

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

The School have a number of excellent faculty in water resources and water environment. 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.

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.

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

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.

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 and Graduation Requirements

Study length: 4 years

Degree conferred: Bachelor of Engineering

The minimum credit requirement for graduation: 134.5 credits (not including English courses);

Category	Module	Minimum Credit Requirement
General Education (GE) Required Courses (51 credits)	Science	31
	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	15
	Major Core Courses	27.5
	Major Elective Courses	17
	Research Projects, Internship and Undergraduate Thesis /Projects	14
Total (not including English courses)		134.5

### IV. Discipline

Hydrology and Water Resources Engineering

### V. Main Courses

Required courses include Major Foundational Courses and Major Core Courses.

**Major Foundational Courses:** CAD & Engineering Drawing, Ordinary Differential Equations B, Introduction to Earth Sciences, Introduction to Environmental Sciences, Probability and Mathematical Statistics.

**Major Core Courses:** Hydraulics, Hydraulics Basic Experiment, Environment Chemistry, Meteorology and Climatology, Hydrology: Principles and Applications, Application of Geographic Information System & Remote Sensing, Introduction to Ecology, Groundwater Hydrology, Evaluation and Management of Water Resources, Soil Physics.

### VI. Practice-Based Courses

**Earth Science Practice:** in the summer term after the second-year study.

**Hydrology and Water Resources Practice:** in the summer term after the third-year study.

**Innovative Design (Water Resources):** In their senior year, students are required to address real-world water resources and water environmental problems identified and selected by the School. Students are divided into groups to develop technology, methods, or programs. 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.

**Degree Thesis (or Design):** 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 hydrology and water resources 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
	CH101B	General Chemistry B	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
	MA107A	Linear Algebra A	NA
	PHY103B	General Physics B (I)	NA
	PHY105B	General Physics B ( II )	PHY103B
	CH101B	General Chemistry B	NA
	CS102A	Introduction to Computer Programming A	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	1/Fall	B/E	NA	MATH
MA102B	Calculus II A	4	0	4	1/Spr	B/E	MA101B	MATH
MA107A	Linear Algebra A	4	0	4	1/Fall	B/E	NA	MATH
PHY103B	General Physics B (I)	4	0	4	1/Fall	B/E	NA	PHY
PHY105B	General Physics B ( II )	4	0	4	1/Spr	B/E	PHY103B	PHY
CH101B	General Chemistry Laboratory B	3	0	3	1/Spr/Fall	B/E	NA	CHEM
CS102A	Introduction to Computer Programming A	3	1	4	1/Spr/Fall	B/E	NA	CSE
BIO102B	Introduction to Life Science	3	0	3	1/Spr/Fall	B/E	NA	BIO
PHY104	Experiments of Fundamental Physics	2	2	4	1/Spr/Fall	B/E	NA	PHY
Total		31	3	34				

### (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	
		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.

SUSTech 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	ME102	CAD & Engineering Drawing	3	1.5	4.5	Spr/Fall	1/Spr	C	NA	CHEM
	ESE201	Introduction to Earth Sciences	3	0	3	Spr/Fall	2/Fall	C	NA	ESE
	ESE202	Introduction to Environmental Sciences	2	0	2	Spr/Fall	2/Fall	E	NA	ESE
	MA212	Probability and Statistics	3	0	3	Spr/Fall	2/Fall	B	MA102B	MATH
	MA201b	Ordinary Differential Equations B	4	1	4	Spr/Fall	2/Spr	B	MA102B	MATH
	Total			15	2.5	17.5				
Major Core Courses	ESE307	Hydrology: Principles and Applications	3	0	3	Fall	2/Fall	B	MA102B	ESE
	ESE206	Environmental Chemistry	3	0	3	Spr	2/Spr	E	CH102B	ESE
	ESE216	Hydraulics	3	0	3	Spr	2/Spr	C	MA102B, PHY105B	ESE
	ESE218	Hydraulics Basic Experiment	0.5	0.5	1	Spr	2/Spr	C	ESE216	ESE
	ESE315	Meteorology and Climatology	3	0	3	Fall	3/Fall	E	MA102B, PHY105B, ESE201	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
	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
	ESE332	Soil Science	3	0	3	Spr	3/Spr	B	MA102B, PHY105B, CH101B	ESE
	Total			27.5	1	28.5				
ESE471	Earth Science Practice	2	2	4	Smr	2/Smr	C	ESE201, ESE216	ESE	
ESE472	Hydrology and Water Resources Practice	2	2	4	Smr	3/Smr	C	ESE307, ESE318	ESE	

ESE481	Innovative Design (Water Resources)	4	4	8	Fall	4/Fall	C	ESE307, ESE318	ESE
ESE490	Degree Thesis (or Design)	6	6	12	Spr	4/Spr	C		ESE
Total		14	14	28					

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**

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
PHY 102-17	General Chemistry Laboratory A	1.5	1.5	3	Spr	1/Spr	B	CH101A	PHY
PHY203-15	Mathematical Methods in Physics	4	0	4	Spr/ Fall	2/Fall	B	MA102B, PHY105B, MA107B	PHY
ESE221	Urban Planning	3	0	3	Fall	2/Fall	B	NA	ESE
ESE220	Physical Geography	3	0	3	Spr	2/Spr			ESE
ESE212	Environment Monitoring	2	0	2	Spr	2/Spr	E	CH102B, PHY105B	ESE
ESE214	Environment Monitoring Experiment	1	1	2	Spr	2/Spr	C	CH102-17, ESE212	ESE
ESE329	Principles of Remote Sensing	3	0	3	Spr	2/Spr	C	MA102B, PHY105B, ESE201	ESE
ESE223	City and Environment	3	0	3	Spr	2/Spr	C	NA	ESE
ESE210	The U.S. Experience of Soil and Groundwater Pollution Prevention	2	2	4	Smr	2/Smr	E		ESE
ESES009	Japanese Experience in Eco-Environmental Technology and Policy	2	2	4	Smr	2/Smr	E	ESE202,ESE204	ESE
ESS303	Fundamentals of Space Geodetics	3	0	3	Fall	3/Fall	B	MA101B, MA107A	ESS
ESE308	Environmental Economics	3	0	3	Fall.	3/Fall	B	MA102B	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



ESE303	Water Treatment Engineering	4	0	4	Fall	3/Fall	B	ESE204, ESE206, ESE212	ESE
ESE305	Environmental Science and Engineering Laboratory I	1	1	2	Fall	3/Fall	C	ESE214, ESE303	ESE
ESE326	Hydrological Forecast	3	0	3	Fall	3/Fall	B	NA	ESE
ESE306	Soil and Groundwater Contamination	3	0	3	Spr	3/Spr			ESE
ESE319	Global Climate Change	3	0	3	Spr	3/Spr	E	NA	ESE
ESE323	Introduction to Water Resources and Hydropower Engineering	2	0	2	Spr	3/Spr	B	NA	ESE
ESE331	Conservation in the Anthropocene	3	0	3	Spr	3/Spr	E	ESE313	ESE
ESE413	Hydrological Modeling at Catchment Scale	2	0.5	2.5	Spr	3/Spr	B	ESE307	ESE
ESE407	Introduction to Numerical Simulation Methods	3	0	3	Fall	4/Fall	C	MA102B, MA107B	ESE
ESE402	Lake & Wetland Hydrology	3	0	3	Fall	4/Fall			ESE
ESE409	Environmental Isotopes in Hydrogeology	3	0	3	Fall	4/Fall			ESE
Total		66.5	8	74.5					

**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 A	1.5	1.5	3	Spr /Fall	2/Spr	B	CH101A	CHEM
ME102	CAD & Engineering Drawing	3	1.5	4.5	Spr	1/Spr	C	NA	ME
MA201b	Ordinary Differential Equations B	4	1	5	Spr	2/Spr	B	MA102B	MATH
ESE218	Hydraulics Basic Experiment	0.5	0.5	1	Spr	2/Spr	C	ESE216	ESE
ESE214	Environment Monitoring Laboratory	1	1	2	Spr	2/Spr	C	CH102-17, ESE212	ESE
ESE471	Earth Sciences Practice	2	2	4	Smr	2/Smr	C	ESE201, ESE216	ESE
ESE210	The U.S. Experience of Soil and Groundwater Pollution Prevention	2	2	4	Smr	2/Smr	E	NA	ESE
ESES008	Japanese Experience in Eco-Environmental Technology and Policy	2	2	4	Smr	2/Smr	E	ESE202, ESE204	ESE
ESE317	Application of GIS & RS	3	0.5	3.5	Fall	3/Fall	C	CS102B, ESE201	ESE
ESE305	Environmental Science and Engineering Laboratory I	1	1	2	Fall	3/Fall	C	ESE214, ESE303	ESE
ESE413	Hydrological Modeling at Catchment Scale	2	0.5	2.5	Spr	3/Spr	B	ESE307	ESE
ESE472	Hydrology and Water Resources Practice	2	2	4	Smr	3/Smr	C	ESE307, ESE318	ESE
ESE481	Innovative Design (Water Resources)	4	4	8	Fall	4/Fall	C	ESE307, ESE318	ESE
ESE490	Degree Thesis (or Design)	6	6	12	Spr	4/Spr	C		ESE
Total		34	25.5	59.5					

**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>	1120	51	51	38%
<b>General Education (GE) Elective Courses</b>	/	10	10	7%
<b>Major Foundational Courses</b>	240	15	15	11%
<b>Major Core Courses</b>	440	27.5	27.5	20%
<b>Major Elective Courses</b>	1192	66.5	17	13%
<b>Research Projects, Internship and Undergraduate Thesis/Projects</b>	448	14	14	11%
<b>Total (not including English courses)</b>	3440	184	134.5	100%

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

## Curriculum Structure of Hydrology and Water Resources Engineering



