Course Description

Undergraduate Course of Civil Engineering in Nanjing University of Aeronautics and Astronautics

Student Name：Han Li

Student Number：011740225

Major: Civil Engineering

College: College of Civil Aviation

Notice and Remarks:

➢ **Usually 180 credits are needed for a student, whose major is Civil Engineering to obtain a Bachelor's Degree in NUAA.**

➢ **In NUAA, 1 credit of Lecture corresponds to 16 course hours (45 minutes = 1 course hour).**

➢ **And 1 credit of Course Design/Experiment in NUAA corresponds to 32 course hours (45 minutes = 1 course hour).**

➢ **1 credit in NUAA corresponds to 1.5 ECTS**

➢ **Grading System:**

Centesimal System

Five-letter Grading System: A (100-90, Excellent) B (89-80, Good) C (79-70, Medium) D (69-60, Pass) F (59or less, Failure) – (Missing exam or Qualification or exam being canceled)

➢ **RC: Required Curse**

EC: Elective Course

PC: Practice Course

Nanjing University of Aeronautics and Astronautics

Contents

Nanjing University of Aeronautics and Astronautics

Mainly Course Module of Civil Engineering

(Only Course Relevant to the Professional Field)

	Modul	Course Name	Credits	Total Class Hours	Total Credits
1	Mathematics	1.1 Advanced Mathematics II (1)	6.0	96	19.5
		1.2 Advanced Mathematics II (2)	5.0	80	
		1.3 Linear Algebra	2.5	40	
		1.4 Probability and Mathematical Statistics II	3.0	48	
		1.5 Computational Methods	1.5	24	
		1.6 Advanced Mathematics Methodology	1.5	24	
2	Phyics	2.1 College Physics II (1)	4.5	72	8.0
		2.2 College Physics II (2)	2.0	32	
		2.3 College Physics Experiments I(1)	0.5	16	
		2.4 College Physics Experiments I(2)	1.0	32	
3	Chemistry	3.1 Basic Chemistry Engineering I	2.0	32	2.0
4	Computer Science	4.1 Introduction to Computational Thinking	1.5	24	5.0
		4.2 Experiments of Introduction to Computational Thinking	1.0	32	
		4.3 C Language Programming	2.0	32	
		4.4 Project of C Language	0.5	16	
5	Mechanics	5.1 Theoretical Mechanics II	4.0	64	19.5
		5.2 Fluid Mechanics (Civil Engineering)	2.0	34	
		5.3 Material Mechanics (Civil Engineering)	4.0	68	
		5.4 Structural Mechanics III(1)	4.0	64	
		5.5 Structural Mechanics III(2)	1.5	24	
		5.6 Elastic Mechanics and Finite Element Methods	2.5	40	
		5.7 Helicopter Rotor Dynamics Foundation	1.5	24	
6	Engineering Drawing	6.1 Descriptive Geometry and Civil Engineering Drawing	2.5	40	2.5

7	**Civil Engineering**	7.1 Introduction to Civil Engineering	1.0	16	**17.5**
		7.2 Recent Development in Civil Engineering	1.0	16	
		7.3 Practice for Civil Engineering	1.0	1 week	
		7.4 Engineering Geology	1.5	24	
		7.5 Engineering Geology Practice	1.0	1 week	
		7.6 Soil Tectonics and Soil Mechanics	2.0	36	
		7.7 Introduction to Airport Engineering	1.5	24	
		7.8 Airport Design and Plan	1.5	24	
		7.9 Building Construction	2.0	32	
		7.10 Project of Building Construction	1.0	1 week	
		7.11 Bridge-culvert and Hydrology	1.0	16	
		7.12 Foundation Engineering	2.0	32	
		7.13 Project of Foundation Engineering	1.0	1 week	
8	**Engineering Surveying**	8.1 Engineering Surveying	2.5	46	**4.5**
		8.2 Project of Civil Engineering Surveying	2.0	2 weeks	
9	**Materials of Civil Engineering**	9.1 Materials of Civil Engineering	2.5	48	**2.5**
10	**Engineering Structure**	10.1 Principle of Engineering Structure Design	5.5	86	**19.5**
		10.2 Experiments and Testing of Engineering Structures	1.5	28	
		10.3 Structural Model Design and Production	2.0	32	
		10.4 Design of Steel Structure	2.5	42	
		10.5 Project of Steel Structure	1.0	1 week	
		10.6 Wind Resistance of Civil Engineering Structure	1.5	24	
		10.7 Design of Reinforced Concrete Rib Floor	1.0	16	
		10.8 Structures Design of Concrete and Masonry	2.5	40	

		10.9 Introduction to Seismic Engineering	1.0	16	
		10.10 Building Seismic	1.0	16	
11	**Engineering Cost**	11.1 Engineering Economics	2.0	24	**4.0**
		11.2 Civil Engineering Cost	1.0	16	
		11.3 Project of Civil Engineering Cost	1.0	1 week	
12	**Engineering Construction**	12.1 Civil Engineering Construction	2.5	40	**8.5**
		12.2 Project of Construction Organization	1.0	1 week	
		12.3 Engineering Project Management and Construction Organization Design	1.0	16	
		12.4 Comprehensive Engineering Training	2.0	2 weeks	
		12.5 Integrated Project	2.0	2 weeks	
13	**Civil Engineering and Environment**	13.1 Introduction to Environmental Science	1.0	24	**2.0**
		13.2 Airport Environmental Engineering	1.0	16	
14	**Engineering Regulations**	14.1 Civil Engineering Regulations and Supervision	1.5	24	**1.5**

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Module 1 Mathematics

1.1 Advanced Mathematics II (1)

Score: 75	Credit(s): 6.0
GPA: 2.5	Course Typ: RC

Content:

➢ Function, the concept of limit and its algorithm, infinitesimal and its main properties, two important limits; the concept that a function is continuous at one point.

➢ The concept of derivatives, the four arithmetic operations of derivatives and the derivation method of compound functions; the concept of differentiation; Lagrange's theorem, Roberta's law, the method of judging the increase and decrease of functions, the method of finding extreme values, and Taylor's theorem.

➢ The concept of indefinite integral, basic integral formula, substitution integral method, partial integral method, definite integral concept, definite integral as a variable upper limit function and its derivation theorem, Newton-Leibniz formula.

➢ The definition of series convergence and divergence, the convergence interval of power series, the definition of Fourier series; the comparison method of number series; the four arithmetic operations of power series and the term-by-term differentiation and integration; the trigonometric function group Orthogonality; Euler and Fourier formulas; ratio check and convergence; function power series expressions and methods defined on (-π, π) to expand into Fourier series.

1.2 Advanced Mathematics II (2)

Score: 69	Credit(s): 5.0
GPA: 1.9	Course Typ: RC

Content:

➢ The concept of vector, the coordinates of the vector, the point product and the cross product, the point method equation of the plane, the standard equation of the straight line, the concept of the surface equation; draw a three-dimensional figure surrounded by several curved surfaces.

➢ The concept of multivariate function, the concept of partial derivative, the concept of total differential, the concept of extreme value of multivariate function, and the differential method of compound function.

➢ The concept of double integral and triple integral, the concept of curve integral and surface integrals; the nature of double integral; Green's formula, Austen's formula, the calculation method of conditional double integral without curve integral and path; the calculation method of coordinate curve integral.

> The basic concepts of differential equations, the solution of differential equations with separable variables and first-order linear differential equations, and the solution of second-order linear differential equations with constant coefficients.

1.3 Linear Algebra

Score: 73	**Credit(s):** 2.5
GPA: 2.3	**Course Typ:** RC

Content:

> $n*n$ arrangement, $n*n$ determinant, the algebraic remainder of determinant elements, row ladders, and other concepts; the properties of determinants, determinant expansion theorems and inferences in one row (column), Cramer's rule; Gauss elimination method, Use Gauss elimination method to solve linear equations.

> The definition of matrix addition, number multiplication, multiplication, inversion and transposition, invertible matrix, inverse matrix, elementary matrix, adjoint matrix, block matrix, the rank of the matrix.

> The linear correlation theorem of the vector group, the important conclusion of the extremely independent group and rank of the vector group, the sufficient and necessary conditions for the homogeneous equation system to have non-zero solutions and the related theorem of the basic solution system, the existence theorem of the solution of the linear equation system and the structure of the general solution.

> Linear space, basis and dimension, the concept of linear transformation; the relationship between the same vector in two sets of coordinates under two different bases, and the linear transformation is a matrix under one set of bases.

> The eigenvalues of the matrix, eigenvectors, similarity matrix, the standard form of the matrix; matrix diagonalization and calculation, the orthogonality of the real symmetric matrix are similar to the calculation of the diagonal matrix.

> Quadratic and quadratic matrix, quadratic standard form, normal form, positive definite quadratic form.

1.4 Probability and Mathematical Statistics II

Score: 69	**Credit(s):** 3.0
GPA: 2.7	**Course Typ:** RC

Content:

> The relationship and calculation between random events; the concept, basic properties, and probability calculation of probability; the application of multiplication theory, total probability formula, and Bayes formula.

> The probability distribution and properties of discrete random variables, the probability

density and properties of continuous random variables, the distribution functions and properties of random variables, 0-1 distribution, binomial distribution, Poisson distribution, uniform distribution, exponential distribution, and the concept and nature of normal distribution, find the distribution of random variable functions.

➢ The joint probability distribution, joint probability density, and joint distribution function of two-dimensional random variables; find the marginal distribution of two-dimensional random variables from the joint distribution of two-dimensional random variables; determine the independence of random variables; find the sum and two of two random variables The distribution of maximum and minimum items of an independent random variable; two-dimensional normal distribution, etc.

➢ The concept, nature, and calculation of the mathematical expectation and variance of random variables; the mathematical expectation of calculating the function of random variables, the concept, nature, and calculation of the covariance of random variables, and correlation coefficients.

➢ The law of large numbers, the central limit theorem, and the application of normal distribution in approximate calculations.

➢ The concepts of population, individual, sample, and statistics; the definition of distribution, t distribution, and F distribution; the basic theorem of normal population sample statistics.

➢ Moment estimation method and maximum likelihood estimation method for parameter point estimation; confidence interval for the mean and variance of a single normal population, and confidence interval for the difference and variance ratio of two normal populations.

➢ Set up the basic idea and basic steps of the test; hypothesis test of the mean and variance of a single normal population.

1.5 Computational Methods

Score: 62	**Credit(s):** 1.5
GPA: 1.2	**Course Typ:** RC
Content:	

➢ Numerical solutions of linear equations, including Gauss elimination method, matrix decomposition method, vector norm and matrix norm, and classical iterative method.

➢ Numerical solutions of nonlinear equations, including bisection method, fixed-point iteration method, Newton iteration method, chord intercept method.

➢ Function interpolation and fitting methods, including Lagrange interpolation polynomial, Newton mean difference interpolation polynomial, and piecewise low-order interpolation.

➢ Interpolation type numerical differentiation and numerical integration, including

interpolation type differentiation and numerical integration.

➢ Numerical solutions of initial value problems of ordinary differential equations, including Euler method, Runge-Kutta method.

1.6 Advanced Mathematics Methodology

Score: 87	**Credit(s):** 1.5
GPA: 3.7	**Course Typ:** EC

Content:

➢ Macro-methodology of mathematics, including the law of the generation, formation and development of mathematics, the structure of mathematics theory, and the relationship between mathematics and other sciences, etc.

➢ Mathematics micro-methodology, including specific mathematical methods, especially mathematical discovery and mathematical creation methods, such as mathematical thinking methods, mathematical problem-solving psychology, and mathematical problem-solving theory, etc.

Module 2 Physics

2.1 College Physics II (1)

Score: 78	Credit(s): 4.5
GPA: 2.8	Course Typ: RC
Content:	

> Mechanics, including mass point kinematics, Newton's law of motion, conservation law, rigid body rotation on a fixed axis, etc.

> Thermal

1) The statistical description of thermal motion such as molecular thermal motion and statistical law, ideal gas state equation, the microscopic meaning of pressure and temperature, internal energy of ideal gas, Maxwell's rate distribution law, average collision frequency, and mean free path

2) Thermodynamics, such as heat, work, and internal energy; the first law of thermodynamics, the equivalent process of the ideal gas, the molar heat capacity of gas, adiabatic process, cyclic process, reversible and irreversible process, the second law of thermodynamics.

> Electromagnetism

1) Electrostatic field, such as: charge and its interaction, electric field strength, Gauss's theorem, electric potential, conductor in electrostatic field, dielectric in electrostatic field, capacitance and electric field energy of capacitor;

2) Steady magnetic field, Such as: steady current, magnetic field, the law of generating magnetic field, two laws that express the properties of magnetic field, the function of magnetic field, the work of magnetic force, the influence of magnetic medium on magnetic field: magnetic medium, Ampere's loop theorem in magnetic medium, ferromagnetism Quality;

3) Electromagnetic induction and electromagnetic fields, such as: Faraday's law of electromagnetic induction, motional electromotive force: interpretation of motional electromotive force, Lorentz force, induced electromotive force and induced electric field, mutual inductance and self-inductance, the energy of magnetic field, the theoretical basis of Maxwell's electromagnetic field.

2.2 College Physics II (2)

Score: 77	Credit(s): 2.0
GPA: 2.7	Course Typ: RC

Content:

➢ Vibration and wave, including simple harmonic vibration and wave propagation law

➢ Wave optics, including the coherence of the light source and the acquisition of coherent light, light interference, light diffraction, light polarization, birefringence, etc.

2.3 College Physics Experiments I (1)

Score: 75	**Credit(s):** 0.5
GPA: 2.5	**Course Typ:** RC

2.4 College Physics Experiments I (2)

Score: 85	**Credit(s):** 1.0
GPA: 3.5	**Course Typ:** RC

Content of 2.3 and 2.4:

Measurement of Young's elastic modulus of metal, measurement of object moment of inertia, measurement of ultrasonic sound velocity, measurement of object thermal conductivity, measurement of resistance with bridge, potentiometer, use of oscilloscope, Hall effect method for magnetic field measurement, and magnetization of ferromagnetic materials Characteristic research, equal thickness interference-Newton ring experiment, use of spectrometer, grating diffraction, Michelson interferometer, Millikan oil-drop experiment, holography, milliammeter calibration with potentiometer, falling ball method to measure liquid viscosity, Electron beam deflection and electron specific charge measurement, magnetoresistive sensor, and geomagnetic field measurement, use nonlinear circuits to study chaotic phenomena.

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Module 3 Chemistry

3.1 Basic Chemistry Engineering I

Score: 72	**Credit(s):** 2.0
GPA: 2.2	**Course Typ:** RC
Content:	

> The basic factors of chemical changes such as reaction heat, reaction direction, reaction balance, and reaction rate, to understand the wide application of chemistry in five aspects of material processing, energy utilization, environmental protection, information technology, and life science;

> Thermochemistry: Including the first law of thermodynamics, constant volume heat, constant pressure heat, and enthalpy change, etc.; reaction direction, reaction limit and reaction rate; solution; electrochemistry and metal corrosion; in addition, it also includes the determination of molar enthalpy change of chemical reaction, Determination of acetic acid dissociation degree and dissociation constant, bright zinc plating on the surface of steel parts, aluminum alloy surface treatment-anodic oxidation and other chemical experiments.

Module 4 Computer Science

4.1 Introduction to Computational Thinking

Score: 73	**Credit(s):** 1.5
GPA: 2.3	**Course Typ:** RC
Content:	
The development of computer language, computer thinking: algorithm and complexity, data abstraction, design and mining, Internet and networked thinking.	

4.2 Experiments of Introduction to Computational Thinking

Score: A	**Credit(s):** 1.0
GPA: 4.5	**Course Typ:** RC

Content:

➢ Raptor environment, basic elements (constants, variables, operators, expressions, functions), basic programming

➢ Simple program design: the use of six graphic symbols, the basic structure of the program

➢ Array: random number generation, one-dimensional array, and string, two-dimensional array

➢ Subgraphs and subroutines

➢ Use of documents

➢ Raptor visualization environment to draw graphics

➢ Interaction between graphics window and keyboard and mouse

➢ Simple animation design: animation of card moving, simple motion animation of small ball, animation of the small ball moving along a rectangle

➢ Comprehensive practice

4.3 C Language Programming

Score: 81	**Credit(s):** 2.0
GPA: 3.1	**Course Typ:** RC

Content:

The basic concepts of C language, process control, common data structures, file operations, common algorithms, and basic methods of structured programming.

The specific content includes:

computer languages and programs, data types, operators and expressions, input and output of standard equipment, C language process control, functions especially C system functions,

compilation preprocessing, arrays, structures, unions, and enumerations Cite types, pointers, linked lists, and their algorithms, and the use of data files.

4.4 Project of C Language

Score: B **GPA:** 0.5	**Credit(s):** 3.5 **Course Typ:** RC
Content: The basic concepts of programming language, the application of process control structures, algorithms, data structures, files, etc. in the program in engineering applications; use computer software tools and develop software through software engineering methods, learn from problem analysis and software modeling, The whole process of software design, development, testing and debugging, and then to software maintenance.	

Module 5 Mechanics

5.1 Theoretical Mechanics II

Score: 81	Credit(s): 4.0
GPA: 3.1	Course Typ: RC
Content:	

> Statics, including the force analysis of objects; the equivalent simplification of the force system; the equilibrium conditions of the force system, and its application

> Kinematics, including the arc coordinate method of point motion, the translation of rigid body and its characteristics, the angular velocity and angular acceleration vector expression of rigid body rotation on a fixed axis; the composite theorem of point velocity, the composite theorem of point acceleration and its application; on plane graphics The velocity analysis of each point, the acceleration analysis of each point on the plane graph, the plane motion is decomposed into rotation and rotation

> Dynamics, including particle dynamics, particle system momentum theorem, particle system momentum theorem, particle system kinetic energy theorem, D'Alembert principle, analytical statics, and vibration of discrete systems

5.2 Fluid Mechanics (Civil Engineering)

Score: 81	Credit(s): 2.0
GPA: 3.1	Course Typ: RC
Content:	

> Basic knowledge of fluid mechanics: continuum assumptions, fluid density, pressure and temperature, gas compressibility, viscosity and heat transfer, fluid modeling.

> Hydrostatics: basic introduction and related theories of hydrostatics, static pressure and its characteristics, differential equations of fluid balance and basic equations of hydrostatics, calculation of static fluid pressure, and different expression methods of pressure.

> Fluid dynamics: The three basic equations of fluid dynamics: continuity equation, energy equation, momentum equation, the application of each equation in fluid mechanics and demonstration experiments.

> Flow resistance: the types of flow resistance and heat loss, the two different flow patterns of laminar flow and turbulent flow, and the meaning of Re number, the estimation formula of resistance along the way, the calculation of local resistance, and the demonstration of fluid experiments.

> Orifice, nozzle outflow, and pressure pipeline

> Flow around the flow: dynamic description of the flow around the fluid, analysis

methods of the movement of fluid clusters, differential equations of fluid motion, non-rotational motion and superposition of potential flow, resistance and lift around the flow, computational fluid dynamics methods.

➢ Bernoulli equation experiment, Reynolds experiment, along-course, and local head loss experiment.

5.3 Material Mechanics (Civil Engineering)

Score: 94	**Credit(s):** 4.0
GPA: 4.4	**Course Typ:** RC
Content:	

➢ The basic deformation of the material, including the mechanical properties of the material in tension and compression, the effect of temperature and time on the mechanical properties of the material, the compression test of low carbon steel and cast iron, and the torsion test of low carbon steel and cast iron

➢ Master Hooke's law of unidirectional tension and compression, and master the properties of tension and compression of materials

➢ Combination deformation of stress analysis and strength theory, including the internal force of the stressed member, the stress of the member, the deformation and displacement of the member

➢ Energy method and statically indeterminate, including statically indeterminate and statically indeterminate systems, use deformation comparison method to solve statically indeterminate problems

➢ Dynamic load and alternating stress

➢ Failure criteria and safety design of members

➢ The stability of the pressure bar

➢ Plane geometry properties

➢ Mechanical performance experiment (tension, compression, torsion), four-point bending beam strain measurement and analysis experiment, equal strength beam strain measurement experiment, thin-walled round tube bending, and torsion combined deformation and strain measurement experiment

5.4 Structural Mechanics III (1)

Score: 81	**Credit(s):** 4.0
GPA: 3.1	**Course Typ:** RC
Content:	

Structural composition characteristics, various engineering member systems (statically indeterminate and statically indeterminate trusses, rigid frames, arches, composite structures,

etc.) internal force, displacement, most unfavorable load, and other analysis methods, understand the forces of various common engineering structures and deformation characteristics

Specifically include:

structural composition analysis, statically determinate beams, statically determinate rigid frames, three-hinged arches, statically determinate trusses, and composite structures, general statically determinate structures, influence lines, virtual work principles and structural displacement calculations, force methods, and displacement methods, Progressive Method and Influence Line of Statically Indeterminate Structure, Matrix Displacement Method, General Theory of Statically Indeterminate Structure, etc.

5.5 Structural Mechanics III (2)

Score: 83	**Credit(s):** 1.5
GPA: 3.3	**Course Typ:** RC
Content:	

➢ Structural dynamic analysis: structural dynamic degrees of freedom, one-degree-of-freedom system analysis, differential equations and basic knots of free vibration, dampen vibration and forced vibration, concepts such as period, frequency, dynamic amplification factor, etc., extend the single-degree-of-freedom system vibration to a Two-degree-of-freedom system and general multi-degree-of-freedom system.

➢ Structural stability analysis: Two structural stability analysis methods: static method and dynamic method.

5.6 Elastic Mechanics and Finite Element Methods

Score: 82	**Credit(s):** 2.5
GPA: 3.2	**Course Typ:** EC
Content:	

Through the analytical solution of plane elastic mechanics problems, master the basic analytical capabilities of deformation body mechanics and the mathematical framework for establishing mechanical models; master the basic theories of finite element analysis based on bar structure and plane elastic bodies, as well as the basic methods of structural analysis.

The specific content includes the basic theory of plane problems, the Cartesian coordinate solution of plane problems, the polar coordinate solution of plane problems, the use of finite element method to solve plane problems, the energy analysis of plane bar structure, the static analysis of continuum, etc.

5.7 Helicopter Rotor Dynamics Foundation

Score: 90	**Credit(s):** 4.0
GPA: 1.5	**Course Typ:** EC
Content: The flying principle of helicopters; the change of rotor angle of attack, the influencing factors of rotor induced drag, the use of Bernoulli principle, etc.	

Module 6 Engineering Drawing

6.1 Descriptive Geometry and Civil Engineering Drawing

Score: 82	Credit(s): 2.5
GPA: 3.2	Course Typ: RC
Content:	

Including descriptive geometry, professional graphics, and computer graphics. The specific content includes: projection of points, straight lines, and planes; three-sided projections of points and their relationship with space coordinates; three-sided projections and drawing methods of straight lines; three-dimensional projections of planes

Elevation projection; drawing building construction drawings and structural construction drawings, drawing roads and bridges and culvert engineering drawings (2 class hours)

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Module 7 Civil Engineering

7.1 Introduction to Civil Engineering

Score: A	Credit(s): 4.5
GPA: 1.0	Course Typ: RC
Content:	
Combining management, economics, laws, and regulations, master the basic concepts, basic theories, and basic methods of various civil construction engineering, such as construction engineering and underground engineering, bridge engineering and road engineering, railway engineering; understand environmental protection and sustainability in engineering construction The concept and principle of development, and an overall understanding of the development of civil engineering in China and abroad.	

7.2 Recent Development in Civil Engineering

Score: 85	Credit(s): 1.0
GPA: 3.5	Course Typ: EC
Content:	
Frontiers and latest developments of civil engineering in China and abroad: including structural safety of civil engineering, sustainable development of civil engineering, hot areas of underground space development, application of deep foundation pit support technology in transportation and construction engineering, new road pavement technology, new road materials, improving bridge capacity, improving bridge service capacity, etc.	

7.3 Practice for Civil Engineering

Score: B	Credit(s): 1.0
GPA: 3.5	Course Typ: RC
Content:	
Through project site visits, reports, etc., understand the types of civil engineering such as construction, road, bridge engineering, and underground engineering, and understand the process of engineering project design, construction, and management	

7.4 Engineering Geology

Score: 80	Credit(s): 1.0
GPA: 3.0	Course Typ: RC
Content:	
Combining with China's engineering geological conditions, study the stratum lithology,	

geological structure, geological action, rock mass stability, adverse geological conditions and its impact on the project; engineering geological survey, etc.

7.5 Engineering Geology Practice

Score: B **GPA:** 3.5	**Credit(s):** 1.0 **Course Typ:** EC
Content: Cultivate the ability to observe and analyze various geological processes, geological phenomena, and the relationship between them; understand how to identify the types of minerals and rocks in the field, master the preliminary ability to analyze stratum, geological structure, engineering geological conditions, and geological phenomena; master rocks, minerals, etc. Recognition methods and characteristics; observe, analyze and describe the characteristics of geological structures; recognize geological phenomena; recognize the influence of geological phenomena on engineering construction.	

7.6 Soil Tectonics and Soil Mechanics

Score: 75 **GPA:** 2.5	**Credit(s):** 2.0 **Course Typ:** RC
Content: The basic characteristics of soil, the basic principles of soil mechanics (especially the calculation of soil pressure), the main analysis and calculation methods of soil deformation and stability.	

7.7 Introduction to Airport Engineering

Score: 63 **GPA:** 1.3	**Credit(s):** 1.5 **Course Typ:** EC
Content: The composition of the airport; airport clearance; functional zoning and architectural configuration of the terminal; air traffic control, airport approach navigation system, lighting system; airport topography, road surface design, and drainage.	

7.8 Airport Design and Plan

Score: 91 **GPA:** 4.1	**Credit(s):** 1.5 **Course Typ:** EC
Content: Airport layout and construction planning, development strategic planning, etc.	

The specific content includes air transportation system composition, characteristics, development history; basic knowledge of airport planning, and airport system and overall planning, which need to consider the surrounding economy, national defense status, airspace availability, ground transportation conditions, geography, meteorology, and other factors; For the geometric design of the airport flight area, the pavement structure design, the airport drainage system design, and the airport lighting, signs, and marks.

7.9 Building Construction

Score: 80	Credit(s): 2.0
GPA: 3.0	Course Typ: EC

Content:

The principle of house design (divided into two parts, civil and industrial) and house structure. The specific content includes civil building graphic design and section design, building shape and elevation design, introduction to the building structure, wall and foundation, industrial plant design, etc.

7.10 Project of Building Construction

Score: A	Credit(s): 1.0
GPA: 4.5	Course Typ: EC

Content:

Draw architectural plan (bottom floor plan, middle floor plan, top floor plan), building elevation (reasonable layout according to the size of the figure), and building section according to a given building

7.11 Bridge-culvert and Hydrology

Score: 81	Credit(s): 1.0
GPA: 3.1	Course Typ: EC

Content:

➢ Basic knowledge of river hydrology, such as bridges and the environment, rivers, and hydrological statistics

➢ Apply probability theory and mathematical statistics to hydrological analysis, calculate the design flow of bridges and culverts, conduct survey and design of bridge locations, and evaluate the interaction between bridges and culverts and hydrology.

➢ From a hydrological point of view, reasonably determine the span layout of bridges and culverts, the height of the bridge deck, estimate the scouring depth of the bridge piers and abutments, and further design the foundation depth

7.12 Foundation Engineering

Score: 80	Credit(s): 2.0
GPA: 3.0	Course Typ: RC
Content:	
The working principle, design calculation method, and construction-related technical issues of shallow foundation, pile foundation, and caisson foundation. The specific content includes: foundation design principles, rigid foundation and expanded foundation design calculation, strip foundation under a column, determination of vertical bearing capacity of single pile, determination and calculation of pile bearing capacity, design and calculation of caisson, etc.	

7.13 Project of Foundation Engineering

Score: B	Credit(s): 1.0
GPA: 3.5	Course Typ: RC
Content:	
Focus on strip foundations or bridge pile foundations, complete the following course design: understand the design process and tasks of the foundation, consult geological data, and superstructure design data; determine the buried depth, structure size, and reinforcement of the foundation through calculations or structural requirements. And draw construction drawings	

Module 8 Engineering Surveying

8.1 Engineering Surveying

Score: 70	Credit(s): 2.5
GPA: 2.0	Course Typ: RC
Content:	

➢ The basic theories of engineering surveying, including elevation surveying, angle surveying, distance surveying, straight-line orientation, control surveying, and topographic mapping surveying and mapping and other basic surveying work, carrying out survey data processing; engineering surveying application in civil engineering.

➢ Carry out the use of leveling instrument and ordinary leveling measurement, fourth-level leveling measurement, the inspection and calibration of micro-tilt leveling, the use of theodolite and the inspection and correction of the horizontal angle, the vertical angle observation, and the vertical plate index difference, and the inspection and correction of the theodolite. Test and calibration, steel ruler measuring distance and magnetic azimuth angle measurement, broken part measurement, and other experiments.

8.2 Project of Civil Engineering Surveying

Score: 86	Credit(s): 2.0
GPA: 3.6	Course Typ: RC
Content:	

Deploy a plane and elevation control network in the survey area, determine the root control points of the map, measure the fragments, measure the ground objects and topographic feature points, and describe them according to the scale of the survey map and the graphic symbols, and finally stitch and decorate the topographic map.

Module 9 Materials of Civil Engineering

9.1 Materials of Civil Engineering

Score: 70 **GPA:** 2.0	**Credit(s):** 2.5 **Course Typ:** RC
Content:	

Content:

➢ Classification and characteristics of civil engineering materials, such as metal materials, air-hardening cementitious materials, cement, concrete, mortar, construction steel, asphalt, and waterproof materials;

➢ Basic theories and knowledge of synthetic polymer materials, wall materials, and other engineering materials

➢ Cement test, concrete aggregate test, concrete test, steel bar tensile and bending performance test, wall brick test, petroleum asphalt test

Nanjing University of Aeronautics and Astronautics

Module 10 Engineering Structure

10.1 Principle of Engineering Structure Design

Score: 88	**Credit(s):** 5.5
GPA: 3.8	**Course Typ:** RC
Content:	

> The basic calculation principles of the structure and the physical and mechanical properties of concrete, steel, and masonry materials,

> Force characteristics, basic theories, and calculation methods of basic components (bending components, compression components, tension components, torsion components, etc.) of reinforced concrete, steel structures, and masonry structures

> Connection structure and calculation method of steel structure

> Basic methods of component test research

> Deformation and crack checking theory and calculation method of components

> Carry out experiments on concrete structural members.

The subjects of the experiments include:

Destruction experiment of the normal section of the reinforced concrete flexural member

Failure experiment of the oblique section of reinforced concrete flexural member

10.2 Experiments and Testing of Engineering Structures

Score: 85	**Credit(s):** 1.5
GPA: 3.5	**Course Typ:** RC
Content:	

> Engineering structure load and loading method (heavy object loading method, pneumatic loading method, mechanical equipment loading method, hydraulic loading method, and basic principles of dynamic excitation), on-site inspection, and evaluation of engineering structure

> Carry out the pasting technology of resistance strain gauges, the use of static resistance strain gauges and the connection of bridges, steel mechanical properties testing, non-destructive testing of simply supported truss, dynamic characteristics of cantilever beams, determination of concrete elastic modulus, and Poisson's ratio, experiments on bending test of I-shaped steel beams, non-destructive testing of defects and diseases of reinforced concrete members, etc.

10.3 Structural Model Design and Production

Score: 94	**Credit(s):** 2.0

GPA: 4.4	**Course Typ:** EC
Content:	
The production process, production accuracy requirements, proportion requirements, and required materials and tools of the models required in different stages of the project, to gradually understand the processing and production methods of different materials during the model production process.	

10.4 Design of Steel Structure

Score: B	**Credit(s):** 2.5
GPA: 3.5	**Course Typ:** EC
Content:	

> Portal frame structure, including frame design, profiled steel plate design, purlin design, portal frame test; single-story frame (row) frame structure, focusing on crane beam design; steel truss structure, including truss load and Internal force calculation, truss member design; steel frame structure, including force analysis of steel frame structure, steel frame member design, steel frame connection, and node design; spatial grid structure, including grid structure member design, grid structure node Design and other forms and characteristics of various steel structures
> The scope of application, basic layout, calculation principle, design method, and corresponding structural measures of different structural forms

10.5 Project of Steel Structure

Score: A	**Credit(s):** 1.0
GPA: 4.5	**Course Typ:** EC
Content:	
Understand the design process and tasks of steel structure engineering; determine the arrangement of rigid frames and supports (roof supports, inter-column supports); determine the arrangement of roof purlins, braces, and struts; calculate the internal force of single-door frame; rigid frame Design; draw construction drawings	

10.6 Wind Resistance of Civil Engineering Structure

Score: 92	**Credit(s):** 1.5
GPA: 4.2	**Course Typ:** EC
Content:	
Conventional high-rise building surface wind load calculation theory and method, building, and bridge structure wind resistance design theory and common method, basic principle and common method of structural wind vibration control.	

10.7 Design of Reinforced Concrete Rib Floor

Score: B	Credit(s): 1.0
GPA: 3.5	Course Typ: EC
Content:	
General principles and methods of concrete structure design, concrete floor design, concrete structure design (including bent structure, frame structure, shear wall structure, frame-shear wall structure), masonry structure design.	

10.8 Structures Design of Concrete and Masonry

Score: 81	Credit(s): 2.5
GPA: 3.1	Course Typ: EC
Content:	
➤ Concrete beam and slab structure, including the main form of the floor, one-way slab and two-way slab, main beam, and secondary beam. Introduce in detail the integral one-way slab-girder structure and the integral two-way slab-girder structure, including its structural layout, beam size, beam load and reinforcement plan, stairs, awning design, etc. ➤ Masonry structure, including material selection, mechanical properties, strength and bearing capacity calculation of masonry structure, design of lintels, ring beams, wall beams and cantilever components, seismic design, etc.	

10.9 Introduction to Seismic Engineering

Score: 79	Credit(s): 1.0
GPA: 2.9	Course Typ: RC
Content:	
Basic knowledge of earthquakes, such as the genesis and types of earthquakes, earthquake intensity and earthquake damage index; ground motion parameters and design response spectra, seismic response of structures, etc.	

10.10 Building Seismic

Score: 83	Credit(s): 1.0
GPA: 3.3	Course Typ: EC
Content:	
➤ The basic concepts and design methods of seismic design of building engineering structures, such as the objectives, design methods and basic requirements of seismic fortification, and the seismic check of natural foundations and foundations, etc.	

- ➢ Seismic action and structural seismic response analysis, such as consideration of the interaction between foundation and structure, calculation of vertical seismic action, etc.
- ➢ Seismic design and structural measures for masonry structures, steel structures, and multi-story reinforced concrete structures, as well as seismic isolation and damping design, etc.

Module 11 Engineering Cost

11.1 Engineering Economics

Score: 75	Credit(s): 2.0
GPA: 2.5	Course Typ: RC
Content:	

- ➤ Basic knowledge of engineering economic analysis, cash flow and its composition focusing on the composition of investment and the source of funds, the concept, and composition of the total cost, the relationship between sales revenue and total cost, profit, and tax
- ➤ Time value and equivalent calculation of funds
- ➤ Project economic evaluation and risk analysis, financial analysis, and national economic analysis

11.2 Civil Engineering Cost

Score: 78	Credit(s): 1.0
GPA: 2.8	Course Typ: RC
Content:	

- ➤ Determination of civil engineering quota and unit price, considering factors such as installation engineering labor, mechanical shifts, and material quota consumption
- ➤ Valuation of construction engineering quantity list, including calculation rules of building area, earthwork, concrete, steel bar, masonry, roof waterproofing list, and engineering quantity calculation of price list, etc.
- ➤ Valuation of highway engineering quantity list
- ➤ Construction project bidding and contract management

11.3 Project of Civil Engineering Cost

Score: B	Credit(s): 1.0
GPA: 3.5	Course Typ: RC
Content:	

Determine the list items of sub-items and measures according to the construction drawings and the engineering quantity list pricing specification; calculate the corresponding list of engineering quantities (including the steel reinforcement engineering quantity) according to the calculation rules of the engineering quantity list pricing specification.

Module 12 Engineering Construction

12.1 Civil Engineering Construction

Score: 85	**Credit(s):** 2.5
GPA: 3.5	**Course Typ:** RC
Content:	
Earthwork, such as earthwork calculation, drainage, and groundwater reduction, earthwork slope and support, earthwork mechanized construction, earthwork filling, and compaction, airport earthwork construction; pile foundation engineering, including concrete precast pile construction and concrete pouring Pile construction; concrete structure engineering, including steel reinforcement engineering, formwork engineering, and concrete engineering; prestressed concrete engineering, focusing on post-tensioning construction technology; masonry engineering; scaffolding engineering; steel structure engineering; structural installation engineering; waterproof engineering; decoration engineering Construction principle, construction method, and construction technology.	

12.2 Project of Construction Organization

Score: A	**Credit(s):** 1.0
GPA: 4.5	**Course Typ:** RC
Content:	
Determine the construction deployment according to the specific construction project, and make overall planning and overall arrangements for the project implementation process, including the main objectives of the project construction, construction methods, construction sequence, and space organization, construction organization arrangements, etc.	

12.3 Engineering Project Management and Construction Organization Design

Score: 67	**Credit(s):** 1.0
GPA: 1.7	**Course Typ:** RC
Content:	
Flow construction principle and engineering construction organization, double-code and single-code network planning technology, double-code time-scale network planning and engineering schedule preparation, construction schedule optimization, engineering construction plan design, engineering construction technology and quality management, engineering construction schedule and cost management, etc.	

12.4 Comprehensive Engineering Training

Score: A	Credit(s): 2.0
GPA: 4.5	Course Typ: RC
Content:	
According to the given load, according to different failure modes, determine the concrete strength grade, calculate the concrete mix ratio and design the beam section reinforcement, draw the construction drawing of the beam; process the steel bar and make the concrete beam	

12.5 Integrated Project

Score: B	Credit(s): 2.0
GPA: 3.5	Course Typ: RC
Content:	
➢ Construction engineering direction: basic method of the overall design of masonry structure, architectural plan design of masonry structure, and internal force analysis of actual structure. ➢ Traffic and civil engineering direction: basic methods of a comprehensive design of roads and bridges, principles of road routing, bridge layout and route planning, etc.	

Module 13 Civil Engineering and Environment

13.1 Introduction to Environmental Science

Score: B	**Credit(s):** 1.0
GPA: 3.5	**Course Typ:** RC
Content:	
Basic knowledge of environmental science and ecology and the theory and implementation of sustainable development, utilization and protection of natural resources, air pollution and control, water pollution and control, solid waste pollution and control, environmental physical pollution and its prevention, environmental ethics, environmental law, environmental planning, and management, etc.	

13.2 Airport Environmental Engineering

Score: 92	**Credit(s):** 1.0
GPA: 4.2	**Course Typ:** EC
Content:	
Airport noise pollution and prevention, airport impact and restoration on the ecological environment, airport waste gas emission pollution and prevention, airport sewage and oil pollution and prevention, airport solid waste pollution and prevention, green airport construction, etc.	

Module 14 Engineering Regulations

14.1 Civil Engineering Regulations and Supervision

Score: 88	**Credit(s):** 1.5
GPA: 3.8	**Course Typ:** RC
Content:	

Content:

➢ The concept and system of construction laws and regulations and the basic legal system involved, the legal basis of project construction (constitution, civil law, administrative law, procedural law, criminal law), construction law, property law

➢ Real estate laws and regulations

➢ Engineering construction procedure regulations and practice qualification regulations

➢ Regulations on bidding and bidding for engineering construction

➢ Engineering survey and design regulations

➢ Construction regulations