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| **校徽20060706** |  |

**College of Beijing Jiaotong University and Lancaster University**

**Curriculums and**

**Course Descriptions**

**Environmental Engineering**

**Undergraduate Program for Environmental Engineering**

**I. Length of Schooling**

Standard Length of Schooling: 4 years; Flexible period of schooling: 3-6 years.

**II. Degree**

Bachelor of Engineering of Beijing Jiaotong University and Bachelor degree of science of Lancaster University and

**III. Requirements of Graduation and Degree**

Students, having obtained the credits as required for the cultivation scheme and complied with the requirements as stipulated by *Regulations Concerning the Management of the Student Status and School Roll of Undergraduate of Beijing Jiaotong University*, are entitled to obtain the undergraduate diploma of Environmental Engineering. The bachelor degree of Engineering from Beijing Jiaotong University and Lancaster University will be conferred to students who comply with the detailed rules for conferring the bachelor degree to college graduates of Beijing Jiaotong University and Lancaster University, subject to the examination and approval of the University Academic Degree Committee, respectively.

**IV. Specialty Orientation**

Through the integration of excellent teaching resource Beijing Jiaotong University and Lancaster University, the collaboration with foreign university, and the respective merits of both universities, cultivate students to be information professionals with the international vision, the skills of external communication, and the understanding of Chinese national situation to meet the needs of our country.

Each student is to be developed into the modern high-caliber professional talent who can positively respond to the social demands with a high sense of social responsibility, the international vision, the intercultural communication competence, the innovative spirit for bold exploration and the practical capacity to solve actual environmental problems according to the cultivation scheme linked up to the international practice.

This cultivation scheme is featured with the highlights of the self-independent choice of the specialty program with attention laid the all-round development in knowledge, capacities and qualities, the cultivation of the practical capacities and the innovative spirit and the individual development of the students based on the completion of the basis courses as required by the environmental science and technology program. It is necessary to break through the cultivation requirements for the wide caliber, solid foundation, strong individuality and capacity to seek innovation and specialty independent choice with emphasis laid upon the overall theoretical knowledge learning coupled with the cultivation and drilling of the practical capacities and innovation and entrepreneurship spirit in a bid to equip the students majoring at all specialties with strong theoretical foundation and the practical capacities. Environmental Science and Technology may provide a general professional education, focusing on Water Quality Engineering, Traffic and Environment, Atmosphere, Weather and Climate, Soil Science and Water Resource Management, and featured with Environmental Microbiology, Environmental Analytical Chemistry and Environmental Monitoring .

**V. Program Objectives**

The undergraduates under Environmental Engineering shall combine the "traffic" characteristics of Beijing Jiaotong University with the advantages of environmental science and technology of University of Lancaster, and be trained to meet the needs of national economic construction and green transportation personnel, be cultivated into talents gaining the all-round development in their moral qualities, intellectual ability, physical fitness and aesthetic appreciation, with the humanistic and scientific cultivation and attainments, the solid Math and English rudiments, a broad command of the basic theories and methods of the specialty of information management so as to adapt themselves to the demand of the 21st environmental development, have the stronger modern management theoretical foundations and the computer application technology and capacity, master the modern information science theories and technical methods coupled with the strong capacities to analyze, design, implement and evaluate the information system to develop themselves into the senior interdisciplinary professional talents proficient in the environmental science and technology knowledge and with the ability to solve the problem of transportation and environmental problems.

**VI. Core Subject Courses**

Major of Environmental Engineering has 10 core subject courses with 29 credits.

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| --- | --- | --- | --- | --- | --- |
| **No.** | **Course Code** | **Course Name** | **Credits** | **Hours** | **Delivered by** |
| 1 | LEC. 173 | Biogeochemical Cycles | 2 | 32 | LU |
| 2 | LEC. 275  | Catchment Hydrology | 3 | 48 | LU |
| 3 | LEC. 276 | Aquatic Biogeochemistry | 3 | 48 | LU |
| 4 | LEC. 278 | Soil Science | 3 | 48 | LU |
| 5 | LEC. 272  | Environmental Data Visualisation and Analysis | 3 | 48 | LU |
| 6 | LEC. 378 | Global Change and the Earth System | 3 | 48 | LU |
| 7 | 30L603Q | Environmental Monitoring & Practical | 3 | 48 | BJTU |
| 8 |  30L713Q | Syllabus of Traffic Environmental Pollution Control | 2 | 32 | BJTU |
| 9 | 30L648Q | Principles of Environment Engineering | 3 | 48 | BJTU |
| 10 | 30L620Q | Air Pollution Control Engineering and Experiment | 3 | 48 | BJTU |

**VII. Course Statistics**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Total** | **LU** | **Percentage Delivered by LU** |
| Total contact hours | 1904 | 800 | 42% |
| The Number of courses | 42 | 16 | 38% |
| The Number of core courses | 10 | 6 | 60.0% |
| Total contact hours of core courses | 448 | 272 | 60.7% |

**VIII. Schedule of Each Semester**

This schedule aims at guiding the students to select the courses as they are required to pay more attention to the semester credits control, the well-matched package of the optional courses and the self-independent studies as planned or scheduled according to the learning interests.

The total credits of this program are 133, with 121 credits compulsory and 12 credits optional and 87.5 credits theoretical, 45.5 credits practical. In the first 3 semesters, students are required to complete fundamental courses in humanities & social Science and natural science. Accounting and finance specialty courses start in the third semester. It is necessary to well arrange the optional modules for each semester to guarantee that you can accomplish the required optional credits in four years.

**Military Training (Summer)**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Name** | **Compulsory / Optional** | **Lecture / Practical** | **Credits** | **Total Contact Hours** | **Exam / CWA** | **Letter Grade(LG)/ Numeric(N)** | **Teaching Weeks** | **Hour(s)/ Week** | **Delivered by** |
| 00L133T: Military Theory | Compulsory | Lecture | 0.5 | 16 | CWA | LG |  | 8 | BJTU |
| 00S001T: Military Training | Compulsory | Practical | 2.5 | 14 Days | CWA | LG |  |  | BJTU |
| Credits Required | 3 Credits in Total（3 Compulsory + 0 Optional） |

**Year 1 Fall Semester**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Name** | **Compulsory / Optional** | **Lecture / Practical** | **Credits** | **Total Contact Hours** | **Exam / CWA** | **Letter Grade(LG)/ Numeric(N)** | **Teaching Weeks** | **Hour(s)/ Week** | **Delivered by** |
| 61L016T: "The Outline of Chinese Modern History" Syllabus | Compulsory | Lecture | 2 | 32 | CWA | LG | 1-16 | 2 | BJTU |
| 60L009T : Physical EducationⅠ | Compulsory | Practical | 1 | 32 | CWA | LG | 1-16 | 2 | BJTU |
| 73L187Q: Calculus (B) Ⅰ | Compulsory | Lecture | 6 | 96 | Exam | N | 1-16 | 6 | BJTU |
| 73L160Q: Geometry and Algebra (B) | Compulsory | Lecture | 3.5 | 56 | Exam | N | 1-16 | 3.5 | BJTU |
| 85L073T: Fundamentals of Computer | Optional | Lecture | 1 | 32 | CWA | LG | 1-16 | 2 | BJTU |
| 50L097T: Introduction to Transportation | Compulsory | Lecture | 1 | 16 | CWA | LG | 1-16 | 1 | BJTU |
| 62L401T English and Study Skills I | Compulsory | Lecture | 3 | 64 | Exam | LG | 1-16 | 4 | LU |
| Credits Required | 17.5 Credits in Total（16.5Compulsory + 1 Optional） |

**Year 1 Spring Semester**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Name** | **Compulsory / Optional** | **Lecture / Practical** | **Credits** | **Total Contact Hours** | **Exam / CWA** | **Letter Grade(LG)/ Numeric(N)** | **Teaching Weeks** | **Hour(s)/ Week** | **Delivered by** |
| 61L020T: Ideological and Moral Cultivation and Legal Basis | Compulsory | Lecture | 2.5 | 48 | CWA | LG | 1-16 | 3 | BJTU |
| Physical Optional Courses | Optional | Practical | 1 | 32 | CWA | LG | 1-16 | 2 | BJTU |
| 73L178Q: Calculus (B) Ⅱ | Compulsory | Lecture | 5 | 80 | Exam | N | 1-16 | 5 | BJTU |
| 73L149Q: University Physics(A)Ⅰ | Compulsory | Lecture | 4 | 64 | Exam | N | 1-16 | 4 | BJTU |
| 73S194Q: Experiments in PhysicsⅠ | Compulsory | Practical | 1 | 32 | CWA | LG | 1-16 | 1 | BJTU |
| 85L074T: C Programming | Optional | Lecture | 3 | 48 | CWA | LG | 1-16 | 3 | BJTU |
| 30L196Q: Introduction to Municipal and Environmental Engineering | Compulsory | Lecture | 2 | 32 | CWA | LG | 1-16 | 2 | BJTU |
| 62L402T English and Study Skills II | Compulsory | Lecture | 3 | 64 | Exam | LG | 1-16 | 4 | LU |
| Credits Required | 19.5 Credits in Total（15.5 Compulsory + 4 Optional） |

**Year 1 Summer Semester**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Name** | **Compulsory / Optional** | **Lecture / Practical** | **Credits** | **Total Contact Hours** | **Exam / CWA** | **Letter Grade(LG)/ Numeric(N)** | **Teaching Weeks** | **Hour(s)/ Week** | **Delivered by** |
| **30S286Q Perception Practice for Environmental Engineering** | **Compulsory** | **Practical** | **1** | **One week** | **CWA** | **LG** | **8-16** |  | **BJTU** |

**Year 2 Fall Semester**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Name** | **Compulsory / Optional** | **Lecture / Practical** | **Credits** | **Total Contact Hours** | **Exam / CWA** | **Letter Grade(LG)/ Numeric(N)** | **Teaching Weeks** | **Hour(s)/ Week** | **Delivered by** |
| 61L021T: Introduction to the Basic Principles of Marxism | Compulsory | Lecture | 2.5 | 48 | CWA | LG | 1-16 | 3 | BJTU |
| Physical Optional Courses | Optional | Practical | 1 | 32 | CWA | LG | 1-16 | 2 | BJTU |
| 73L168Q: Probability and Mathematical Statistics (B) | Compulsory | Lecture | 3.5 | 56 | Exam | N | 1-16 | 3.5 | BJTU |
| 73L150Q: University Physics(A)Ⅱ | Compulsory | Lecture | 4 | 64 | Exam | N | 1-16 | 4 | BJTU |
| 73S195Q: Experiments in PhysicsⅡ | Compulsory | Practical | 1 | 32 | CWA | LG | 1-16 | 1 | BJTU |
| 62L403T English and Study Skills III | Compulsory | Lecture | 3 | 64 | Exam | LG | 1-16 | 4 | BJTU |
| LEC. 171 The Earth's Interior | Compulsory | Lecture /Practical | 2 | 32 | Exam | LG | 1-8 | 4 | LU |
| LEC. 172 Geology | Compulsory | Lecture /Practical | 2 | 32 | Exam | LG | 1-8 | 4 | LU |
| Credits Required | 19 Credits in Total（18 Compulsory + 1 Optional） |

**Year 2 Spring Semester**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Name** | **Compulsory / Optional** | **Lecture / Practical** | **Credits** | **Total Contact Hours** | **Exam / CWA** | **Letter Grade(LG)/ Numeric(N)** | **Teaching Weeks** | **Hour(s)/ Week** | **Delivered by** |
| 61L022T: Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics | Compulsory | Lecture | 3 | 64 | CWA | LG | 1-16 | 4 | BJTU |
| Physical Optional Courses | Optional | Practical | 1 | 32 | CWA | LG | 1-16 | 2 | BJTU |
| 62L404T English and Study Skills IV | Compulsory | Lecture | 3 | 64 | Exam | LG | 1-16 | 4 | LU |
| LEC. 173 Biogeochemical Cycles | Compulsory  | Lecture /Practical | 2 | 32 | Exam | LG | 9-16 | 4 |  |
| LEC. 174 Hydrology: Water in the Environment | Compulsory  | Lecture /Practical | 2 | 32 | Exam | LG | 1-8 | 4 | LU |
| LEC. 175 Atmosphere, Weather and Climate | Compulsory | Lecture /Practical | 2 | 32 | Exam | LG | 1-8 | 4 | LU |
| 30L654Q Environmental Microbiology and Experiments | Compulsory | Lecture /Practical | 3 | 48 | Exam | LG | 8-16 | 6 | BJTU |
| 30L696Q Environmental Analytical Chemistry and  Experiments | Compulsory | Lecture /Practical | 3 | 48 | Exam | LG | 8-16 |  6 | BJTU |
| Credits Required | 20 Credits in Total（19 Compulsory + 1 Optional） |

**Year 3 Fall Semester**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Name** | **Compulsory / Optional** | **Lecture / Practical** | **Credits** | **Total Contact Hours** | **Exam / CWA** | **Letter Grade(LG)/ Numeric(N)** | **Teaching Weeks** | **Hour(s)/ Week** | **Delivered by** |
| 61S021T: Social Practice of Ideological and Political Theory | Compulsory | Practical | 1 | 2 weeks | CWA | LG |  |  | BJTU |
| LEC. 275 Catchment Hydrology | Compulsory  | Lecture /Practical | 3 | 48 | Exam | LG | 1-8 | 6 | LU |
| LEC. 276 Aquatic Biogeochemistry | Compulsory | Lecture /Practical | 3 | 48 | Exam | LG | 1-8 | 6 | LU |
| 30L648Q Principles of Environment Engineering | Compulsory | Lecture /Practical | 3 | 48 | Exam | LG | 1-16 | 3 | BJTU |
| 30L705 The Water Quality Engineering and Experiment I | Compulsory | Lecture /Practical | 3 | 48 | Exam | LG | 8-16 | 6 | BJTU |
| 30S283Q Environmental Professional Practice | Optional | Practical | 2 | 32 | Exam | LG | 3-4 | 32 | BJTU |
| Credits Required | 17 Credits in Total（15 Compulsory + 2 Optional） |

**Year 3 Spring Semester**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Name** | **Compulsory / Optional** | **Lecture / Practical** | **Credits** | **Total Contact Hours** | **Exam / CWA** | **Letter Grade(LG)/ Numeric(N)** | **Teaching Weeks** | **Hour(s)/ Week** | **Delivered by** |
| LEC. 272 Environmental Data Visualisation and Analysis | Compulsory | Lecture | 3 | 48 | Exam | LG | 9-16 | 6 | LU |
| LEC. 278 Soil Science | Compulsory | Lecture  | 3 | 48 | Exam | LG | 1-8 | 6 | LU |
| 30L603Q Environmental Monitoring & Practical | Compulsory | Lecture /Practical | 3 | 48 | Exam | LG | 9-16 | 6 | BJTU |
| 30L620Q Air Pollution Control Engineering and Experiment | Compulsory | Lecture /Practical | 3 | 48 | Exam | LG | 1-8 | 6 | BJTU |
| 30S277Q Air Pollution Control Engineering Course design | Optional | Practical | 1 | 16 | Exam | LG | 9 | 16 | BJTU |
| 30L706 The Water Quality Engineering and Experiment II | Compulsory | Lecture | 3 | 48 | Exam | LG | 1-8 | 6 | BJTU |
| 30S275Q Water Quality Engineering Course Design | Optional | Practical | 1 | 16 | Exam | LG | 7-8 | 8 | BJTU |
| Credits Required | 17 Credits in Total（15 Compulsory + 2 Optional） |

**Year 4 Fall Semester**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Name** | **Compulsory / Optional** | **Lecture / Practical** | **Credits** | **Total Contact Hours** | **Exam / CWA** | **Letter Grade(LG)/ Numeric(N)** | **Teaching Weeks** | **Hour(s)/ Week** | **Delivered by** |
| 61L007T: Situation and Policy | Compulsory | Lecture | 2 | 32 | CWA | LG |  |  | BJTU |
| LEC. 378 Global Change and the Earth System | Compulsory  | Practical | 3 | 48 | Exam | LG | 1-8 | 6 | LU |
| LEC. 377 Geological Hazardsss | Compulsory | Lecture | 3 | 48 | Exam | LG | 1-8 | 6 | LU |
| 30L642Q Solid Waste Pollution Control Engineering  | Compulsory | Lecture | 2 | 32 | Exam | LG | 1-8 | 2 | BJTU |
| 30L713Q Syllabus of Traffic Environmental Pollution Control | Compulsory | Lecture /Practical | 2 | 32 | Exam | LG | 8-16 | 4 | BJTU |
| 30S278Q Solid Waste Pollution Control Engineering Design | Optional | Practical | 1 | 16 | Exam | LG | 10 | 16 | BJTU |
| Credits Required | 11 Credits in Total（10 Compulsory+ 1 Optional） |

**Year 4 Spring Semester**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Name** | **Compulsory / Optional** | **Lecture / Practical** | **Credits** | **Total Contact Hours** | **Exam / CWA** | **Letter Grade(LG)/ Numeric(N)** | **Teaching Weeks** | **Hour(s)/ Week** | **Delivered by** |
| Dissertation project (continued) | Compulsory | Practical | 12 | 96 | CWA | LG | 1-16 | 4 | LU & BJTU |
| 60S238T: Physical Fitness Tests | Compulsory | Practical | 1 | 32 | CWA | LG |  |  | BJTU |
| Credits Required | 7 Credits in Total（7 Compulsory + 0 Optional） |

**VII Introduction to Courses**

**61L016T The Outline of Chinese Modern History**

 Chinese Modern History is essential to all majors. By applying scientific methods, students will improve their ability to analyze historic process, events and personalities and have the independent learning and exploration capabilities. This course is composed of ten chapters. Students successfully completing this course will understand the historical process of Chinese Modern History and master two tough historic tasks of liberation of the masses and prosperity of the nation. Through this course, students will understand the course and lessons of struggle of social elite and people for saving the nation from subjugation and have the correct understandings of how Chinese people chose Communist Party of China and Marxism so as to establish the belief that only socialism can save and develop China.

**60L009T Physical Education I**

 This course is a compulsory course for undergraduates of all majors in our university. Through this course, students can have a new understanding of the importance of the basic physical quality. To improve and correct the attitude towards physical education, form the habit of taking physical exercise and the consciousness of lifelong physical education. Develop the students' physical fitness comprehensively, promote their body shape and physiological functions, improve their health, and lay a good physical foundation for them to learn special course. Cultivate the students’ hardworking, indomitable fighting spirit, and strengthen the organization, discipline, safety education.Main contents: (1) Theory part: Function of physical education; the thought of lifelong physical education; Health and healthy life style; Common sense of scientific physical education; The meaning of physical education in colleges; The arrangement of PE classes in our college. (2)Physical quality part: Speed exercises; Endurance exercises; Strength exercises. (3)National sports part: 16-form Tai Chi.

**73L187Q Calculus (B) I**

 This course is a compulsory basic theory course for undergraduate students of every specialty of engineering and economic and management. It can lay a solid foundation for   course learning under engineering and economic and management programs. This course helps develop students’ ability in scientific thinking and mathematical modeling ability and train students’ scientific and rigorous academic research attitude. This course is mainly about function, limits and continuity, derivative and differential, definite integral and indefinite integral, differential equation, differential mean-value theorem and application of derivative, application of definite integral. It also introduces commonly used mathematical software and typical cases of mathematical modeling.

**73L160Q Geometry and Algebra B**

 The course is an important basic course to students majoring in engineering and science. The goal of this course is to introduce fundamental concepts, theories and methods of linear algebra and analytic geometry, and to heighten student’s ability in abstract thinking, inference and proof reasoning and geometry intuition. This course includes the following contents: matrices、determinants、geometry spaces、vector spaces with dimension n、eigenvalues and eigenvectors、quadratic forms and quadratic surfaces.

**85L073T Fundamentals of Computers**

 This course is the first computer basic course in undergraduate study and is the basis for learning other computer-related courses. Through learning this subject, students can enhance the knowledge of Computer Science and systematically learn the basic concepts of computer hardware and software technology and network technology; they can also understand data processing, programming ideas and methods, master the basic working principle of the computer and data processing, develop the ability of operating and processing data in a network environment, and strengthen the awareness of information security and social responsibility. The course content includes a basic knowledge of computers, hardware and software platforms, data processing and Internet applications. This course aims to help students to lay a solid foundation of knowledge, be familiar with the application of knowledge modules, and understand the history of computer development, new technologies and new developments, on the basis of understanding the concept of the computer as a whole. Students should be able to master basic computer applications, develop problem-solving skills and computational thinking skills, and lay the foundation of learning other computer-related courses.

**61L020T Ideological and Moral Cultivation and Legal Basis**

 The teaching objectives of “Ideological and Moral Cultivation and Legal Basis" are to help college students to improve their ideological and ethical standards and legal quality in an all-round way. Taking Marxism as guides and taking the education of outlook on world, life, value, morality and law as main contents, the course leads college students to establish lofty ideals and beliefs, carry forward the great spirit of patriotism, set up correct outlook on life and values, strengthen conscientiously ideological and moral cultivation, enhance the consciousness of studying, obeying and practicing the law, eventually bring up themselves to all-round development of talent. The objective of this course is to improve the students’ ability to analyze and solve problems, cultivate their awareness of strengthening initiatively self-cultivation, improve their ability of employing consciously Marxist standpoint, perspective and method to guide life.

**73L178Q Calculus (B) II**

 This course is a compulsory basic theory course for undergraduate students of every specialty of engineering and economic and management. It can lay a solid foundation for   course learning under engineering and economic and management programs. This course helps  develop students’ ability in scientific thinking and mathematical modeling ability and train students’ scientific and rigorous academic research attitude. This course is mainly about differential calculus of multivariable functions and its applications; iterated integral; line integral and surface integral and infinite series. It also introduces commonly used mathematical software and typical cases of mathematical modeling.

**73L149Q University Physics I**

 Our goal is to convey the excitement of the physicist's quest to understand nature at its deepest level, and at the same time to provide the knowledge and tools that students will need to continue their studies in engineering. The course will convey the basic knowledge of physics to students, train student’s capabilities in physical modeling, scientific analyzing, problem solving, and knowledge obtaining, and develop students’ appreciation of physics. The course will benefit the students who have taken part in all required activities and meet the assessment standards. The main contents of this course are mechanics, special relativity, and electromagnetism.

**73S194Q Experiments in University Physics I**

 Experiments in University Physics I is a natural science foundation course for students of any specialty in engineering and science. This course offers a wide range of physics experiments in the laboratory on mechanics, thermal physics, optics, electromagnetism, modern physics, etc. The major objectives of this course are to help students learn: the theory of measurement error, how to tabulate and analyze data and display it in graphs; the fundamental principles and method of physical experiments; how to use common physics laboratory instruments, such as oscilloscopes, Michelson interferometer; general operation technology in physics lab. The goal of this course is to develop a rigorous academic attitude and the ability of doing experiments, to cultivate students' innovation awareness, and to lay a good foundation for future learning and work.

**85L074T C Programming**

 C Programming is an important class in computer basic courses. For students in non-CS major, through the study of this course, they can train their capacity of logical and computational thinking. The course makes it easier for them to understand the working process of computer, and how to use computer to solve specific problems. It is the foundation of some advanced courses, and also lays the foundation for programming in other majors. The course introduces the basic principles, ideas and methods of program design. It elaborated the fundament knowledge and procedural programming methods of C programming language, including data types supported by C, usages of expressions, there essential programming constructs, modular programming, applications of array, code preprocessing, pointer, struct, union, file, etc. Through the study, students can make use of C programming language to correctly describe data, understand common algorithms, use functions to achieve modular programming and use them to solve some simple problems. Students can know well the development process of programs, be familiar with C programming language, and grasp the methods of program debugging.

**61L021Q Introduction to the Basic Principles of Marxism**

 “Introduction to the Basic Principles of Marxism” is a common required course for undergraduates. The aim of this course is to provide students with a systematic understanding of the basic Marxist theories and to help students grasp Marxist outlook of world and Marxist methodology, establish Marxist outlook on life and values, and use what they learn in the class to analyze and solve social practical problems. Through the study of this course, students will learn the basic principles of Marxist philosophy, grasp the nature of human society and the dynamic mechanic as well as the main laws of social development and investigate the new situations and new problems appearing in the developmental process of both capitalism and socialism, with the result of strengthening the communist belief in the final victory of Marxism and communism.

**73L168Q Probability Theory and Mathematical Statistics (B)**

 This course is a core mathematics subject introducing random phenomena and statistical laws. The discipline is rapidly penetrating into the cutting-edge technology research. The course focuses on the basic theory and methods of probability and mathematical statistics. At the same time, in teaching it provides an elementary introduction to specific applications in various fields combining with the corresponding specialized characteristics. This course is an important public basic course for all majors of science and engineering. It trains students’ abilities in abstract thinking, logical reasoning, team working and mathematical presentation of natural hypotheses. The task of the course is to help students master the basic theory and the methods of dealing with random phenomenon and to cultivate students’ ability of practice, initiative and innovation. It also aims to develop the ability to analyze and solve some practical problems employing what they have learned.

**73L150Q University Physics II**

Our goal is to convey the excitement of the physicist's quest to understand nature at its deepest level, and at the same time to provide the knowledge and tools that students will need to continue their studies in engineering. The course will convey the basic knowledge of physics to students, train student’s capabilities in physical modeling, scientific analyzing, problem solving, and knowledge obtaining, and develop students’ appreciation of physics. The course will benefit the students who have taken part in all required activities and meet the assessment standards. The main contents of this course are heat, wave, optics and quantum physics, etc.

**30L196Q Introduction to Municipal and Environmental Engineering**

Introduction to Municipal and Environmental Engineering is the professional basis course for the students of Water Supply and Drainage Engineering and Environmental Engineering specialty. Its task is to make the students know the main environmental problems faced by human beings at present, find out the pollution and the main pollutants, know the main problems of water supply and drainage engineering and environmental engineering solve, master the basic prevention and control ways and methods, understand the basic contents and measures of the environmental legal management, environmental quality management, environment mark management, environmental quality planning management.

**LEC.171 The Earth's Interior**

 The Earth's Interior is an important specialty core course for Environmental Engineering. This course begins with a brief overview of the current state of knowledge of the Earth's origin and early evolution, including the development of the core, mantle, lithosphere, hydrosphere, atmosphere and biosphere. This sets the context for understanding how the Earth’s internal processes have profoundly altered the surface environment over geologic time, and continues to do so today through plate tectonics and volcanism. We examine evidence for the internal layering of the Earth, plate tectonics and mantle convection, drawing upon seismology, geomagnetism, geology, geodesy, heat flow and geochemistry. By the end of the module you will be able to discuss how supereruptions and the supercontinent cycle have influenced the Earth's climate and the evolution of life.

**LEC.172 Geology**

 Geology is an important specialty core course for Environmental Engineering. This course aims to demonstrate that rocks and minerals are one of Earth's key natural resources and that it is therefore important to have an understanding of geological processes and materials.  Emphasis is 8p1aced on the dynamic way in which the Earth works and the processes that generate rocks, minerals, sediments, landforms and fossils.  Five topics are studied: minerals as building blocks of rocks; volcanism and plutonism; metamorphism; sedimentation, and deformation.  This module provides students with the tools to interpret the processes that have formed the planet on which we live.  LEC.172 Geology, although a starting point for students who are aiming for careers in the oil industry, hazard management, town planning, cartography, environmental consultancy etc, should also be fascinating to others who have a broad interest in the way the Earth works and are curious to know more.

**LEC.173 Biogeochemical Cycles**

Biogeochemical Cycles is an important specialty core course for Environmental Engineering. The main aim of the module is to introduce students to key biogeochemical processes that have a major impact on the lithosphere, hydrosphere and atmosphere and how biogeochemistry has shaped the Earth's environment. The importance of biogeochemical processes will be demonstrated through a consideration of their relevance to the environmental discipline of Earth System Science. The processes will be illustrated using examples of biogeochemical cycles of various elements, on various spatial scales, including carbon, and how anthropogenic perturbations have dramatically influenced the biogeochemical cycles of many different elements.

**LEC.174 Hydrology: Water in the Environment**

 Hydrology: Water in the Environment is an important specialty core course for Environmental Engineering. The course aims to introduce to the science of hydrology and emphasizes the*physical processes* and their *measurement*. Two case studies will be used to illustrate how an understanding of hydrological processes can be used to quantify and sometimes solve environmental problems. The first issue to be examined is the impact of rainforest logging on the physical environment and will use data for a region of northern Borneo currently under study. The second issue to be addressed is the potential for environmental contamination from a proposed radionuclide repository near Sellafield. Again, research work will be used to illustrate the hydrological theory.

**LEC.175 Atmosphere, Weather and Climate**

 Atmosphere, Weather and Climate is an important specialty core course for Environmental Engineering. This module provides an introduction to atmospheric science, giving an understanding of the Earth's atmosphere through both meteorological theory and observation. We investigate the structure and characteristics of the atmosphere and explore the physical principles which govern its behavior and which lead to the everyday experience of weather. We also look at the wider role of the atmosphere as an important component of the Earth's climate system. Practical activities involve making and reporting measurements of a wide range of meteorological variables, interpreting weather charts and satellite images, and investigating the scientific principles that underpin the way our atmosphere and climate system work.

**30L648Q Principles of Environment Engineering**

 Principles of Environment Engineering is an important professional core course in environmental engineering major, which serves as a connecting link between the preceding course and following course in the teaching of environmental engineering. This course is based on natural science principle to analysis of practical engineering and closely related with engineering practice. This course expatiates the water treatment engineering, air pollution control engineering, solid waste treatment engineering, environmental pollution and ecological restoration engineering of all kinds of pollution control projects involving the common basic phenomena and basic process principle in industrial and daily life; it analyzes the structure and operating principle of the unit operation of typical equipment. The course also introduces the basic method of calculation for designing unit process.

Through the study of this course, students should master basic principles of sedimentation, filtration, absorption, adsorption, membrane separation and ion exchange et al, calculation method of unit operation, the typical equipment in basic mass balance transfer and heat transfer theory. The course enables students to obtain necessary technical knowledge as environmental engineers, and to obtain necessary theoretical foundation for further studying specialized courses in environmental and municipal engineering practice. It helps students develop the viewpoint of engineering and the ability of analyzing and solving engineering problems, laying the foundation for the engineering designs, scientific researches and operation managements.

**30L654Q Environmental Microbiology and Experiments**

 Environmental Microbiology and Experiments is an important specialty core course for Environmental Engineering. This course mainly discusses the role of microorganisms present in the natural or artificial environment. The purpose of the course is to provide students some basic professional theory knowledge and practical applications of microorganisms in environmental pollution control. Through the course learning, students could understand microbial cell structure, metabolism and growth and reproduction, evolution, and genetic information transmission, the microorganisms in the microbial population dynamics, the role of microorganisms in the material cycle, microbial bioremediation and biodegradation. Course content: microbial growth and reproduction and survival factors; the microbial genetic variation; microbial ecology; bio-degradation of environmental pollutants and transformation; microorganisms in the water treatment and some new technologies in environmental engineering microbiology.

 Environmental Microbiology Experimentsis a basis professional training course after learning Environmental Microbiology. Students could apply their environmental microbiology knowledge what they had learned into practices. Through the experiment, they could observe the status of micro-organisms in the biosphere. This course content: optical microscope operation; microbial cell counts and dyeing operations; media preparation and sterilization; bacteria purebred isolated and cultured and inoculated technology; bacterial colony morphology observation; determination of the total number of bacterial colonies; air microbial detection; algae detection in lake eutrophication.

**30L696Q Environment Analysis Chemistry**

 Environment Analysis Chemistry is an important specialty core course for Environmental Engineering. This course mainly consists of three parts, namely, data processing and error analysis, titration methods of chemical analysis and instrumental analysis methods. In the first part, the frontier overview of domestic and international environmental analysis application, precision and accuracy; significant figures and computation rules; normal distribution of random errors, statistical processing of a small amount of data (t test, abnormal data) the error transfer law; characteristics and classification of analysis method,. Representation and preparation of standard solution will be in traduced, in which focus on the abnormal value processing, the standard solution. So that students learn the method how to increase the accuracy of analysis results.

 The second section will include the basic principles, calculation methods for the acid-base titration, complex ometric titration, redox titration, precipitation titration. To introduce the titration curve and selection of indicator, application conditions and the range of applications for different titration methods, and the calculation of the sample concentration. Keyson selection of indicator, the analysis of the sample concentration. To be able students to understand the scope of application of the various titration methods, to familiar with the basic principles of the titration method, and to master measurement methods of alkalinity, hardness, Cl-, permanganate index CODCr , BOD5, residual chlorine, dissolved oxygen.

In third part, the basic principles, analytical methods and operation procedures for atomic absorption spectrometry, UV - visible absorption spectroscopy, infrared absorption spectroscopy, nuclear magnetic resonance spectroscopy, mass spectrometry analysis, chromatography and potential analytical instrument will be described, of which will focus on the qualitative analysis method of atomic absorption, spectral absorption law and its calculation, and quantitative analysis methods of gas chromatography. To introduce the instrument characteristics, classification and application scope. To describes the requirements and methods of the sample pretreatment, which will be used in instrument analysis. By learning, students should understand the basic structure, characteristics, application scope of these large analytical instruments, the basic principles of instrumental analysis, and master analytical methods.

**30S286Q Perception Practice for Environmental Engineering**

Cognition practice is very important in practical teaching link of undergraduate teaching plan. It is a compulsory practical courses associated with teaching, an important way for students to get practical knowledge and strengthen practical engineering skills, meanwhile an important link for students to obtain certain perceptual knowledge about enterprise and cultivate talents. The purpose of perception practice is enable students to understand the basic situation of environmental pollution prevention, environmental decision-making and management through the site visit. On the one hand, students will consolidate professional knowledge learned, on the other hand can apply theory to reality, then enriching professional curriculum content, improving students' learning effects on the course.

During the internship, it can make students understand theory, technology, engineering and management of environmental engineering combined with actual engineering, and obtain preliminary perceptual knowledge of pollution control engineering; lay necessary practical basis for further in-depth, specialized courses learning. Through cognition practice, improve students’ ability and methods of study, observation, analyze and solve problems and adaptation to society; strengthen students' occupation consciousness, viewpoint of labor; improve the ideological and political consciousness, expand the horizons. At the same time, let the students have the opportunity to widely contact site personnel, and learn social life.

**LEC.272 Environmental Data Visualisation and Analysis**

 The module will provide the students with scientific numeracy skills going beyond the use of spreadsheets. The module focuses on data pre-processing and QA, processing and visualization, mainly for use with dissertation work which provides the focus and immediate motivation. It includes introductory elements of current visualisation and numerical processing standards. The main programming elements are introduced and used in examples: data input, processing, output in numerical and graphical forms, programming tools and structures (loops, conditional statements and other flow control). The course introduces selected principles of dynamic systems modelling applied to environmental systems in the form of worked examples and case studies.

**LEC.275 Catchment Hydrology**

 Catchment Hydrology is an important specialty core course for Environmental Engineering. This course includes introduction to watershed hydrology, measurement and use of professional hydrological analysis technology to solve the development and utilization of river basin water resources present situation analysis, scheduling, management issues(notably flood forecasting and water quality remediation), this course aim is to cultivate students' capacity of applying knowledge to solve the practical problems of the regional water environment, to cultivate students' innovative sense and engineering attitude.

**LEC.276 Aquatic Biogeochemistry**

Aquatic Biogeochemistry is an important specialty core course for Environmental Engineering.  This course will make the students be able to: (1) understand facts and principles of the nature of aquatic systems from a chemical standpoint; (2)be able to explain the main processes and factors governing the chemical composition of natural waters; (3)apply these concepts to a range of case studies evaluate and assess aspects of various analytical methods and analytical quality control.

**30L713Q Syllabus of Traffic Environmental Pollution Control**

 Syllabus of Traffic Environmental Pollution Control is an important specialty core course for Environmental Engineering. The content includes air pollution prevention and control of transportation, traffic noise impact analysis and control, traffic and ecological environment protection, environmental impact of soil and water conservation, the environmental cost analysis, environmental impact assessment of transportation project, traffic environment and sustainable development and so on. Students should master the core content of traffic and environment course. This course aim is to help the students to improve their ability to solve water pollution, air pollution, noise pollution, and environmental actual problem from transportation, to cultivate students' innovative sense and engineering attitude.

**30L705Q The Water Quality Engineering and Experiment I**

 The Water Quality EngineeringⅠis the core course of environmental engineering, water supply and drainage engineering. It mainly introduces physical and chemical treatment technology of drinking water and industrial water quality treatment. Through study of the course, students will master basic concept and basic theory of drinking water and industrial water purification methods, learn technological process and working principle of drinking water and industrial water treatment, improve ability of process design and the design calculation of treatment structure.

**30S283Q Environmental Professional Practice**

 The course is one important component of environmental engineering practice teaching .It is an important means of production practice in environmental engineering fields for the students. The purpose of the production practice and the basic task is to enable students to integrate environmental engineering theory based and professional courses of study. Students will deepen the professional knowledge through contact with the actual production and process. And gradually establish professional engineering concepts and ideas. Practice mainly include: municipal wastewater and water reuse treatment plant, a variety of productive enterprises (such as beer, paper, etc.) wastewater treatment plant, the depth of the water treatment plants, municipal solid waste landfill and other environmentally friendly business practice. By production practice, students can apply their knowledge to improve social adjustment purposes.

**LEC.278 Soil Science**

 Soil Science is an important specialty core course for Environmental Engineering. This course content includes the nature and properties of soils in an environmental context. It will provide an introduction to soil formation, soil description (including field work), chemical and physical properties, and biology, leads to the application of soil science to a variety of practical problems. This course aim is to help the students to improve their ability to solve soil environmental actual problem , to cultivate students' innovative sense and engineering attitude.

**30L603Q Environmental Monitoring & Practical**

 Environment Monitoring, a course combined with theory and practice, is for the undergraduates of Environmental Engineering major. The aim of this course is to help students acquire the knowledge of monitoring, about monitoring methods, techniques requirement, quality guarantee, data analysis, and using equipment. In addition, teachers should pay attention to cultivate students to discover, think and solve problems independently in sample analysis, to be strict towards science and to be innovative, which can help the undergraduates to prepare for future environment monitoring work.

 Experiment of Environment Monitoring is the follow-up practicality complement of Environmental Monitoring, one of the most important practical courses of Environmental Engineering, Water Supply and Drainage Science and Engineering, an important way for students to obtain practical knowledge, and strengthen monitoring skills. According to Environmental Monitoring Experiment, students can be familiar with the basic process of environmental detection, strengthen the combination of theory and practice, and establish the sensory awareness of environmental monitoring. The course trains students to participate in the practice of environmental monitoring capabilities, and to environmental monitoring skills, and to lay a solid foundation for the future in environmental monitoring.

**30L620Q Air Pollution Control Engineering**

 This course focuses on the basic theory of air pollution control, the basic principles of the various control methods, the typical structural features of the control equipment, as well as the typical process and equipment design and some topics about the latest achievements and trends of air pollution control. Combined with the air pollution control engineering experiments and course design, this course will cultivate the ability of students to analyze and solve practical problems. Necessary foundation will be supplied for students to do furthermore scientific research and technology management.

**30S277Q Air Pollution Control Engineering Course design**

 This course is set up for the purpose of teaching students to more deeply understand the basic theory of the air pollution control technology, to master the chimney design of coal-fired power plants by height calculation, and to master industrial pollution, such as sulfur dioxide, control method and typical control equipment, process design and calculation methods. Students successfully completing this course will be able to improve the ability to analyze and solve air pollution engineering problems. At the same time they can get a basic practice foundation of furthermore air pollution engineering control and technology management.

**30L706Q The Water Quality Engineering and Experiment II**

 The Water Quality Engineering II is the core course of environmental engineering. Through the study of this course, students will master the sewage quality characteristics, physical treatment, the basic concepts and biochemical reaction kinetics foundation of biological wastewater treatment, activated sludge method and the stabilization pond, biological film and sewage land treatment, anaerobic treatment, sewage advanced treatment, small sewage treatment facilities, sludge treatment and disposal technology. It lays the necessary theoretical and applied basic for the students engaged in environmental engineering design, scientific research and operation management and so on.

**30S275Q Water Quality Engineering Course Design**

The course design is a practice teaching link following the Water Quality Engineering I and the Water Quality Engineering II. The course’s main purpose is to make students master basic theory of water treatment engineering, and then further master main point of water supply and sewage treatment plant project design, basic steps of the engineering design such as scheme comparison,and rendering method of water supply and sewage treatment plant’s floor plan and flow chart, which can lay the root for students’ graduation project and practical work.

**LEC.300 Dissertation project**

Dissertation project is an important specialty core course for Environmental Engineering. This Dissertation project is an individual and individually supervised extensive project ending in submission of a substantial dissertation report. Below is the normal schedule for students not on the Study Abroad or other exchange schemes. For the latter students the schedule varies depending on the logistics of the schemes and sometimes on the project logistics (e.g. for expedition based projects); students on the Study Abroad schemes will have their milestones delayed or brought forward as needed.  The students are expected to have completed the Y2 skills modules appropriate for their scheme of study.

**LEC.378 Global Change and the Earth System**

Global Change and the Earth System is an important specialty core course for Environmental Engineering. This module is intended for students who wish to gain experience in the field of Earth system science, and how scientists study this area in an era of global change. The aim is to introduce the concept of the Earth system and how the different components (atmosphere, ocean, ice and ecosystems) interact with each other to shape the Earth's climate and control how the climate might change. The module begins with underlying concepts that shape the Earth's climate (energy transfer, the greenhouse effect, atmosphere and ocean circulation), before considering natural and human drivers of climate change, including volcanoes, solar output, greenhouse gases and land use change. In addition, it will also introduce the computer models and global observation networks that scientists use to understand the Earth system as well as the IPCC process. Overall, this module aims to provide an introduction to the physical processes which influence global climate change, leading to a better understanding of Earth system science.

**30L642Q Solid Waste Pollution Control Engineering**

Solid Waste Pollution Control Engineering and Practical is an important specialty core course for Environmental Engineering. The content includes The main task and purpose of the course is to discuss the fundamental theory and technology of solid waste treatment and disposal, such as compaction, shredding, separation, composting, incineration, landfill .The content includes waste production, classification and management, scientific and technological principles of treatment and disposal. Students successfully completing this course will be able to understand the laws and regulations related to solid waste, grasp solid waste treatment and disposal technology, improve their problem-solving abilities. They will get the necessary foundation for the furthermore scientific research and technology management in the solid waste treatment and disposal.

**30S278Q Solid Waste Pollution Control Engineering Course Design**

This course is a practical course after students complete the study of solid waste pollution control engineering. The main purpose is to enable students to in-depth understanding of solid waste pollution control engineering principles ,to improve the ability of students analyze and solve problems, and to apply these principles to the engineering design. The main contents include solid waste disposal program, the urban garbage collection system design, urban waste transfer station engineering, engineering design of urban organic waste composting, and municipal solid waste sanitary landfill project design.

**LEC.377 Geological Hazards**

Geological Hazards is an important specialty core course for Environmental Engineering. This module takes a broad look at geological hazards, covering contemporary events, to those that have shaped the Earth over geological time. Specific hazards addressed are: 1) earthquakes and tsunamis, 2) terrestrial and sub-marine landslides at a variety of differing scales, landslide triggering and principles of run-out, 3) volcanic hazards (eruption styles, plumes and pyroclastic flows) and 4) extreme events which civilization has yet to witness. The module explores in depth the fundamental processes involved, and to what extent events can be predicted. Case histories of national and international disasters will be used to illustrate these hazards, with the inherent risks and potential mitigation measures discussed. The module develops a sense of human-place in the geological world, promoting an understanding of how the geological world impacts human society, and what can be done to limit that impact.