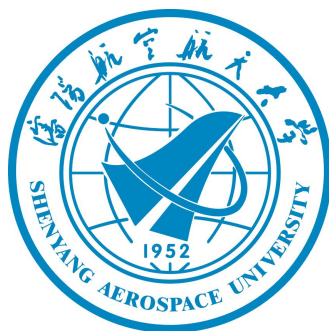


# 课程计划/课程描述

## Curriculum /Course Description

航空航天工程专业  
Aeronautical Engineering



沈阳航空航天大学  
Shenyang Aerospace University  
2022

## Foreword

The aviation industry is a huge and diverse one, employing engineers across multiple disciplines. The aeronautical engineering degree prepares students for a career in the industry by providing knowledge on how aircraft are designed, constructed, powered, used, and controlled for safe operation. The students also develop skills in management, aviation law, Chinese language, and economics through a number of additional courses.

The university has approved an arrangement whereby students who satisfy the requirements of the first two years of an aeronautical engineering degree/diploma program at any recognised foreign or Chinese institution may be admitted to Years 3 and 4 of the SAU degree program leading to the bachelor of engineering degree in aeronautical engineering. The proviso is that the academic office of the college of international education is satisfied that the courses studied at the other institution are equivalent, and the office gives recommendation.

## Aeronautical Engineering(Aircraft Manufacturing)

### 1st Semester First Year

Code	Course Name	Hours	Credits
L17001	Comprehensive Chinese I	64	4
L17006	Introduction to China	32	2
L17007	Introduction to Chinese Law	32	2
L14013	Advanced Mathematics I	80	5
L14031	General Chemistry	24	1.5
L26007	C Programming	56	3.5
L26023	C Programming Design Lab	1W	1
L06018	Engineering Drawing I	40	2.5
		328	21.5

### 2nd Semester First Year

Code	Course Name	Hours	Credits
L17002	Comprehensive Chinese II	64	4
L14014	Advanced Mathematics II	80	5
L06019	Engineering Drawing II	48	3
L14004	Physics I	56	3.5
L14051	Physics Lab I	24	1.5
L03117x	Introduction to Aerospace Engineering	32	2
L26042	Engineering Training I	3W	3
		304	22

### 1st Semester Second Year

Code	Course Name	Hours	Credits
L17003	Comprehensive Chinese III	64	4
L14005	Physics II	56	3.5
L14052	Physics Lab II	24	1.5
L14010	Probability and Statistics	48	3
L14053	Linear Algebra	40	2.5
L07011	Circuits and Electronics I	40	2.5
L07013	Circuits and Electronics Lab I	14	1
L03061	Theoretical Mechanics	80	5
L26043	CNC Machining Lab II	2W	2
		366	25

### 2nd Semester Second Year

Code	Course Name	Hours	Credits
L17004	Comprehensive Chinese IV	64	4
L02123	Circuits and Electronics II	40	2.5
L02124	Circuits and Electronics Lab II	18	1

L11031	Engineering Materials	40	2.5
L17010	Fundamentals of Avionics	48	3
L03006	Material Mechanics	72	4.5
L06033	Computer Aided Drafting(Auto-CAD)	2w	2
L26010	Digital Electronics Lab	2w	2
		282	21.5

### 1st Semester Third Year

Code	Course Name	Hours	Credits
L17005	Comprehensive Chinese V	48	3
L06016	Interchangeability and Technique Measurement	32	2
L06050	Mechanisms and Machine Theory	56	3.5
L06051	Mechanisms and Machine Lab	2w	2
L03082	Theory of Plasticity	40	2.5
L17014	Aviation Regulatory Framework	48	3
L17011	Fluid Mechanics	48	3
L17012	Aerospace Propulsion	48	3
		320	22

### 2nd Semester Third Year

Code	Course Name	Hours	Credits
L17009	Chinese for Science and Technology	48	3
L06043	Machinery Design	56	3.5
L06037	Machinery Design Lab	3W	3
L03028	Introduction to Aircraft Manufacturing	48	3
L03035	Aerodynamics and Flight Theory	80	5
L03004	Sheet Metal Fabrication	48	3
L17013	Aircraft Mechanical Systems	48	3
L03021	Finite element method for aircraft structure	32	2
		360	25.5

### 1st Semester Final Year

Code	Course Name	Hours	Credits
L03208	Aircraft Maintenance and Quality	32	2
L03030	Aircraft Assembly	48	3
L03031	Aircraft Design	56	3.5
L03016	Aircraft CAD/CAM	40	2.5
L03141	CAD/CAM Systems	32	2
L03121	Aircraft Assembly Lab	4W	4
L03122	Aircraft CAD/CAM Lab	4W	4
L03175	Aircraft Manufacturing Lab (AE Lab)	2W	2
		208	23

**2nd Semester Final Year**

Code	Course Name	Hours	Credits
L03152	Production Practice/Internship	3W	3
L03150	Graduation Project & Thesis	17W	16
			19
		Total	179.5

Medium of Education: English

### **Comprehensive Chinese I / II / III / IV / V / Chinese for Science and Technology**

This course is aimed at developing students' skills in listening, speaking, reading, and writing. It also focuses on improving basic communication competence in Chinese language.

### **Introduction to China**

This course introduces students to the characteristics of China's social development, Chinese history, and culture, Chinese traditional thinking inheritance and innovation of Chinese life changes, China's contribution to human civilization, and various manifestations of China's modernization. It also introduces the students to China's ideology of past, present, and future.

### **Introduction to Chinese Law**

This course introduces students to Chinese legal tradition and law, such as constitutionalism and rule of law, administrative law, civil law, marriage law, succession law, criminal law, and the procedural law. The course also focuses on fundamental and practical aspects of the Chinese law to familiarize international students about legal issues in China.

### **Advanced Mathematics I / II**

This course is designed to introduce the student to the main ideas of calculus. It is divided into two semesters.

### **General Chemistry**

This course is an introduction to basic areas of chemistry including energy relationships in chemical reactions, entropy and free energy, chemical equilibrium, rates of chemical reactions, acids and bases, and electrochemistry.

### **C Programming**

This course provides students with a comprehensive study of the C programming language. Classroom lectures stress the strengths of C, which provide programmers with means of writing efficient, maintainable, and portable code. The lectures are supplemented with non-trivial lab exercises. The course aims to introduce programmers to C language. The course aims to introduce C in a structured manner beginning with simple aspects of the language and working up to more complex issues.

### **Engineering Drawing I**

Descriptive geometry and mechanical drawing is an application oriented subject that introduces the preparation, representation and reading of mechanical drawings, similar to characters and numbers, mechanical drawing is one of the tools used by human for the expression. The course is divided into two parts, I and II. The first it mainly covers basic theories and methods for the preparation and reading of mechanical drawings.

### **Engineering Drawing II**

The course involves examination of drafting as a tool of technical communication and for solving graphical problems. Emphases are on development of basic drafting skills, visualization, and solution of spatial problems. It is an exploratory first course in drafting.

### **College Physics I**

This course is the introduction to classical mechanics, electromagnetism and special relativity. In classical mechanics, it includes motion in one and two dimensions, Newton's laws of motion and their applications, work and energy, linear momentum and collisions, rotational motion, and principles of conservation. In electromagnetism, it covers a study of electric charges, forces, and field, Coulomb's law, electric potential and electric potential energy, electric current, electric circuits, and an introduction to magnetism. In special relativity, it includes frame of reference, Galilean transformation, Michelson, Morley experiment, postulates of special theory of relativity, Lorentz transformation, length contraction, time dilation, relativity of simultaneity in addition to velocities, variation of mass with velocity, Mass energy equation.

### **Introduction to Aerospace Engineering**

The course provides the basic theory of flight. Students are introduced to aircraft primary structure, flight controls, aero-foil, and aerodynamic forces. The course discusses the four forces acting on an airplane during flight, aircraft performance basics, and weight and balance.

### **College Physics II**

This course introduces students to the laws of thermodynamics, wave motion, optics, and quantum physics. The student will learn about heat behaviors critical to understanding of engines and furnaces, metallurgy, geothermal system, etc. A mathematical description

of wave motion will be introduced. The student will also learn about that light can be viewed as either a particle or a wave. The three primary topics examined are interference, diffraction, and polarization. These phenomena can't be adequately explained with ray optics, but can be understood if light is viewed as a wave. For quantum physics, it introduces underlying ideas of quantum theory and the wave-particle nature of matter, and discusses applications of quantum theory including the photoelectric effect, the Compton Effect, and x-rays.

### **Probability and Statistics**

This course provides an elementary introduction to probability and statistics with applications.

### **Linear Algebra**

This course encompasses the study of linear equations, matrices, determinants, vectors in the plane and space, vector spaces, linear transformations, inner products, eigenvalues values and eigenvectors. Students will learn to recognize and express the mathematical ideas graphically, numerically, and symbolically.

### **Circuits and Electronics I**

This course introduces a range of topics on electrical technology. Topics cover circuit analysis and theory application, including basic components and basic laws of the circuit and circuit analysis methods. It also includes measuring the parameters of DC and AC circuits, verifying circuit analysis methods, applications of Multisim on studying electric circuits, applications of oscilloscope and function generator.

### **Theoretical Mechanics**

This fundamental course is designed for engineering disciplines, such as aerospace vehicle manufacturing engineering, mechanical machines manufacturing, and automation engineering. It is the foundation of all mechanics curriculums, and has a wide application in many areas of engineering and technology. The course introduces students to basic laws and research methods of mechanical motion (including balance) of particle, particle systems and rigid-body. It also provides the ability to analyze and solve practical problems in engineering using knowledge of theoretical mechanics.

### **Circuits and Electronics II**



This course describes principle of digital and analogy electronic circuits and it emphasizes the applications of integrated circuits, diodes and its application circuits, model of amplifiers, electronic device- BJT (Bipolar Junction Transistor), and amplifiers circuits composed of BJT. DC regulated power supply, concepts and application circuits of digital logic circuits and basic functions of triggers, simulation experiments with EDA (Electronic Automatic Design) software of Multisim include two-stage amplifier circuit, odd/even examining circuit and logic circuit design of intelligence competition responder are also covered.

### **Engineering Materials**

This course covers common engineering materials and it provides an introduction to crystalline structures and properties of engineering materials, Students will be introduced to factors affecting the selection of materials, structure and properties of materials, and the types of possible defects. The course develops the knowledge of students in analysing the failure of engineering products and systems related to mechanical behavior of materials.

### **Fundamentals of Avionics**

This course introduces students to a range of topics that are fundamental to the field of avionics, including aircraft electrics, electronic flight instrument systems (EFIS), automatic flight controls, radio communication and navigation, and satellite navigation. The course also investigates the technical aspects of performance based navigation (PBN), area navigation (RNAV), required navigation performance (RNP), flight management system (FMS), and instrument landing system (ILS).

### **Material Mechanics**

This course introduces students to fundamental concepts of mechanics of deformable solids. Essentially, the course covers theory and methods of determining normal and shear stresses. Students will also learn about physical performance of solid structural members associated with mechanical, civil, and aerospace engineering.

### **Interchangeability and Technique Measurement**

This course involves how to design and express geometric precision requirements include sizes and shapes of a workpiece when design a machinery or instrument, how to measure a size or a shape deviation from ideal conditions, and it is as a tool of technical

communication. Emphases are on how to express geometric precision requirements on engineering drawings

### **Mechanisms and Machine Theory**

This course explores design and analysis of mechanisms used in complex machineries. It also includes designing of primary mechanisms. Common problems of mechanisms, such as motion, force, and balancing are also examined in this course.

### **Theory of Plasticity**

This course introduces students to the theory of elasticity, plasticity, loading, and various stresses. Relationship between stress and strain and related theories are also covered in the course.

### **Aviation Regulatory Framework**

This course explores major areas of civil aviation law and regulatory requirements. The first section covers importance and role of the International Civil Aviation Organization (ICAO) in enhancing the safety, regularity and efficiency of international civil aviation. The second provides an overview of the civil aviation regulatory framework of major contracting states of the ICAO. Finally, students are introduced to the licensing requirements of aircraft personnel and the aviation legislation as they apply to the aircraft airworthiness, flight operations, and airspace.

### **Fluid Mechanics**

This course introduces students to terminology, principle, and methods used in fluid mechanics. The course primarily covers fluid properties, fluid statics and buoyancy, Bernoulli's equations, flow measurement techniques, dimensional analysis, laminar and turbulent flow, steady flow energy equations, flow measurement, momentum analysis, flow in pipes, pressures in accelerating fluid systems, turbines, pumps, and turbo machines.

### **Aerospace Propulsion**

Primarily, this course applied the principles of aerodynamics, thermodynamics, and fluid mechanics to analyse aerospace gas turbine and reciprocating engine. The course covers construction, materials, performance, and operational aspects of gas turbine and reciprocating engines.

### **Machinery Design**

Primarily, this course focuses on basic theory and methods of designing machines and universal components. Students will be introduced to design concept, handling technical data, various standards, criterion, technical manuals, and development processes. Additionally, the new developments in the field of machinery design will also be discussed in this course.

### **Introduction to Aircraft Manufacturing**

This course covers the manufacturing processes, such as machining, hot process, planning, design principles of various fixtures and jigs, machining accuracies, and machine tooling. Students will be introduced to traditional and non-traditional manufacturing processes. Furthermore, the course also discusses machining operations, rules of metal cutting, and quality processes.

### **Aerodynamics and Flight Theory**

This course provides an introduction to theoretical and applied aerodynamics. This course builds upon the study of thermodynamics and fluid mechanics. Students will be introduced to the qualitative and quantitative examination of fluids in motions and the aerodynamic forces exerted by fluids on streamlined bodies, such as wings of aircraft. Compressible and incompressible flows are examined, but emphasis is on lift and drag force components in incompressible flow during the course.

### **Sheet Metal Fabrication**

This course provides a comprehensive coverage of metal working processes including concept, classification, and advantages of the processes. Students will also learn the common sheet metal forming processes and their applications to design during this course. The course focuses on simple, practical engineering methods rather than complex theoretical and numerical methods to provide students with usable approaches to sheet metal forming processes and die design.

### **Aircraft Mechanical Systems**

This course covers operations, description, and practical aspects of mechanical systems of an aircraft. The topics comprise of generic as well as sophisticated systems of various types of the aircraft including modern heavy transport aircraft.

### **Finite Element Method for Aircraft Structure**

This course covers rudimentary knowledge of the finite element method and software.

### **Aircraft Maintenance and Quality**

This course is designed to provide students with a broader perspective and understanding of aircraft maintenance management. Central areas of aircraft maintenance, quality assurance, and safety management system are explored in the course. The primary focus is on scheduled airlines, but general aviation maintenance will also be discussed in this course.

### **Aircraft Assembly**

This course discusses assembly processing, riveting, welding, tooling design, coordination and interchange ability issues associated with an aircraft assembly. Students are also introduced to the structures of advanced composite materials used in aircraft manufacturing.

### **Aircraft Design**

Primary objective of this course is to introduce students to aircraft design methods and processes. The course describes the processes used in developing an aircraft conceptual design from a given set of requirements and it investigates basic tools and design concepts required to produce a sustainable design. Students will also learn various rules-of-thumb for initial estimation of design parameters using historical data, statistically.

### **Aircraft CAD/CAM**

This course focuses on computer-aided design technology and its application in aircraft manufacturing domain. Students will learn computer-aided design tools for engineering drawings, mathematical expression method of geometry shape of mechanical products, computer graphic transformation, coordination routine in aircraft manufacture, and related advance techniques.

### **CAD/CAM Systems**

This course focuses on computer-aided design technology and its application in aircraft manufacturing domain. Students will learn computer-aided design tools for engineering

drawings, mathematical expression method of geometry shape of mechanical products, computer graphic transformation, coordination routine in aircraft manufacture, and related advance techniques. Methods of computer aided design and its platform software CATIA are also covered in the course.