Department of Mechanics and Aerospace Engineering

Program of Aerospace Engineering for International Students (2023)

I. Introduction

Aerospace Engineering is a modern area that exemplifies the need for interdisciplinary problem solving and the mind for innovation. Aerospace Engineering is also an area of national strategic importance and high priority for growth. The Aerospace Engineering bachelor program at SUSTech is led by the Member of Chinese National Academy of Engineering, and the faculty consists of several renowned scholars. Major areas include aircraft design and engineering, aircraft propulsion, and aircraft manufacturing. The design and analysis of Aerospace Engineering relies on solid grasp of broad subjects of mechanics, heat transfer, material science, and electronics; the proficient knowledge of these subjects are applicable in other areas such as mechanical engineering and civil engineering. The students trained by the Aerospace Engineering program are expected to establish solid foundations of mathematics and mechanics, as well as deep understanding of basic aircraft design theory, strong capabilities in structural analysis, and good hands-on skills.

Academic subject areas: Aerospace

Program code: 082001

II. Objectives and Learning Outcomes

1. Objectives

The Aerospace Engineering program at SUSTech is dedicated to train students of high calipers by empowering them with solid foundations of mathematics and mechanics, broad knowledge in aerospace engineering, good overall capability of aircraft design, and a mind for innovation. The students who successfully complete the program may perform consulting, research and development, planning, and management roles in the industries of aerospace engineering, mechanical engineering, and mechanics. They can also enter top universities and research institutes to pursue master or doctoral degrees.

2. Learning Outcomes

Morality and humanity. With professionalism, a firm attitude of pursuing excellence, a sound personality, a sense of social responsibility and rich humanities and sciences accomplishment.

Basic knowledge. Master the basic theoretical knowledge and skills of engineering such as mathematics, mechanics, physics, electronics, machinery and so on.

Core knowledge

Have the necessary ability of drawing, computing, experimenting and testing in this major. Through the professional curriculum design, students can initially achieve the design, control, debugging and research abilities of aircraft application system. At the same time, they have strong computer and foreign language application abilities.

Master the complete basic knowledge system of aerospace engineering, including material mechanics, engineering thermodynamics, aircraft dynamics, aerodynamics, control principle, aircraft design, aircraft turbomachinery principle, aircraft structural strength and so on.

Master the general engineering design, aircraft design, Aerial engine Design and other design methods.

Understand the frontiers of the discipline. Understand the development trends, theoretical frontiers and application prospects in the field of aerospace.

Master the basic methods of literature retrieval and data query, and have the ability to engage in scientific research and practical work.

Management ability and teamwork ability. Good organizational and management skills, good communication skills, as well as environmental adaptation, team work ability.

International vision. Has the international vision and certain international exchange and cooperation ability.

Life long learning. Have the consciousness of lifelong learning and self-learning ability, innovative consciousness and grasp the basic innovative methods.

III. Study Length, Degree, and Graduation Requirements

1. Study length: 4 years.

2. Degree conferred: Students who complete and meet the degree requirements of the undergraduate program will be awarded a bachelor's degree in Bachelor of Engineering

3. The minimum credit requirement for graduation: 160 credits. The specific requirements are as follows.

Module		**Category**	**Minimum Credit Requirement**
General Education Courses	Chinese Language and Culture Module	Chinese Language and Culture	16
	Arts and Physical Education Module	Physical Education	4
		Arts	2
	Competence Development Module	Computer Programming	3
		Writing	2
		Foreign Languages	14
	Humanities and Social Sciences Module	Humanities	6
		Social Sciences	
		Chinese Studies	2
	Mathematics and Natural Sciences Module	Mathematics	12
		Physics	10
		Chemistry	3
		Geoscience + Life Science	3
	GE to Majors Bridging Module	Introduction to Majors	2
Major Courses	Major Required Courses	Major Foundational Courses	24
		Major Core Courses	19
		Practice-based Learning (Undergraduate Thesis, Internships, Research projects, etc.)	21
	Major Elective Courses	Major Elective Courses	17
Total			160
Note: please see the General Education Requirement for more details on Chinese Language and Culture Module, Arts and Physical Education Module, Competence Development Module（Foreign Languages & Writing）, Humanities and Social Sciences Module, and GE to Majors Bridging Module。			

IV. Course Requirements for the Mathematics and Natural Sciences Module and Computer Programming

Course Category	Course Code	Course Name	Credits	Terms	Prerequisite	Dept.
Mathematics	MA117	Calculus I	4	1Fall	None	MA
	MA127	Calculus II	4	1Spring	Calculus I	MA
	MA113	Linear Algebra	4	1Spring /Fall	None	MA
Physics	PHY105	College Physics I	4	1Spring /Fall	None	PHY
	PHY106	College Physics II	4	1Spring /Fall	General Physics I	PHY
	PHY104B	Experiments of Fundamental Physics	2	1Spring /Fall	None	PHY
Chemistry	CH105	Chemistry: the Central Science	3	1Spring /Fall	None	CH
Geoscience + Life Science	BIO102B	Introduction to Life Science	3	1Spring /Fall	None	BIO
Computer Programming	CS109	Introduction to Computer Programming	3	1Spring /Fall	None	CS

Note:

1. For Mathematics Category, students can take Mathematical Analysis I and II as alternatives to Calculus I and II; Advanced Linear Algebra I as an alternative to Linear Algebra.
2. For Physics Category, students can take General Physics I and II as alternatives to College Physics I and II.
3. For Chemistry Category, students can take General Chemistry as an alternative to Chemistry: the Central Science.
4. For Biology Category, students can take Principles of Biology as an alternative to Introduction to Life Science.
5. For Computer Programming Category, students can choose any one of the five computer programming courses.
6. The above alternative courses are also applicable to "Prerequisites for Major Declaration".

V. Prerequisites for Major Declaration

Major Declaration Time	Course Code	Course Name	Prerequisite
Declare major at the end of the first academic year	MA117	Calculus I	None
	MA127	Calculus II	Calculus I
	MA113	Linear Algebra	None
	PHY105	College Physics I	None
	PHY106	College Physics II	College Physics I
Declare major at the end of the second academic year	MA117	Calculus I	None
	MA127	Calculus II	Calculus I
	MA113	Linear Algebra	None
	PHY105	College Physics I	None
	PHY106	College Physics II	College Physics I

Note:

1. If the number of students entering a major at the end of the first academic year in the department is greater than or equal to the total number of the teaching-research faculty (PI)*2*60%, all majors in the department may implement the prerequisites for major declaration at the end of the second academic year.
2. If the number of students entering a major at the end of the first academic year in the department is less than the total number of the teaching-research faculty (PI)*2*60%, all majors in the department do not implement the prerequisites for major declaration at the end of the second academic year.
3. Suppose the number of students applying for a major at the end of the first academic year exceeds four times the total number of the teaching-research faculty (PI), then the department may select students according to predetermined rules. In principle, the rules set by the department shall examine the students' suitability for the major and not based on weighted GPA (Specific rules shall be set by the department and announced in advance).
4. For departments that do not implement prerequisites for major declaration at end of the second academic year, if the cumulative number of students applying for a major at the end of the second academic year and the number of students who have entered a major at the end of the first academic year exceeds four times the total number of the teaching-research faculty (PI), the department may select students according to predetermined rules. In principle, the rules set by the department shall examine the students' suitability for the major and not based on weighted GPA (Specific rules shall be set by the department and announced in advance).

VI: Major Course Arrangement

Table 1: Major Required Courses

Program of Aerospace Engineering

Course Category	Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Major Foundational Courses	ME102	CAD and Engineering Drawing	3	1.5	1Spring /Summer	None	ME
	EE104	Fundamentals of Electric Circuits	2		1Spring	MA113 MA117	EE
	MAE203B	Engineering Mechanics I - Statics and Dynamics	3		2Fall	MA113	MAE
	MAE209	Foundations of Engineering Mathematics	4		2Fall	MA127 PHY106 MA113	MAE
	MAE305	Engineering Thermodynamics	3		2Fall	MA127	MAE
	MAE207	Engineering Fluid Mechanics	3		2Fall	MA127	MAE
	MAE202	Mechanics of Materials	3		2Spring	MA113 MA127	MAE
	ME311	Mechanical Design	3		3Fall	None	ME
	Total		24	1.5			
Major Core Courses	MAE405	Aerodynamics	3		3Fall	MAE207	MAE
	MAE307	Aircraft Structural Strength	3		3Fall	MAE202	MAE
	MAE315	Aero-Thermal Fluid Lab	2	2	3Fall	MAE207 or MAE303	MAE
	MAE322	Fundamentals of Combustion	3		3Fall	MAE305	MAE
	MAE316	Experiments in Aircraft Structural Mechanics	2	2	3Spring	MAE202	MAE
	MAE407	Jet and Propulsion	3		3Spring	MAE305 or PHY204	MAE
	MAE417	Aircraft Design Group Practice	3	2	4Fall	MAE405 MAE307 MAE407	MAE
	Total		19	6			
Practice-based Courses	MAE499	Research and Innovation Project	2	2	4Fall	None	MAE
	ME103	Awareness Practice of Manufacturing Engineering	3	2	1-4Fall	None	ME
	MAE477	Cognitive Internship	2	2	2Summer	None	MAE
	MAE478	Practical Internship (Research and Production)	2	2	3Summer	None	MAE
	MAE488	Degree Thesis (or	12	12	4Spring	None	MAE

		Design)					
	Total		21	20			
Total			64	27.5			

Note:
Note 1: "Engineering Mechanics I - Statics and Dynamics MAE203B" can be replaced by "Theoretical Mechanics I MAE203".
"Engineering Fluid Mechanics MAE207" can be replaced by "Fluid Mechanics MAE303".
"Engineering Thermodynamics MAE305" can be replaced by "Thermodynamics and Statistical Physics I PHY204".
Note 2: Science and technology innovation projects are carried out in any semester after the beginning of the second academic year, so they are not included in the specific weekly credit hour allocation table.
Note 3: The industrial internship is not fixed to a specific semester and therefore is not included in the specific weekly credit hour allocation table.
Note 4: Students who have completed Comprehensive Design I (COE491) and Comprehensive Design II (COE492) are not required to take the graduation design (or thesis) (MAE490).

Table 2: Major Elective Courses

Program of Aerospace Engineering

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
MAE498	Research and Innovation Projects of Mechanics and Aerospace Engineering	2	2	2-4Fall	None	MAE
MAE206	Introduction to Aircraft Engines	1		2Fall	None	MAE
MAE208	Lectures on selected Engineering Software	2		2Spring	None	MAE
MAE210	Engineering Materials	3		2Spring	None	MAE
MAE204	Theoretical Mechanics II	3		2Spring	MA113 MA127（or MAE209）	MAE
MAE323	Mordern Numerical Methods	3	1	2Spring	MA127 MA113	MAE
MAE211	Overseas Practice	2	2	2Summer	None	MAE
MAE312	Aircraft Flight Dynamics	3		3Fall	MA127	MAE
MAE313	Aero Engine Structure and Strength	3	1	3Fall	None	MAE
MAE309	General Principles of Transport Phenomena	3		3Fall	MA127	MAE
MAE304	Elasticity	4		3Spring	MAE203 MAE202 MAE209	MAE
MAE403	Computational Fluid Dynamics	3		3Spring	MAE207 Or MAE303	MAE
MAE310	Computational Solid Mechanics	3		3Spring	MAE202	MAE
MAE320	Mechanism of Flight Vehicle	3		3Spring	MAE405	MAE
MAE318	Theory of Vibration	3		3Spring	MAE203B MA201b	MAE
MAE5027	Interfacial Phenomena	3		3Spring	PHY106	MAE
MAE5021	Fracture Mechanics	3		3Spring	MAE202	MAE
MAE7001	Multiphase Flow	3		3Spring	MAE207	MAE
MAE308	Heat Transfer	3		3Spring	MA127	MAE
MAE7002	General Theory of	3		3Spring	None	MAE

	Aeroengine Engineering					
MAE5017	Aeroacoustics	3		4Fall	MAE207 Or MAE303	MAE
MAE311	Principles of Turbomachinery	3		4Fall	MAE305 MAE405	MAE
MAE5020	Mechanics of Composite Materials	3		4Fall	MA127	MAE
MAE419	Aerodynamic analysis and design of aircraft	2		4Fall	MAE403	MAE
MA201b	Ordinary Differential Equations B	4		2Fall	MA127	MA
MA212	Probability and Statistics	3		2Fall	MA127	MA
MA233	Introduction to MATLAB	4	1	2Spring	MA113	MA
ME307	Fundamentals of Control Engineering	3	1	3Fall	EE104	ME
ME331	Robot Modeling and Control	3		3Fall	MAE203B	ME
ME310	Fundamentals of Measurement Technology	3		3Spring	ME307 EE205	ME
ME301	Dynamics and Vibration	3	1	3Spring	MA201b MAE203B	ME
EE205	Signals and Systems	3	1	2Fall	MA117	EE
EE201-17	Analog Circuits	3		2Fall	PHY106 EE104	EE
EE323	Digital Signal Processing	3	1	4Fall	EE205	EE
CS203B	Data Structures and Algorithm Analysis B	3	1	2Fall	CS109	CS
CS205	C/C++ Program Design	3	1	3Fall/Spring	None	CS
PHY221	Open Physics Laboratory II	1	1	2Fall	None	PHY
PHY201-15	Physics Laboratory II	2	2	2Fall	PHY105	PHY
PHY203-15	Mathematical Methods in Physics	4		2Fall	MA113 MA127	PHY
PHY202	Physics Laboratory III	2	2	2Spring	PHY105	PHY
PHY425	Modern Techniques in Materials Characterization	3	1	4Fall	PHY206-15	PHY
Total		117	19			

Note

Note 1: The above courses should be taken for a minimum of 17 credits; the elective courses of the Department of Mechanics and Aerospace Engineering should be taken for a minimum of 12 credits.

Note 2: "Computational Fluid Mechanics MAE403" and "Computational Solid Mechanics MAE310" at least one of them.

Note 3:

Aircraft design direction: Aircraft Flight Dynamics MAE312, Mechanism of Flight Vehicle MAE320, Aerodynamic analysis and design of aircraft MAE419, at least one elective.

Aircraft dynamics direction: Principles of Turbomachinery MAE311, Aero Engine Structure and Strength MAE313 at least one elective.

Note 4: "Theory of Vibration MAE318" can be replaced by "Dynamics and Vibration ME301".

Table 3: Overview of Practice-based Learning

Program of Aerospace Engineering

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
ME102	CAD and Engineering Drawing	3	1.5	1Spring	None	ME
MAE211	Overseas Practice	2	2	2Summer	None	MAE
MAE315	Aero-Thermal Fluid Lab	2	2	3Fal	MAE207 Or MAE303	MAE
MAE316	Experiments in Aircraft Structural Mechanics	2	2	3Spring	MAE202	MAE
MAE417	Aircraft Design Group Practice	3	2	4Fal	MAE405 MAE307 MAE407	MAE
MAE499	Research and Innovation Projects	2	2	4Fal	None	MAE
ME103	Awareness Practice of Manufacturing Engineering	3	2	1-4Fal	None	ME
MAE477	Cognitive Internship	2	2	2Summer	None	MAE
MAE478	Practical Internship (Research and Production)	2	2	3Summer	None	MAE
MAE488	Degree Thesis(or Design)	12	12	4Spring	None	MAE
Total		33	29.5			

Curriculum Structure of Aerospace Engineering