a second course designated as US or IL or US/IL.

FACULTY, RESEARCH AND FACILITIES IN THE DEPARTMENT

Aerospace Engineering Faculty and Staff

A list of Aerospace Engineering Faculty can be found on the following website:
https://www.aero.psu.edu/department/faculty-list.aspx

A list of Aerospace Engineering Staff can be found on the following website:
https://www.aero.psu.edu/department/staff-list.aspx

Research in the Department of Aerospace Engineering

Detailed information covering research can be found on our department website at www.aero.psu.edu/research. A list of faculty and their research areas can also be found here: https://aerospaceengineeringresearch.psu.edu/ If you are interested in pursuing undergraduate research, look for a "UG" next to faculty names in this link, which indicates they may be looking for UG researchers. Reach out to ask for more information. It is also recommended that you check https://www.engr.psu.edu/research/undergrad-opportunities.aspx, for advertised opportunities.

Computer Facilities

The University's Learning Applications and Technologies (LAT) unit provides up-to-date computer platforms running a full spectrum of industry standard software. At the University Park campus, more than 3000 computers are available in over 100 locations in nearly 40 buildings, including classroom buildings, residence halls, and libraries. Computer platforms are available in Windows and Mac to accommodate a range of software and computational needs. Within these computing facilities are 12 dedicated Media Commons Labs with specialized facilities such as 3-D scanners and immersive technologies. Additionally, students work on their own devices using the campus-wide wireless network. Students have access to a variety of technical support services including a real-time display of current lab use (see www.it.psu.edu) that enables students to know in advance of going to a laboratory the number of seats available and hours of operation. Other support provided to students including printing services, online help lines, student consultants, and support guides.

ITS regularly holds classes and/or information sessions on operating systems and popular systems and application software available on the various computer platforms. Information regarding ITS and its services may be obtained from any of the campus student computer labs. Lab operators are often stationed in the computer labs to help with student computer needs. They are an excellent source of information if you have trouble with computer hardware/software or just need information.

What follows is a summary list of popular software used by aerospace engineering students, grouped by type of application. This is not an all-inclusive list; rather, it is intended to give the student a feel for some of the software packages available for use. Detailed information on the software available can be obtained from ITS, computer labs, the lab operators, or at: http://www.it.psu.edu

- **Programming**
  - Programming software is used to create your own programs, often to solve engineering problems. Various programming languages, including C, C++, and MATLAB, are available on most computer platforms.
- **Wordprocessing**
  - Wordprocessing software can be used to write, edit, and print reports, letters, documents, resumes, and theses. Popular wordprocessing software includes Microsoft Word. These software packages are available on the computers.
- **Spreadsheets**
  - Spreadsheet software is essentially used for dealing with numerical data. Data can be manipulated, analyzed, and plotted in a spreadsheet program. EXCEL is a spreadsheet available on the computers.
- **Computer Aided Design (CAD)**
  - Computer aided design (CAD) software allows the user to build and manipulate a structure on a computer. Some advanced CAD packages on the PC's perform static and dynamic structural analysis and optimization.
- **Presentations**
  - Presentation software can be used to create, edit, and print slide shows, handouts, and speeches. Powerpoint is the presentation software package available on the computers.
- **Math Software**
  - Several math software packages are available to solve simple and complex mathematical problems. Mathematica is a symbolic math software processor. Matlab is also available on some computers.

Students can also access a variety of engineering software tools, listed below, via a VDI computer. This can be accessed from a personal computer at https://weblabs.engr.psu.edu by signing in with your user id and password. Two Factor Authentication is also required. Questions regarding account access can be directed to aerohelpdesk@engr.psu.edu

Software available on the VDI includes:

- Matlab
- Solidworks
- Fieldview
- Techplot
- Mathematica
- Adobe
- Office
- Star CCM+
- STK/Ansys
- MS Project A
- Auto CAD
- One API (Fortran)
- Labview
- Python
- Visual Studio
- Notepad ++
- PuTTy
- Freeflyer
- 7-zip
- Windographer
- Furow

Research Facilities and Equipment in the Aerospace Engineering Department

Major research facilities include a low-turbulence subsonic wind tunnel with a 3.25 x 5 foot test section, speed range to 150 mph, and a floor mounted six-component strain gauge balance; an additional low-turbulence wind tunnel with a 2-foot by 3-foot test section; a laminar flow water channel (2.5 x 1.5 foot test section); an axial flow turbine facility with heavily instrumented blading to measure unsteady pressures, heat transfer, and shear stresses; a heat transfer facility to simulate turbine flow; a linear turbine cascade for heat transfer research; a real time color image processing system for the post processing of liquid crystal images in convective heat transfer research; various probe calibration jets; several laser Doppler anemometers including a subminiature semiconductor model; an ATC/510G flight simulator; aeroacoustic research facilities—a jet noise facility, an anechoic chamber, and a reverberant room; a vacuum tank facility for low-density flow (pressure range to 10^{-4} Torr, pumping approximately 5000 cfm at 5 x 10^{-3} Torr) and associated instrumentation; an unsteady propellant combustion facility and a variable power microwave generator; and a compressed air flow facility (300-psi reservoir); a thermal analysis system, an ultrasonic inspection system, an acoustic emission system, a high temperature bi-axial tension/torsion testing facility, a fiberoptic interferometer, a reflection polariscope used in material fabrication and characterization; structural dynamics laboratory; a space environmental simulator, a spectrometer and a CW Nd laser for space propulsion research.

As we get settled into the new ECoRE building, we will soon have four new wind tunnels, and new facilities for several of the labs noted above.

For more detailed information on these labs, please visit
https://www.aero.psu.edu/research/facilities-and-labs/overview.aspx

Laboratory and Safety Manager

LABORATORY DIRECTOR

The Laboratory Director assists the Aerospace faculty, staff, and students as needed in all technical aspects of instructional, academic and research related laboratory activities. This position is presently filled by Prof. Richard Auhl, located in 371 ECoRE Building. His areas of responsibilities include but are not limited to the following:

- Assist the Department Head with the implementation of department management strategies, staff software training, information systems development and strategic planning.
- Assist the faculty with undergraduate laboratory course instruction. (AERSP 305W)
- Coordinate the laboratory facility and department space allocation.
- Provide engineering and fabrication advice or assistance to faculty and students involved in project activity.
- Supervise the part-time laboratory assistants involved in general department maintenance.
- Serve as the primary contact person for the Dean's Office with regard to department space and facilities management.
- Coordinate and supervise all Machine Shop activities.

LABORATORY SAFETY

The department values the importance of safety in its laboratories. Students who are engaged in laboratory work or who take a course with a laboratory component will be given a printed copy of the laboratory safety manual, which can also be found at http://www.aero.psu.edu/Facilities/Facilities.html

APPENDIX A:
Credits Earned and Awarded for Participation in AERSP 204H/404H Program

YEARS COMPLETED

Starting Year	1		2		3		4	
	Earn	**Award**	**Earn**	**Award**	**Earn**	**Award**	**Earn**	**Award**
1st	4	(0)	8	3 - Lab (3)	14	5 - Design 3 - Lab (8)	20	5 - Design 3 - Lab 3 - Tech Elec (11)
		Award		**Award**		**Award**		
2nd	4	(0)	**10**	5 - Design (5)	16	5 - Design 3 - Lab (8)		XXX
		Award		**Award**				
3rd	6	3 - Tech Elec (3)	**12**	5 - Design 3 - Lab (8)		XXX		XXX
		Award						
4th	6	3 - Tech Elec (3)		XXX		XXX		XXX

NOTES

- Students starting in their 2nd year or beyond are encouraged to do a senior thesis in the project, but must schedule three additional credits for that purpose.
- () indicates total credits awarded
- General guideline is about 0.55 of earned credits are actually awarded toward meeting curricular requirements.
- Student is responsible for indicating how credits are to be awarded (i.e. in lieu of AERSP 305W, 401 A&B or 402 A&B, etc) by emailing Amy Custer at asm1@psu.edu.

Updated 8/24/06 to reflect curriculum changes; revised on 9/13/10

APPENDIX B: AERSP 494 & 496 REGISTRATION FORMS

AEROSPACE 494 – AEROSPACE THESIS
DEPARTMENT REGISTRATION FORM

This document confirms that an agreement has been made between the below-listed student and faculty advisor to write an undergraduate thesis for credit under AERSP 494 for the term specified.

Student: _____PSU ID_____

Thesis Advisor: _____

Faculty (Academic) Advisor: _____

Semester(s) to be enrolled:
Fall _____
Spring _____
Summer _____

No. of credit(s) to be enrolled for:
Fall _____
Spring _____
Summer _____

Note: Filling out this form does not register you for this course. You must officially register for Aerospace 494 via LionPath or by filling out a registration drop/add form and having it processed in the Aerospace Office by Amy Custer. The form would require your academic advisor's signature.

Signatures: Date:

_____ _____
(Student)

_____ _____
(Thesis Advisor)

AEROSPACE 496 – INDEPENDENT STUDIES
DEPARTMENT REGISTRATION FORM

This document confirms that an agreement has been made between the below-listed student and faculty advisor to accomplish a project for credit under AERSP 496, Independent Studies, for the term specified.

Student: _____PSU ID_____

Faculty Advisor for Project: _____

Tentative Project Title: _____

Semester(s) to be enrolled:

Fall _____
Spring _____
Summer _____

No. of credit(s) to be enrolled for:

Fall _____
Spring _____
Summer _____

Basis of grade _____
(report, model, exams, etc.)

Note: Filling out this form does not register you for this course. You must officially register for Aerospace 496 via LionPath or by filling out a registration drop/add form and having it processed in the Aerospace Office by Amy Custer. The form would require your academic advisor's signature.

Signatures: Date:

_____ _____
(Student)

_____ _____
(Project Advisor)