School of Environmental Science and Engineering

Program of Environmental Science and Engineering for International Students (2023)

I. Introduction

SUSTech established the School of Environmental Science and Engineering (hereafter referred to as "the School") in 2015 as a platform to foster top talents in the field of environmental science and engineering in China. The School's teaching and research mainly focus on water science and technology, resources recycling, atmospheric environment and earth system science.

Environmental Science and Engineering is the first bachelor degree program of the school. This Major cover important environmental issues such as water pollution control, air pollution control, solid waste disposal, treatment and recycling, ecological conservation, environmental monitoring, environmental quality assessment, environmental planning, natural resources management, etc. At present, the School has 78full-time faculty members (including 16 professors, 24 associate professors, 36 assistant professors). The faculty has received numerous honors and distinctions. Among them, one is academician of CAS, one is member of the U.S. National Academy of Engineering, one is member of the European Academy of Sciences, five recipients of Outstanding Young Investigator Award from the National Natural Science Foundation of China (NSFC), four recipient of the State Council Special Allowance, three recipients of Outstanding Young Investigator Award (junior level) from the NSFC. All faculty members have prior experiences studying and/or working abroad.

This degree program especially emphasizes the integration of theory and practice. The Engineering Innovation Center (Beijing) of SUSTech is the School's platform for industry-university-research cooperation, which will provide training opportunities for students to practice what they learned in classes.

The School strives to make Environmental Science and Engineering an internationally recognized degree program, which is unique in the following aspects:

a. Innovation of engineering science.

b. Coupling of resources, environment and society.

c. New environmental industries, products, and services targeted.

Academic subject areas: Environmental Science and Engineering

Program code: 082501

II. Objectives and Learning Outcomes

1. Objectives

The major aim of the program is to train talents with firm fundamental knowledge, broaden their vision, and build the innovation ability. Most of the graduates will continue their study in leading universities at home and abroad; while the other will enter government or international organizations for works related to environment management.

2. Learning Outcomes

The School's graduates should have:

- A solid foundation of theoretic knowledge (including math, physics, chemistry, biology, geoscience, et al.), as well as professional knowledge on environmental science and engineering.

- Capability to do scientific research and engineering design, knowing the tendency of environmental science and technology, and be familiar with the standards, guidelines, policies, laws and regulations in the field of environmental protection.

- A rigorous attitude, a desire for excellence, the social responsibility and good communication skills.

- Innovative thinking, and capability to solve problems independently.

- An international vision, fluency in at least one foreign language.

III. Study Length, Degree, and Graduation Requirements

1. Study length: 4 years.

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

3. The minimum credit requirement for graduation: 163.5 credits. The specific requirements are as follows.

Module		Category	Minimum Credit Requirement
General Education Courses	Chinese Language and Culture Module	Chinese Language and Culture	16
	Arts and Physical Education Module	Physical Education	4
		Arts	2
	Competence Development Module	Computer Programming	3
		Writing	2
		Foreign Languages	14
	Humanities and Social Sciences Module	Humanities	6
		Social Sciences	
		Chinese Studies	2
	Mathematics and Natural Sciences Module	Mathematics	12
		Physics	10
		Chemistry	4
		Geoscience + Life Science	3
	GE to Majors Bridging Module	Introduction to Majors	2
Major Courses	Major Required Courses	Major Foundational Courses	18.5
		Major Core Courses	21
		Practice-based Learning (Undergraduate Thesis, Internships, Research projects, etc.)	18
	Major Elective Courses	Major Elective Courses	Specialty Tracks-Restricted Electives Courses: 20 Electives Courses: 6
Total			163.5
Note: please see the General Education Requirement for more details on Chinese Language and Culture Module, Arts and Physical Education Module, Competence Development Module（Foreign Languages & Writing）, Humanities and Social Sciences Module, and GE to Majors Bridging Module.			

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

Course Category	Course Code	Course Name	Credits	Terms	Prerequisite	Dept.
Mathematics	MA117	Calculus I	4	1 Fall	None	Department of Mathematics
	MA127	Calculus II	4	1 Spring	Calculus I	
	MA113	Linear Algebra	4	1 Spring & Fall	None	
Physics	PHY105	College Physics I	4	1 Fall	None	Department of Physics
	PHY106	College Physics II	4	1 Spring	College Physics I	
	PHY104B	Experiments of Fundamental Physics	2	1-2 Spring & Fall	None	
Chemistry	CH103	General Chemistry	4	1-2 Spring & Fall	None	Department of Chemistry
Geoscience + Life Science	Complete any one of the following courses					
	BIO102B	Introduction to Life Science	3	1-2 Spring & Fall	None	Department of Biology
	EOE100	Introduction to Earth Sciences	3	1-2 Spring & Fall	None	ESS, OCE, ESE
Computer Programming	Complete any one of the following courses					
	CS109	Introduction to Computer Programming	3	1-2 Spring & Fall	None	Dept. of Computer Science and Engineering
	CS110	Introduction to Java Programming	3	1-2 Spring & Fall	None	
	CS111	Introduction to C programming	3	1-2 Spring & Fall	None	
	CS112	Introduction to Python Programming Python	3	1-2 Spring & Fall	None	
	CS113	Introduction to Matlab Programming	3	1-2 Spring & Fall	None	

Note:
1. Calculus I and Calculus II can be replaced by Mathematical Analysis I and Mathematical Analysis II；
2. Linear Algebra can be replaced by Advanced Linear Algebra I；
3. College Physics I and College Physics II can be replaced by General Physics I and General Physics II；
4. Introduction to Life Science can be replaced by Principles of Biology；
5. The above alternative courses are also applicable to V.

V. Prerequisites for Major Declaration

Major Declaration Time	Course Code	Course Name	Prerequisite
Declare major at the end of the first academic year	MA117	Calculus I	None
	MA127	Calculus II	Calculus I
	PHY105	College Physics I	None
	CH103	General Chemistry	None
Declare major at the end of the second academic year	MA117	Calculus I	None
	MA127	Calculus II	Calculus I
	MA113	Linear Algebra	None
	PHY105	College Physics I	None
	PHY106	College Physics II	College Physics I
	PHY104B	Experiments of Fundamental Physics	None
	CH103	General Chemistry	None
	Geoscience + Life Science		
	Computer Programming		

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

VI: Major Course Arrangement

Table 1: Major Required Courses

Program of Environmental Science and Engineering

Course Category	Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Major Foundational Courses	CH102-15	General Chemistry Laboratory	2	2	1/Spr.	General Chemistry / Chemistry: The Central Science	Department of Chemistry
	ESE202	Introduction to Environmental Sciences	2		Fall/Spr.	None	School of Environment
	ESE203	Fundamentals of Geology	3	0	2/Fall	None	School of Environment
	MA212	Probability and Mathematical Statistics	3		2/Fall	Calculus II	Department of Mathematics
	ESE204	Principles of Environmental Engineering	2		2/Fall	General Chemistry, College Physics II	School of Environment
	MA201b	Ordinary Differential Equations B	4	1	2/Spr.	Calculus II	Department of Mathematics
	ESE205	Physical Chemistry	3		2/Spr.	Calculus II, General Chemistry	School of Environment
Total			**19**	**3**			
Major Core Courses	ESE206	Environmental Chemistry	3	0	2/Spr.	General Chemistry/ Chemistry: The Central Science	School of Environment
	ESE212	Environment Monitoring	2		2/Spr.	General Chemistry Laboratory A, College Physics II	School of Environment
	ESE214	Environment Monitoring Laboratory	1	1	2/Spr.	Environment Monitoring	School of Environment
	ESE303	Water Treatment Engineering	4		3/Fall	Principles of Environmental Engineering, Environmental Chemistry, Environment Monitoring	School of Environment
	ESE305	Environmental Science and Engineering Laboratory I	1	1	3/Fall	Water Treatment Engineering，Environment Monitoring Laboratory	School of Environment
	ESE406	Environmental Transport Process	3	0	3/Fall		School of Environment
	ESE302	Solid Waste Treatment, Disposal and Recycling	3		3/Spr.	Physical Chemistry, Physical Chemistry	School of Environment
	ESE304	Atmospheric Pollution Prevention and	3		3/Spr.	Physical Chemistry, Physical Chemistry	School of Environment

		Control					
	ESE310	Environmental Science and Engineering Laboratory II	1	1	3/Spr.	Solid Waste Treatment, Disposal and Recycling, Atmospheric Pollution Prevention and Control	School of Environment
	Total		**21**	**3**			
Practice-based Courses	ESE370	Projects of Science and Technology Innovation*	0	0	2/Smr.	None	School of Environment
	ESE470	Cognition Practice	2	2	4/Fall	Environmental Chemistry, Environment Monitoring	School of Environment
	ESE480	Innovative Design	4	4	4/Spr.	Solid Waste Treatment, Disposal and Recycling, Water Treatment Engineering, Atmospheric Pollution Prevention and Control	School of Environment
	ESE491	Degree Thesis (or Design)	12	12			
	Total		**18**	**18**			
Total			**57.5**	**23.5**			
Note：Students can choose to carry out this course in any semester after the beginning of the second academic year.							

Students should follow the rules below to select the Major Elective Courses. Credits for these courses should be not less than 26.

● Special Track- Restrict Elective Courses

There are two Special Tracks as shown in Table 2. Students are required to select at least one track and complete courses of no less than 20 credits.

● Elective Courses

No less than 6 credits are required.

a. Students may select elective courses from Table 2 that do not belong to Special Track-Restrict Elective courses.

b. Students can select courses from Table 3.

c. Besides the Major Required Courses for Environmental Science and Engineering, students may select course(s) from other majors in the School, such as the degree program of Hydrology and Water Resources Engineering.

Table 2: Major Elective Courses

Program of Environmental Science and Engineering

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Track I Environmental Science (Not less than 20 credits are required)						
CH209	Inorganic Chemistry I	4	0	2/Fall	None	Department of Chemistry
CH106	Organic Chemistry B	3	0	2/Spr.	General Chemistry	Department of Chemistry
ESE207	Environmental Chemistry Laboratory	1	1	2/Spr.	Environmental Chemistry	School of Environment
ESE308	Environmental Economics	3	0	3/Fall	Calculus II	School of Environment
ESE5095	Atmospheric Chemistry	3	0	3/Fall	None	School of Environment
ESE313	Introduction to Ecology	3	0	3/Fall	None	School of Environment
ESE317	Application of GIS & RS	3	0.5	3/Fall	Computer Programming	School of Environment
ESE335	Environmental Data Analysis	3	0	3/Spr.	None	School of Environment
ESE336	Environmental Analytical	3	0	3/Spr.	None	School of

	Chemistry				Environment
ESE332	Soil Science	3	0	3/Spr.	Calculus II, General Chemistry, College Physics II	School of Environment
ESE405	Environmental Impact Assessment	3	0	4/Fall	None	School of Environment
Total		32	1.5			

Track II   Environmental Engineering (Not less than 20 credits are required)

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
ME102	CAD& Engineering Drawing	3	1.5	1/Spr.	None	Department of Mechanical and Energy Engineering
CH209	Inorganic Chemistry Fundamentals	3	0	2/Fall	None	Department of Chemistry
CH106	Organic Chemistry B	3	0	2/Spr.	General Chemistry	Department of Chemistry
ESE301	Environmental Microbiology	3	0	3/Fall	Introduction to Life Science	School of Environment
ESE309	Environmental Microbiological Experiments	1	1	3/Fall	Introduction to Environmental Sciences, Environmental Microbiology	School of Environment
ESE317	Application of GIS & RS	3	0.5	3/Fall	Computer Programming	School of Environment
MAE207	Engineering Fluid Mechanics	3	0	3/Fall	Introduction to Life Science	School of Environment
ESE412	Ecological Restoration	3	0	3/Fall	Environmental Chemistry	School of Environment
ESE306	Soil and Groundwater Contamination	3	0	3/Spr.	None	School of Environment
ESE335	Environmental Data Analysis	3	0	3/Spr.	None	School of Environment
ESE417	Industrial Water Reuse	3	0	3/Spr.	None	School of Environment
ESE405	Environmental Impact Assessment	3	0	4/Fall	None	School of Environment
Total		35	3			

Table3: Elective Course

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
BIO201	Biochemistry (Macromolecules)	3	0	2/Fall	Introduction to Life Science, General Chemistry	Department of Biology
MSE203	Crystallography	2	0	2/Fall	None	Department of Materials Science and Engineering
ESE307	Hydrology: Principles and Applications	3	0	2/Fall	Calculus II	School of Environment
ESE216	Hydraulics	3	0	2/Spr.	Calculus II, College Physics II	School of Environment
ESE223	City and Environment	3	0	2/Spr.	None	School of Environment

ESE329	Principles of Remote Sensing	3	0	2/Spr.	Calculus II, College Physics II, Introduction to Earth Sciences	School of Environment
ESE211	Oversea Fieldtrip on Water and Environmental Management	2	2	2/Smr.	None	School of Environment
ESE322	Environmental and Health	3	0	3/Fall	None	School of Environment
ESE314	Environmental Materials Science	3	0	3/Spr.	None	School of Environment
ESE316	Water Resources Assessment and Management	3	0	3/Spr.	None	School of Environment
ESE318	Groundwater Hydrology	3	0	3/Spr.	Introduction to Earth Sciences	School of Environment
ESE319	Global Climate Change	3	0	3/Spr.	None	School of Environment
ESE321	Scientific Presentation	2	0	3/Spr.	None	School of Environment
ESE331	Conservation in the Anthropocene	3	0	3/Spr.	None	School of Environment
ESE337	Environmental Psychology and Design Application	3	0	3/Spr.	None	School of Environment
ESE221	Urban Planning	3	0	4/Fall	None	School of Environment
ESE407	Introduction to Numerical Simulation Methods	3	0	4/Fall	Calculus II, Linear Algebra	School of Environment
ESE5016	Environmental Instrument Analysis	2	1	4/Fall	General Chemistry/Chemistry: the Central Science	School of Environment
ESE415	Watershed hydrologic models: Applications and Practices	3	0	4/Fall	Calculus II	School of Environment
Total		**53**	**3**			

Table 4: Overview of Practice-based Learning

Program of Environmental Science and Engineering

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
CH102-15	General Chemistry Laboratory	2	2	1/Spr.	General Chemistry / Chemistry: The Central Science	Department of Chemistry
ME102	CAD & Engineering Drawing	3	1.5	1/Spr.	None	Department of Chemistry
MA201b	Ordinary Differential Equations B	4	1	2/Spr.	Calculus II	Department of Mathematics
ESE207	Environmental Chemistry Laboratory	1	1	2/Spr.	Environmental Chemistry	School of Environment
ESE214	Environment Monitoring Experiment	1	1	2/Spr.	Environment Monitoring	School of Environment
ESE211	Oversea Fieldtrip on Water and Environmental Management	2	2	2/Smr.	None	School of Environment
ESE470	Cognition Practice	2	2	2/Smr.	Environmental Chemistry, Environment Monitoring	School of Environment
ESE305	Environmental Science and Engineering Laboratory I	1	1	3/Fall	Water Treatment Engineering，Environment Monitoring Laboratory	School of Environment
ESE309	Environmental Microbiological Experiments	1	1	3/Fall	Introduction to Environmental Sciences, Environmental Microbiology	School of Environment
ESE317	Application of GIS & RS	3	0.5	3/Fall	Computer Programming	School of Environment
ESE310	Environmental Science and Engineering Laboratory II	1	1	3/Spr.	Solid Waste Treatment, Disposal and Recycling, Atmospheric Pollution Prevention and Control	School of Environment
ESE370	Projects of Science and Technology Innovation	0	0		None	School of Environment
ESE480	Innovative Design	4	4	4/Fall	Solid Waste Treatment, Disposal and Recycling, Water Treatment Engineering, Atmospheric Pollution Prevention and Control	School of Environment
ESE491	Degree Thesis (or Design)	12	12	4/Spr.		School of Environment
Total		**37**	**30**			

Curriculum Structure of Environmental Science and Engineering

GE Required Courses

Calculus
Linear Algebra
General Physics
General Chemistry
Geoscience + Life science
Computer Programming
Experiments of Fundamental Physic

Mayor Fundamental Courses

Fundamentals of Geology
Introduction to Environmental Sciences
Probability and Statistics
Principles of Environmental Engineering
Physical Chemistry
Ordinary Differential Equations B
General Chemistry Laboratory

Mayor Core Courses

Environmental Chemistry
Environment Monitoring
Water Treatment Engineering
Solid Waste Treatment, Disposal and Recycling
Atmospheric Pollution Prevention and Control
Environmental Transport Process
Environment Monitoring Experiment
Environmental Science and Engineering Laboratory I
Environmental Science and Engineering Laboratory II
Cognition Practice
Innovative Design
Projects of Science and Technology Innovation

Special Track- Restrict Elective Courses

Track I Environmental Science

Inorganic Chemistry I
Organic Chemistry B
Atmospheric Chemistry
Introduction to Ecology
Environmental Data Analysis
Soil Science
Environmental Economics
Environmental Impact Assessment
Application of GIS & RS
Environmental Chemistry Laboratory

Track II. Environmental Engineering

CAD & Engineering Drawing
Inorganic Chemistry I
Organic Chemistry B
Ecological Restoration
Engineering Fluid Mechanics
Environmental Microbiology
Soil and Groundwater Contamination
Environmental Impact Assessment
Industrial Water Reuse
Environmental Data Analysis
Application of GIS & RS
Environmental Microbiological Experiments

Elective Courses

Crystallography
Biochemistry (Macromolecules)
Hydrology：Principles and Applications
Hydraulics
City and Environment
Principles of Remote Sensing
Conservation in the Anthropocene
Environmental Materials Science
Watershed hydrologic models: Applications and Practices
Environmental and Health
Water Resources Assessment and Management
Global Climate Change
Groundwater Hydrology
Urban Planning
Introduction to Numerical Simulation Methods
Oversea Fieldtrip on Water and Environmental

Degree Thesis (or Design)

Lecture ☐

Practice Based ▨

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