Course Descriptions

Course	Hours	Course Descriptions
Calculus I & II	160	This course is intended to provide an introduction to the essential knowledge of calculus. In part I, it covers: Function, Limit and continuity, Derivative and Differential, Mean Value Theorem and the Application of Derivatives, Indefinite Integrals, Definite Integrals and its application. In part II, it covers: Differentiation of Functions of Several Variables and Its Application, Multiple Integrals, Line (Curve) Integrals and Surface Integrals, Infinite Series, Ordinary differential equation.
Geometry and Algebra (B1)	56	The course is an important basic course to students majoring in Engineering. It covers: Matrices, Determinants, Germetry spaces, Vector spaces with n-dimemsion, Eigenvalues and Eigenvectors, Quadratic forms and Quadratic Surfaces.
Probability Theory and Mathematical Statistics (B) I	64	This course is intended to provide an introduction to probability theory and many methods used in problems of statistical inference. It covers: The basic concepts of probability, Random variables and probability distributions, Multidimensional random variables and their distribution, Numerical characteristics of random variables, Law of large numbers and central limit theorem, Sample and sampling distribution, Parameter estimation, In the application of mathematical statistics.
College English II, III & IV	192	The students are required to have English classes twice a week during their first two years' study. The abilities of listening, speaking will be gained through discussing with partners about the special topics given by the teacher. The skills of reading and writing will be promoted by means of intensive reading.
Certificate of CET-4	16	The most important English Test for undergraduate students. After two years' study in English, the students are required to pass CET-4 in order to get a bachelor's degree.
Theoretical Mechanics (A)	80	This course is intended to provide an introduction to three branches of mechanics: statics, kinematics and dynamics. Topics covered include: composite motion of particle equilibrium of forces, plane motion of the rigid bodies, transformation of force system, the theory of D'Alembert's principle, methods of Newton, Lagrange, and method of virtual displacement.

Mechanics of Materials	80	This course is one of the most important compulsory courses of Civil Engineering, which reveals the basic rule and theory of the deformation of members under forces and the design theory and calculation method of the strength, stiffness and stability of members. The main course objective is to develop the ability to analyze, calculate, judge and learn by oneself.
Structure Mechanics(A)	80	One of the important parts of the training of every civil engineer. Topics covered include: calculation of deformation and internal force for the statically determinate structures and statically indeterminate structures; deformation and internal force due to the variation in temperature and bearing displacement; the basic two methods of internal force calculation: force and displacement methods.
Principles of Concrete Structure Design	80	This course is intended to provide students with a rational basis of the design of reinforced concrete members and structures through advanced understanding of material and structural behavior. Topics covered: introduction to materials and methods of reinforced concrete construction; behavior and design of reinforced concrete beams and slabs considering flexure, shear, torsion, deflection and crack; behavior and design of columns including slenderness effects; some fundamentals on prestressed concrete members.
Design Principles of Steel Structure	48	This course is intended to provide an introduction to the problems of designing structural members and connections. It covers: characteristics of steel, behavior and design of the tension members, compression members, beams and beam-column, behavior and design of welded and bolted connections.
Materials of Civil Engineering	48	The course provides a basic understanding of the behavior and use of the important civil engineering materials. Students are introduced to the principles of materials science and the behavior of materials under mechanical loads and in aggressive environmental conditions. Emphasis is placed on achieving an understanding of the materials' behavior by consideration of their constituents and structure.

Concrete Building Structures	64	This course provides a basic understanding of main structural systems of high-rise concrete buildings. Five structural systems are discussed: frame structures, shear wall structures, shear wall-filled frame structures, tube structures and single-storey industrial structures. It covers the loads and load placement, proportioning of structural members, structural analysis theory, manual analysis methods.
Descriptive Geometry	48	This course introduces the student to the nature of design by involvement in problem solving projects that call for imaginative thinking and communication development. Concurrently, drawing skills will be developed through drawing exercises that will enable the student to read and produce engineering drawings and sketches, and will develop spatial visualization ability.
Surveying	64	The object of this course is to provide students with first-hand experience of practical field surveying and associated considerations of accuracy, which will enable them to undertake surveys of topography and the built environment and to set out new designs for construction.
Soil Mechanics	40	This course aims to provide students with knowledge and understanding of the physical properties and engineering classification of soil, permeability of soil and flow nets, compressibility of soil and settlement of foundations, shearing resistance of soil, lateral soil pressures, the stability of soil, bearing capacity of soil and stability of foundations.
Ground and Foundation	32	This course aims to provide students with principles of foundation engineering. Topics covered include: shallow foundations, deep foundations, stripe foundations, raft foundations, box and pile foundations.
Engineering Geology	32	This course aims to provide students with a knowledge and understanding of geological and geophysical exploration in rock; properties and behavior of rock masses; rock slope stability; geological engineering of underground openings; evaluation of rock foundations.
Hydromechanics	48	This course aims to form a bridge between fundamental knowledge and understanding of fluid flow phenomena and the solution of practical engineering problems. Topics covered include: the Bernoulli equation and its restrictions, differential continuity equation, boundary layer theory, turbulent flow.

Bridge Engineering	64	The purpose of this course is to explain the basic structural types, mechanical characteristics and available scopes of all kinds bridges. Topics covered include: classification and calculation of design loads, construction of bridge decks, structural construction, design methods of reinforced concrete simply supported beams and prestressed concrete simply supported beams, design of bridge pedestals, as well as construction and design methods of gravity bridge piers and abutments.
Building Architecture	32	The aims of this course are to provide students with the basic principle of the architectural design. Topics covered include: the procedures of architectural design, the design of the stairway, roof, and basement.
Chemistry	32	This course is intended to provide an introduction to principles of chemistry. Topics covered include: the Aggregation State of Substance, chemistry and energy, atmospheric environment and chemistry, concrete and mortar, life phenomena and chemistry, synthetic polymers. Students have to do some chemical experiments to have a better understanding of what they have learned in class.
College Physics I& II	128	This course is intended to provide an introduction to principles of electricity, magnetism, optics, mechanics, heat, sound, and the quantum theory.
General Physics Experiment I& II	64	Experiments in physics of atoms, nuclei, molecules, the solid state physics and other areas that have advanced our modern understanding of physics. Written reports required at the end of each semester. And most important of all, initiative is encouraged as much as possible.
Project on Concrete Building Construction	16	The aims of this course are to introduce certain expertise in the design of a beam-column. Structural analysis theory, manual and computer analysis methods, validation of results from computer analysis and skills will be gained. An understanding of real-world open-ended design issues will be developed. The project is required to be finished in one week, under the guidance of the tutor.
Field Work in Geological Engineering	16	The students are expected to practical application of engineering geology in exploration. Written report is required at the end of the semester, and some more questions will be put forward by a supervising member of staff. But most important of all, initiative is encouraged as much as possible.

Professional Practice	32	The students are expected to pay visits to more than five construction sites including sites of underground project, structural building and bridge. They can acquire some knowledge on what they have not learned in class. Written report is required at the end of the professional practice.
Field Work in Surveying	32	The aims of this course are to introduce students to surveying technology and the use of the latest equipment. Emphasis is placed on developing skills in operation and the proper handling of high-tech equipment used in the surveying business. Good fieldwork habits and office engineering are covered.
Military Training	48	The students have to stay in a military camp about half a month. During these days, they got strike military training under the supervision of the officers every day.
Theory of Military Affairs	16	It is a prerequisite before students' military training, they acquire enough knowledge about military affairs. At the same time it improves their patriotism.
Mechanical Experiments	8	The aims of this course are to introduce some fundamental laboratory measurement techniques and report writing skills. An advanced lab course with experiments in dynamical systems and feedback control design including troubleshoot, and perform detailed, multi-session experiments.
Experiment for Civil Engineering Materials	8	The aims of this course are to introduce some fundamental laboratory measurement techniques and report writing skills. An advanced lab course with experiments in basic properties of engineering materials test, cement test, ordinary concrete experiment.
Engineering Structure Experiment	24	The project serves to develop independence in problem solving by experiment, calculation or field studies. Normally working in pairs, students are expected to read the relevant literature, develop experimental techniques, and prepare a report which presents their results. Guidance is given by a supervising member of staff, but initiative is encouraged as much as possible.
Civil Engineering CAD	32	The aim is to introduce students to computer interfacing and the basics of Computer Aided Design (CAD), thus giving them skills relevant to their future careers.
Fundamentals of Computer	32	The aim of this course is to introduce students to basic principles of the using the computer, for example, the usage of Microsoft offices.

Moral Cultivation and Fundamentals of Law	48	The aim of this course is to help students to have advancement in their moral cultivation, and to introduce students to basic Law concepts in China.
Modern Chinese History Program	32	The aim of this course is to help students to have a basic understanding of China's modern history.
Principles of Marxism Philosophy	48	The aim of this course is to introduce students to basic principles of Marxism philosophy and Political Economics, such as Capitalism and Socialism.
Situation and Policy	24	The aim of this course is to help students to have a basic understanding of situation and policy in current society.
Programming in Combined Language	32	The aim of this course is to introduce students to basic concepts of programming language C.
Selection and Design of Structures	24	The course describes various structural forms, including beams, columns, frame, lattice girder, arch, shell, truss, shell, cable structures, membrane structures. Highlight the basic structure of these structural systems, power transmission mechanism, working principle, structural arrangement and the application of occasions.
Finite Element Analysis	32	The aim of this course is to introduce students to basic theory of finite element.

Dean of School of Civil Engineering

Beijing Jiaotong University

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