

# **Program of Environmental Science and Engineering for International Students (2019)**

## **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 covers 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 57 full-time faculty members (including 13 professors, 7 associate professors, 24 assistant professors). The faculty has received numerous honors and distinctions. Among them, one is fellow of the Royal Academy of Engineering (UK), five national chair professors, three recipients of Outstanding Young Investigator Award from the National Natural Science Foundation of China (NSFC), two recipient of the State Council Special Allowance, one recipient of the National High-level Personnel of Special Support Program, 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.

## **II. Objectives and Learning Outcomes**

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.

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 and Graduation Requirements

Study length: 4 years

Degree conferred: Bachelor of Engineering

The minimum credit requirement for graduation: 135.5 credits (not including English courses);

Category	Module	Minimum Credit Requirement
General Education (GE) Required Courses (52 credits)	Science	32
	Physical Education	4
	Chinese Languages & Culture	16
General Education (GE) Elective Courses (10 credits)	Humanities	4
	Social Sciences	4
	Arts	2
Major Course (73.5 credits)	Major Foundational Courses	21.5
	Major Core Courses	21
	Major Elective Courses	19
	Research Projects, Internship and Undergraduate Thesis /Projects	12
Total (not including English courses)		135.5

### IV. Discipline

Environmental Science and Engineering

### V. Main Courses

Required courses include Major Foundational Courses and Major Core courses.

**Major Foundational Courses:** General Chemistry Laboratory A, CAD & Engineering Drawing,

Introduction to Earth Sciences, Introduction to Environmental Sciences, Ordinary Differential Equations B, Physical Chemistry, Probability and Mathematical Statistics, Principles of Environmental Engineering.

**Major Core Courses:** Environmental Chemistry, Environment Monitoring, Environment Monitoring Laboratory, Environmental Microbiology, Water Treatment Engineering, Environmental Science and Engineering Laboratory I, Solid Waste Treatment, Disposal and Recycling, Atmospheric Pollution Prevention and Control, Environmental Science and Engineering Laboratory II.

## **VI. Practice-Based Courses**

**Science and Technology Innovation Training:** For the students who are interested in the scientific research, they can join the research labs from sophomore year.

**Cognition Practice (in the summer term after the second-year study):** The School arranges a series of field visits to modern enterprises related to energy, resources and environment.

**Innovative Design:** In their senior year, students are required to address valuable resources and environmental problems identified by the school. Students are divided into groups to develop engineering designs, products or methods. The School will evaluate the students' project outcomes. Some good projects will be implemented with supports from enterprises, or be developed to entrepreneurial projects with supports from the university and/or the School.

**Undergraduate Thesis/Projects:** The students need to complete a research project independently and then finish the thesis under the supervision of the assigned faculty; or complete a practical environmental engineering design. Students also have to pass the dissertation defense.

## VII. Pre-requisites for Major Declaration

Major Declaration Time	Course Code	Course Name	Prerequisite
Declare major at the end of First Year	MA101B	Calculus I A	NA
	MA102B	Calculus II A	MA101B
	PHY103B	General Physics B (I)	NA
	CH101A	General Chemistry A	NA
Declare major at the end of Second Year	1. The following courses are passed.		
	MA101B	Calculus I A	NA
	MA102B	Calculus II A	MA101B
	MA107B	Linear Algebra B	NA
	PHY103B	General Physics B (I)	NA
	PHY105B	General Physics B ( II )	MA101B
	CH101A	General Chemistry A	NA
	CS102B	Introduction to Computer Programming B	NA
	BIO102B	Introduction to Life Science	NA
	PHY104B	Experiments of Fundamental Physic	NA
	2. Major Foundational Courses and Major Core Courses in the first two years of the program must be completed at least 50 % (calculated by credit).		
	3. If student doesn't meet any of the above two requirements while GPA is not less than 3.4, they can apply for special approval.		

## VIII. Requirements for GE Required Courses

### (I) Science Module

Course Code	Course Name	Credit	Lab Credits	Hours/week	Term	Language Instruction	Prerequisite	Dept
MA101B	Calculus I A	4	0	4	Spr/Fall	B/E	NA	MATH
MA102B	Calculus II A	4	0	4	Spr/Fall	B/E	MA101B	MATH
MA107B	Linear Algebra B	4	0	4	Spr/Fall	B/E	NA	PHY
PHY103B	General Physics B (I)	4	0	4	Spr/Fall	B/E	NA	CHEM
PHY105B	General Physics B ( II )	4	0	4	Spr/Fall	B/E	PHY103B	CSE
CH101A	General Chemistry A	4	0	4	Spr/Fall	B/E	NA	BIO
CS102B	Introduction to Computer Programming B	3	1	4	Spr/Fall	B/E	NA	PHY
BIO102B	Introduction to Life Science	3	0	3	Spr/Fall	B/E	NA	MATH
PHY104B	Experiments of Fundamental Physics	2	2	4	Spr/Fall	B/E	NA	MATH
Total		32	3	35				

### (II) Physical Education

Course Code	Course Name	Credit	Lab Credits	Hours/week	Term	Language Instruction	Prerequisite	Dept
GE131	Physical Education I	1		2	1/Fall	C	NA	PE Center
GE132	Physical Education II	1		2	1/Spr	C	NA	
GE231	Physical Education III	1		2	2/Fall	C	NA	
GE232	Physical Education IV	1		2	2/Spr	C	NA	
Total		4		8				

### (III) Chinese Languages & Culture

Course Code	Course Name	Credit	Hours/week	Term	Language Instruction	Prerequisite	Dept
CLE008	Elementary Chinese I	2	4	1/Fall	B	NA	CLE
CLE009	Elementary Chinese II	2	4	1/Spr	B	CLE008	
CLE027	Intermediate Chinese I	2	4	2/Fall	B	CLE009	
CLE028	Intermediate Chinese II	2	4	2/Spr	B	CLE027	
CLE031	Advanced Chinese I	2	4	3/Fall	B	CLE028	

CLE032	Advanced Chinese II	2	4	3/Spr	B	CLE031	
CLE033	Chinese Culture	2	2	Spr/Fall	B/E	NA	CLE/ HUM/ SSC
CLE034	Chinese History	2	2	Spr/Fall	B/E	NA	
Total		16	28				

#### (IV) English Language

All students are required to undertake the English Placement Test before selecting courses, based on which students will be assigned to 3 levels to be ready for the courses with English as the instruction language.

SUSTech English III, English for Academic Purposes are required for Level A.

SUTech English II, SUSTech English III, English for Academic Purposes for Level B.

SUSTech English I, SUSTech English II, SUSTech English III, English for Academic for Level C.

Course Code	Course Name	Credit	Hours/week	Instruction Language	Prerequisite	Dept
CLE021	SUSTech English I	4	4	E	NA	CLE
CLE022	SUSTech English II	4	4	E	CLE021	
CLE023	SUSTech English III	4	4	E	CLE022	
CLE030	English for Academic Purposes	2	2	E	CLE023	

#### IX Requirements for GE Elective Courses

Students are required to complete 4 credits for the Humanities Module and Social Sciences Module respectively, and 2 credits for the Music and Art Module. (Information about the available courses and the instruction language will be announced before the course selection session)

## X. Major Course Arrangement

**Table 1: Major Required Course (Foundational and Core Courses)**

Course Category	Course Code	Course Name	Credit	Lab Credits	Hours/week	Term	take the course Advised term to	Instruction Language	Prerequisite	Dept.
Major Foundational Courses	CH102-17	General Chemistry Laboratory A	1.5	1.5	3	Spr	1/Spr	B	CH101-A	CHEM
	ME102	CAD& Engineering Drawing	3	1.5	4.5	Spr	1/Spr	C		ME
	ESE201	Introduction to Earth Sciences	3		3	Fall	2/Fall	C		ESE
	ESE202	Introduction to Environmental Sciences	2		2	Fall	2/Fall	E		ESE
	MA212	Probability and Mathematical Statistics	3		3	Fall	2/Fall	C, E, B	MA102B	MATH
	ESE204	Principles of Environmental Engineering	2		2	Fall	2/Fall	C	CH101A, PHY105B	ESE
	MA201b	Ordinary Differential Equations B	4		4	Spr	2/Spr	C, E, B	MA102B	MATH
	MSE202	Physical Chemistry	3		3	Spr	2/Spr	E	MA102B, CH101A	MSE
	Total			21.5	3	24.5				
Major Core Courses	ESE206	Environmental Chemistry	3		3	Spr	2/Spr	B	CH101B	ESE
	ESE212	Environment Monitoring	2		2	Spr	2/Spr	E	CH101B, CH102-17, PHY105B	ESE
	ESE214	Environment Monitoring Laboratory	1	1	2	Spr	2/Spr	C	ESE212	ESE
	ESE301	Environmental Microbiology	3		3	Fall	3/Fall	B	BIO102B	ESE
	ESE303	Water Treatment Engineering	4		4	Fall	3/Fall	B	ESE204, ESE206, ESE212	ESE
	ESE305	Environmental Science and Engineering Laboratory I	1	1	2	Fall	3/Fall	C	ESE303	ESE
	ESE302	Solid Waste Treatment, Disposal and Recycling	3		3	Spr	3/Spr	C	MSE202, ESE206	ESE
	ESE304	Atmospheric Pollution Prevention	3		3	Spr	3/Spr	C	MSE202, ESE206	ESE

		and Control								
ESE310		Environmental Science and Engineering Laboratory II	1	1	2	Spr	3/Spr	C	ESE302, ESE304	ESE
Total			21	3	24					
ESE370		Projects of Science and Technology Innovation*	0	0	0					Voluntary Application
ESE470		Cognition Practice	2	2	4	Smr	2/Smr	C	ESE206, ESE212	ESE
ESE480		Innovative Design	4	4	8	Fall	4/Fall	C	ESE302, ESE303, ESE304	ESE
ESE490		Degree Thesis (or Design)	6	6	12	Spr	4/Spr	C		ESE
Total			12	12	24					
*Note: Students can choose to carry out this course in any semester after the beginning of the second academic year.										



To choose Major Elective Courses, students should follow the rules below:

a. Major Elective Courses should not be less than 19 credits. Besides the Major Elective Courses of 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.

b. Students can also select courses from other departments with an approval from School. In addition, for students in the grade of 2019, such credits should be no more than 5.

**Table 2: Major Elective Courses**

Course Code	Course Name	Credit	Lab Credits	Hours/week	Term	take the course Advised term to	Instruction Language	Prerequisite	Dept.
ESES007	Global Environmental Problems	1	0	1	Fall	1/Fall	B	NA	ESE
CH213	Inorganic Chemistry Fundamentals	3	0	3	Spr/Fall	2/Fall	E	CH101A	CHEM
CH203	Organic Chemistry I	4	0	4	Spr/Fall	2/Fall	B	CH101A	CHEM
CH205	Analytical Chemistry	4	0	4	Spr/Fall	2/Fall	B	CH101A	CHEM
BIO201	Biochemistry (Macromolecules)	3	0	3	Fall	2/Fall	B	BIO102A, CH101A	BIO
ESE221	Urban Planning	3	0	3	Fall	2/Fall	B	NA	ESE
ESE307	Hydrology: Principles and Applications	3	0	3	Fall	2/Fall	B	MA102B	ESE
ESE223	City and Environment	3	0	3	Spr	2/Spr	C	NA	ESE
ESE216	Hydraulics	3	0	3	Spr	2/Spr	C	MA102B, PHY105B	ESE
ESE329	Principles of Remote Sensing	3	0	3	Spr	2/Spr	C	MA102B, PHY105B, ESE201	ESE
ESE210	The U.S. experience of soil and groundwater pollution prevention	2	2	4	Smr	2/Smr	E	NA	ESE
ESES009	Japanese Experience in Eco-Environmental Technology and Policy	2	2	4	Smr	2/Smr	E	ESE202, ESE204	ESE
MAE207	Engineering Fluid Mechanics	3	0	3	Fall	3/Fall	E	MA102B	MAE
ESE308	Environmental Economics	3	0	3	Fall	3/Fall	B	MA102B	ESE

ESE309	Environmental Microbiological Experiments	1	1	2	Fall	3/Fall	C	ESE202, ESE301	ESE
ESE313	Introduction to Ecology	3	0	3	Fall	3/Fall	E		ESE
ESE317	Application of GIS & RS	3	0.5	3.5	Fall	3/Fall	C	CS102B, ESE201	ESE
ESE321	Scientific Presentation	2	0	2	Fall	3/Fall	C	ESE202	ESE
ESE412	Ecological Restoration	3	0	3	Fall	3/Fall	E	ESE206	ESE
ESE413	Hydrological Modeling at Catchment Scale	2	0.5	2.5	Fall	3/Fall	B	ESE307	ESE
ESE306	Soil and Groundwater Contamination	3	0	3	Spr	3/Spr			ESE
ESE314	Environmental Materials Science	3	0	3	Spr	3/Spr	E		ESE
ESE316	Water Resources Assessment and Management	3	0	3	Spr	3/Spr	E		ESE
ESE318	Groundwater Hydrology	3	0	3	Spr	3/Spr	E	ESE201	ESE
ESE319	Global Climate Change	3	0	3	Spr	3/Spr	E	NA	ESE
ESE322	Environmental and Health	3	0	3	Spr	3/Spr	E	ESE202	ESE
ESE330	Applied Bioinformatics in Environmental Science	3	0	3	Spr	3/Spr	B	ESE301	ESE
ESE331	Conservation in the Anthropocene	3	0	3	Spr	3/Spr	E	NA	ESE
ESE332	Soil Science	3	0	3	Spr	3/Spr	C	MA102B, PHY105B, CH101B	ESE
ESE403	Environmental Planning	2	0	2	Fall	4/Fall			ESE
ESE405	Environmental Impact Assessment	2	0	2	Fall	4/Fall			ESE
ESE406	Environmental Transport Process	3	0	3	Fall	4/Fall	B	MA102B, MSE202	ESE
ESE407	Introduction to Numerical Simulation Methods	3	0	3	Fall	4/Fall	C	MA201b, MA107B	ESE
ESE410	Environmental Instrument Analysis	2	1	3	Fall	4/Fall	C	CH102-17	ESE
Total		93	7	100					

**Table 3: Overview of Practice-Based Courses**

Course Code	Course Name	Credit	Lab Credits	Hours/week	Term	Take the course Advised term to	Instruction Language	Prerequisite	Dept.
CH102-17	General Chemistry Laboratory	1.5	1.5	3	Spr	1/Spr	B	CH101A	ESE
ME102	CAD & Engineering Drawing	3	1.5	4.5	Spr	1/Spr	C	NA	CHEM
MA201b	Ordinary Differential Equations B	4	1	5	Spr	2/Spr	B	MA102B	MATH
ESE214	Environment Monitoring Experiment	1	1	2	Spr	2/Spr	C	ESE212	ESE
ESE210	The U.S. experience of soil and groundwater pollution prevention	2	2	4	Smr	2/Smr	E	NA	ESE
ESE305	Environmental Science and Engineering Laboratory I	1	1	2	Fall	3/Fall	C	ESE214, ESE303	ESE
ESE309	Environmental Microbiological Experiments	1	1	2	Fall	3/Fall	C	ESE202, ESE301	ESE
ESE317	Application of GIS & RS	3	0.5	3.5	Fall	3/Fall	C	CS102B, ESE201	ESE
ESE413	Hydrological Modeling at Catchment Scale	2	0.5	2.5	Fall	3/Fall	B	ESE307	ESE
ESE310	Environmental Science and Engineering Laboratory II	1	1	2	Spr	3/Spr	C	ESE302, ESE304, ESE305	ESE
ESE370	Projects of Science and Technology Innovation	0	0	0			C	NA	ESE
ESES008	Japanese Experience in Eco-Environmental Technology and Policy	2	2	4	Smr	2/Smr	E	ESE202, ESE204	ESE
ESE470	Cognition Practice	2	2	4	Smr	2/Smr	C	ESE206, ESE212	ESE
ESE410	Environmental Instrument Analysis	2	1	3	Fall	4/Fall	C	CH102-17	ESE
ESE480	Innovative Design	4	4	8	Fall	4/Fall	C	ESE302, ESE303, ESE304	ESE
ESE490	Degree Thesis (or Design)	6	6	12	Spr	4/Spr	B		ESE
Total		35.5	26	61.5					

**Table 4: Overview of Course Hours and Credits**

<b>Course Category</b>	<b>Total Course Hours</b>	<b>Total Credits</b>	<b>Credit Requirements</b>	<b>Percentage of the Total*</b>
<b>General Education (GE) Required Courses (not including English courses)</b>	1136	52	52	38%
<b>General Education (GE) Elective Courses</b>		10	10	7%
<b>Major Foundational Courses</b>	392	21.5	21.5	16%
<b>Major Core Courses</b>	384	21	21	15%
<b>Major Elective Courses</b>	1600	93	19	14%
<b>Research Projects, Internship and Undergraduate Thesis/Projects</b>	384	12	12	10%
<b>Total (not including English courses)</b>	3896	209	135.5	100%

\* Percentage of the total= Credit requirements of each line / Total credit requirements

## Curriculum Structure of Environmental Science and Engineering



