School of Environmental Science and Engineering

Program of Hydrology and Water Resources 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 the water science and technology, resources circular using, atmospheric environment and earth system science.

At present, the School has 78full-time faculty members (including 16professors, 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. The program will be unique in the following aspects:

a. Integration of surface water and groundwater protection.

b. The science of water from molecular to global.

c. The system coupling of water resources, water environment, and social economy.

Academic subject areas: Water Conservancy

Program code: 801102

II. Objectives and Learning Outcomes

1. Objectives

The major aims to train talents for Hydrology and Water Resources Engineering field with firm fundamental knowledge, broad vision and outstanding innovation. Most students will

continue their education in domestic and overseas famous universities; and other students will enter government and international organizations for work related to environment and water resources management.

2. Learning Outcomes

The School's graduates should have:

A solid and broad theoretic basis (including mathematics, physics, chemistry, biology, geoscience, et al.) as well as specialized knowledge in hydrology, water resources, and water environment protection.

Capacity to do research on water resource and water environment. Mastering methods of water resource assessment, planning, management, and protection, and be familiar with the standards, guidelines, policies, laws, and regulations in the field of water resources.

A rigorous attitude, a desire for excellence, a sense of social responsibility and good communication skills.

Innovative thinking and capable to solve problems independently.

An international vision and 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: 158.5 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	3
		Geoscience + Life Science	3
	GE to Majors Bridging Module	Introduction to Majors	2
Major Courses	Major Required Courses	Major Foundational Courses	15
		Major Core Courses	27.5
		Practice-based Learning (Undergraduate Thesis, Internships, Research projects, etc.)	20
	Major Elective Courses	Major Elective Courses	17
Total			**158.5**
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	CH105	Chemistry: The Central Science	3	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. Chemistry: The Central Science can be replaced by General Chemistry;
5. Introduction to Life Science can be replaced by Principles of Biology;
6. 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
	CH105	Chemistry: The Central Science	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
	CH105	Chemistry: The Central Science	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 Hydrology and Water Resources Engineering

Course Category	Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Major Foundational Courses	ME102	CAD & Engineering Drawing	3	1.5	1/Spr.	None	Department of Mechanical and Energy Engineering
	ESE203	Fundamentals of Geology	3	0	2/Fall.	None	School of Environment
	ESE202	Introduction to Environmental Sciences	2	0	Spr./Fall.	None	School of Environment
	MA212	Probability and Statistics	3	0	2/Fall.	Calculus II	Department of Mathematics
	MA201b	Ordinary Differential Equations B	4	1	2/Spr.	Calculus II	Department of Mathematics
	Total		15	2.5			
Major Core Courses	ESE307	Hydrology: Principles and Applications	3	0	2/Fall	Calculus II	School of Environment
	ESE206	Environmental Chemistry	3	0	2/Spr..	General Chemistry/ Chemistry: The Central Science	School of Environment
	ESE216	Hydraulics	3	0	2/Spr.	Calculus II, College Physics II	School of Environment
	ESE218	Hydraulics Basic Experiment	0.5	0.5	2/Spr.	Hydraulics	School of Environment
	ESE315	Meteorology and Climatology	3	0	3/Fall	Calculus II, College Physics II,Introduction to Earth Sciences	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
	ESE316	Water Resources Assessment and Management	3	0	3/Spr.		School of Environment
	ESE318	Groundwater Hydrology	3	0	3/Spr.	Introduction to Earth Sciences	School of Environment
	ESE332	Soil Science	3	0	3/Spr.	Calculus II, College Physics II,Chemistry: The Central Science	School of Environment
	Total		**27.5**	**1**			

Practice-based Courses	ESE471	Earth Science Practice	2	2	3/Smr.	Introduction to Earth Sciences, Hydraulics	School of Environment
	ESE472	Hydrology and Water Resources Practice	2	2	4/Fall	Hydrology: Principles and Applications, Groundwater Hydrology	School of Environment
	ESE481	Innovative Design (Water Resources)	4	4	4/Spr.	Hydrology: Principles and Applications, Groundwater Hydrology	School of Environment
	ESE491	Degree Thesis (or Design)	12	12			
	Total		**20**	**20**			
Total			**62.5**	**23.5**			

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

a. The credits of Major Elective Courses should not be less than 17. Besides the Major Elective Courses, students may select courses from other majors in the school, such as the degree program of Environmental Science and Engineering.

b. Students can also select courses from other departments. However, an approval from the School is needed. In addition, for the 2019 class, such credits should be no more than 6.

Table 2: Major Elective Courses

Program of Hydrology and Water Resources 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
PHY203-15	Mathematical Methods in Physics	4	0	2/Fall	Calculus II, College Physics II, Linear Algebra	Department of Physics
ESE221	Urban Planning	3	0	2/Fall	None	School of Environment
ESE220	Physical Geography	3	0	2/Spr.	None	School of Environment
ESE212	Environment Monitoring	2	0	2/Spr.	General Chemistry Laboratory A, College Physics II	School of Environment
ESE214	Environment Monitoring Experiment	1	1	2/Spr.	Environment Monitoring	School of Environment
ESE329	Principles of Remote Sensing	3	0	2/Spr.	Calculus II, College Physics II, Introduction	School of Environment

					to Earth Sciences	
ESE223	City and Environment	3	0	2/Spr.	None	School of Environment
ESE211	Oversea Fieldtrip on Water and Environmental Management	2	2	2/Smr.	None	School of Environment
ESS303	Fundamentals of Space Geodetics	3	0	3/Fall	Calculus II, Linear Algebra	School of Environment
ESE308	Environmental Economics	3	0	3/Fall	Calculus II	School of Environment
ESE412	Ecological Restoration	3	0	3/Fall	Environmental Chemistry	School of Environment
ESE303	Water Treatment Engineering	4	0	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
ESE323	Introduction to Water Resources and Hydropower Engineering	3	0	3/Fall	None	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
ESE319	Global Climate Change	3	0	3/Spr.	None	School of Environment
ESE321	Scientific Presentation	2	0	3/Spr.	None	School of Environment
ESE326	Hydrological Forecast	3	0	3/Spr..	None	School of Environment
ESE331	Conservation in the Anthropocene	3	0	3/Spr	None	School of Environment
ESE338	Mechanics of river and coast	3	0	3/Spr	None	School of Environment
ESE402	Lake & Wetland Hydrology	3	0	4/Fall		School of Environment
ESE407	Introduction to Numerical Simulation Methods	3	0	4/Fall	Calculus II, Linear Algebra	School of Environment
ESE409	Environmental Isotopes in Hydrogeology	3	0	4/Fall		School of Environment
ESE415	Watershed hydrologic models: Applications and Practices	3	0	4/Fall	Calculus II	School of Environment
ESE418	Applied Groundwater Modeling	3	0	4/Fall		School of Environment
Total		**75**	**6**			

Table 3: Overview of Practice-based Learning

Program of Hydrology and Water Resources 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 Mechanical and Energy Engineering
MA201b	Ordinary Differential Equations B	4	1	2/Spr.	Calculus II	Department of Mathematics
ESE218	Hydraulics Basic Experiment	0.5	0.5	2/Spr.	Calculus II, College Physics II	School of Environment
ESE214	Environment Monitoring Laboratory	1	1	2/Spr.	Environment Monitoring	School of Environment
ESE471	Earth Sciences Practice	2	2	2/Smr.	Introduction to Earth Sciences, Hydraulics	School of Environment
ESE211	Oversea Fieldtrip on Water and Environmental Management	2	2	2/Smr.	None	School of Environment
ESE317	Application of GIS & RS	3	0.5	3/Fall	Computer Programming	School of Environment
ESE305	Environmental Science and Engineering Laboratory I	1	1	3/Fall	Water Treatment Engineering，Environment Monitoring Laboratory	School of Environment
ESE472	Hydrology and Water Resources Practice	2	2	3/Smr.	Hydrology: Principles and Applications, Groundwater Hydrology	School of Environment
ESE481	Innovative Design (Water Resources)	4	4	4/Fall	Hydrology: Principles and Applications, Groundwater Hydrology	School of Environment
ESE491	Degree Thesis (or Design)	12	12	4/Spr.		School of Environment
Total		**36.5**	**29.5**			

Curriculum Structure of Hydrology and Water Resources Engineering