Environmental Engineering (3+2 SCUT-UWA Program)

Program Code: 082502 Duration：4 years

Educational Objectives:

The Environmental Engineering program is designed to cultivate high-caliber engineering professionals equipped to support national modernization and respond to advancements in contemporary science and technology. The curriculum emphasizes the holistic development of students, fostering their ethical, intellectual, physical, aesthetic, and vocational capacities. Students will establish a robust foundation in the natural sciences and humanities, develop applied competence in computing and foreign languages, and acquire systematic expertise in environmental engineering theory. Additionally, the program nurtures a global perspective and the capacity for innovation, entrepreneurship, and creative problem-solving.

Graduates will be qualified to undertake professional roles in the planning, design, construction, operation, management, research, and education pertaining to environmental engineering. Within five years of graduation, it is anticipated that they will assume key positions in research and development, technological innovation, or senior management within the environmental engineering sector.

Overview of educational objectives

(1) Acquire solid foundational knowledge: Students will master the basics of professional principles, methods and means of the major, and have the engineering knowledge of water, gas, solid waste and other pollution prevention, water supply and drainage engineering, environmental planning and resource protection.

(2) Problem-solving ability: Students will have the ability to design and operate pollution control engineering, develop ability of environmental planning and environmental management, as well as the ability to research and develop new theories, new processes and new equipment in environmental engineering.

(3) Teamwork and leadership skills: Student will develop ability to communicate and cooperate in a team, which will lead to leadership skills in the field of environmental engineering.

(4) Cognitive ability of engineering systems: Students will master that pollution control theory and technology are the core of environmental engineering system design and equipment, and apply it into practice to serve the social development.

(5) Professional social impact assessment ability: Students will be familiar with the principles, policies, laws and regulations of environmental protection and sustainable development, and be able to correctly view the impact of environmental engineering on the objective world and society.

(6) Global consciousness: Students will acquire the concepts of sustainable development, the ability to maintain a clear sense in a global environment, and to perform their responsibilities in a competitive and responsible manner.

(7) Lifelong learning ability: Graduates will be able to work in government departments, planning departments, economic management departments, environmental protection departments, design units, industrial and mining enterprises, scientific research institutions, schools and other organizations, to perform work related to planning, designing, management, education and R&D with lifelong learning ability.

Graduation Requirements:

№1. Engineering Knowledge: Be able to use basic knowledge of mathematics, natural sciences, relevant engineering fundamental theories and expertise to develop solutions for complex engineering problems.

№1.1 Master the knowledge of mathematics and be able to use mathematics to describe, deal with and evaluate engineering problems, and be able to lay a solid mathematical foundation for basic engineering calculations and simulations.

№1.2 Master the knowledge of chemistry, microbiology and other natural sciences, which provides a solid basis to identify and analyze key problems involved in complex environmental engineering.

№1.3 Understand the basics of physics, mechanics, electricity, etc. in environmental engineering, master the engineering theories of fluid mechanics, mass transfer and separation, engineering drawing, etc., and be able to lay an engineering foundation to analyze, identify and describe the processes of equilibrium and transfer of matter and energy in complex environmental engineering problems.

№1.4 Understand the root causes, current situation and coping strategies of environmental problems, master the basics of environmental microbiology, environmental monitoring, chemical engineering principles, etc., and understand the basic theories and grounds of environmental engineering.

№1.5 Master the principles of engineering treatment of pollutants in water, gas, solid and other media, unit operations and technical means, master the basic theories of relevant majors to solve complex environmental engineering problems.

№2. Problem Analysis: Be able to use basic principles of mathematics, natural sciences and engineering sciences to identify, formulate, study and analyze complex environmental engineering problems for valid conclusions.

№2.1 Master the knowledge of mathematics, chemistry, microbiology and other natural sciences, be able to translate and formulate environmental engineering problems into problems of the

corresponding field for analysis.

№2.2 Master the basic principles of environmental engineering, analyze complex engineering problems in the field of environmental engineering and get solutions to relevant engineering problems.

№2.3 Apply engineering basis and basic professional principles, conduct literature research, study and analyze complex engineering problems in the field of environment, correctly express the solution of the problem and obtain effective conclusions.

№3. Design/Development of Solutions: Be able to design solutions for complex engineering problems, as well as systems, units or processes to meet standards and clients' needs with innovation, and take due account of factors such as society, health, safety, laws, culture and environment.

№3.1 Have basic and professional knowledge of environmental engineering and be able to define design objectives based on complex environmental engineering problems.

№3.2 Be able to demonstrate the feasibility of engineering projects within the constraints of public health, safety, culture and society.

№3.3 Be able to choose the optimal pollution control process through research or modeling with innovation, and perform calculations for systems and units (components).

№3.4 Be able to present design results in the form of drawings, reports, etc.

№4. Research: Be able to use research methods to study complex engineering problems and systems, including research based on knowledge, design experiments, analysis and interpretation of data, and synthesis of information to provide effective conclusions.

Be able to study complex environmental science and engineering problems based on scientific principles and scientific methods in fields related to environmental science and engineering, such as chemistry, chemical engineering, physics, and electrical engineering, including designing experiments, analyzing and interpreting data, and summarizing information to reach reasonable and valid conclusions.

№4.1 Understand the basic status quo of research and development trends in the field of environmental engineering at home and abroad.

№4.2 Master the basic principles and methods of experiments in physics, chemistry, microbiology and other experiments related to environmental engineering.

№4.3 Master the basic experimental methods of engineering treatment of pollutants in water, gas, solid and other media, consolidate the understanding of the basic theoretical knowledge of the major and improve hands-on skills.

№4.4 Be able to design experiments for the study of complex environmental engineering problems, collect, analyze and interpret data using reasonable means, and obtain effective

conclusions in a comprehensive manner.

№5. Use of Modern Tools: Be able to develop, select, and apply appropriate technologies, resources, and modern engineering and information technology tools aiming at complex environment and engineering problems, including prediction, modeling and recognition of the limitations of complex engineering problems.

№5.1 Master the methods of literature retrieval by web searching tools, master the basic methods of data searching and use modern information technologies to obtain information related to the environmental engineering major.

№5.2 Select and use appropriate modern engineering tools and information technology tools for the definition of engineering problems and expression of solutions.

№5.3 Apply appropriate tools and resources to predict or simulate the operation and effectiveness of solutions to complex environmental engineering problems, and be able to understand their limitations.

№6. Engineering and the Society: Be able to perform sound analyses based on engineering-related background knowledge, evaluate the social, health, safety, legal, and cultural impacts of environmental science and engineering practices and solutions to complex environmental problems, and understand the responsibilities involved.

№6.1 Have internship and practical experiences related to the environmental engineering major.

№6.2 Be familiar with technical standards, intellectual property rights, industrial policies and laws and regulations related to the field of environmental engineering.

№6.3 Be able to identify, quantify, analyze and evaluate the social, health, safety, legal and cultural impacts of the development and application of environmental engineering technologies and processes.

№7. Sustainable Development of Society and Environment: Be able to understand and evaluate the impact of professional engineering practice for complex environmental science and engineering problems on sustainable development of society and environment.

№7.1 Understand the impact of historically significant environmental events on sustainable development of society and environment.

№7.2 Understand and evaluate the impact of professional engineering practice for complex environmental engineering problems on the environment.

№7.3 Master the evaluation methods of the impact of professional engineering practice for complex environmental engineering problems on sustainable development of society.

№8. Professional norms: Have humanities and social sciences qualities, social responsibility, be able to understand and comply with the ethics and norms of the engineering profession and fulfill the responsibilities in the practice of environmental science and engineering.

№8.1 Understand the basic significance of worldview and outlook on life and their implications.

№8.2 Understand the path of sustainable development and individual responsibility.

№8.3 Understand the broader societal context in which engineering projects are implemented.

№8.4 Cultivate a strong foundation in the humanities and social sciences.

№8.5 Maintain personal physical fitness and perseverance, foster a sense of public welfare, and improve professionalism and a sense of social responsibility.

№8.6 Participate in various professional practice activities, develop good engineering ethics and fulfill responsibilities.

№9. Individual and Collaborative Team Work: Be able to effectively play a role as an individual, member or leader against a multidisciplinary background.

№9.1 Understand the role of the individual in a multidisciplinary team and be able to collaborate with team members.

№9.2 Be able to coordinate team members in group activities and possess a certain level of leadership skills.

№10. Communication: Be able to effectively communicate and exchange complex environmental science and engineering issues with industry peers and the general public, including report and document writing, presentations, clear expression, or response to instructions, and possess a certain international perspective, be able to communicate and exchange in a cross-cultural background.

№10.1 Master a foreign language and be able to apply it against the background of environmental engineering.

№10.2 Be able to effectively communicate and exchange complex environmental engineering issues with industry peers and the general public through oral and written methods.

№10.3 Be able to communicate and exchange in a cross-cultural background, with a certain international perspective.

№10.4 Be able to express personal thoughts on current international hot issues related to environmental engineering profession.

№11. Project Management: Understand and master the principles of engineering management and economic decision-making methods, and be able to apply them in a multi-disciplinary environment.

№11.1 Master the basic principles and methods of engineering management.

№11.2 Master the basic theories and methods of economic decision-making in engineering.

№11.3 Be able to apply the principles of engineering management and economic decision-making methods to professional engineering practice.

№12. Continuous Lifelong Learning: Possess awareness of self-directed and lifelong learning and

the ability to constantly learn and adapt to development.

№12.1 Establish the concept of the importance of lifelong learning for self-development.

№12.2 Be able to continuously conduct self-learning and self-exercise through appropriate approaches and methods.

№12.3 Be able to demonstrate the achievement through self-learning and pave the way for lifelong learning.

Educational objectives / Outcomes	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5	Objective 6	Objective 7
Graduation requirement 1	●	●	●	●			●
Graduation requirement 2	●			●	●	●	●
Graduation requirement 3	●	●		●	●	●	●
Graduation requirement 4	●	●		●			●
Graduation requirement 5	●	●		●			●
Graduation requirement 6	●			●	●	●	●
Graduation requirement 7	●			●	●	●	●
Graduation requirement 8			●	●	●		
Graduation requirement 9			●		●	●	●
Graduation requirement 10	●		●	●	●	●	
Graduation requirement 11	●			●	●	●	●
Graduation requirement 12					●	●	●

Program Profile：

The Environmental Engineering (3+2 SCUT-UWA Program) was established in 2017 through a collaborative partnership with the University of Western Australia (UWA). Under this framework, students complete their first three years of study within the Environmental Engineering (All-English Program) at South China University of Technology (SCUT). Those who fulfill SCUT's credit requirements and UWA's English language proficiency standards by the end of the third year are eligible to transfer to UWA for the remainder of their studies. Upon satisfying the degree requirements of both institutions, students will be awarded a Bachelor's Degree and Undergraduate Graduation Certificate from SCUT, as well as a Master's Degree from UWA.

This joint program is built upon the robust foundation of the Environmental Engineering major, which began undergraduate enrollment in 1998. The discipline has earned multiple recognitions, including designation as a Characteristic Specialty Construction Site in Guangdong Province in 2010 and a National First-Class Undergraduate Program Construction Site in 2020. It has also successfully passed National Engineering Education Professional Certification on three

occasions—in 2011, 2014, and 2017.

The program is supported by a first-level doctoral program in Environmental Science and Engineering, a Guangdong Provincial First-Class Key Discipline, and more than ten research platforms at or above the provincial-ministerial level. These include the National Engineering Laboratory for Volatile Organic Pollutants Control Technology and Equipment, the Key Laboratory of Pollution Control and Ecological Restoration in Industrial Agglomeration Areas under the Ministry of Education, and the Guangdong Provincial Key Laboratory of Atmospheric Environment and Pollution Control.

Teaching and research facilities encompass a total laboratory area of 1,000 square meters, housing specialized instructional laboratories in areas such as water pollution control engineering, atmospheric pollution control engineering, solid waste treatment and disposal, environmental engineering microbiology, physical pollution control, environmental monitoring, industrial wastewater treatment, environmental analysis, and ecological restoration. The laboratories are rationally configured and equipped with advanced instrumentation, including high-performance liquid chromatography, gas chromatography, ion chromatography, ultraviolet spectrophotometers, and atomic absorption spectrophotometers, with a total asset value exceeding RMB 7.3 million.

In addition, the program maintains 13 off-campus practical training bases, including the Guangzhou Development Zone Water Purification Center, Guangzhou First Thermal Resources General Plant (Likeng Waste Incineration Plant), Guangzhou Shijing Sewage Treatment Plant, and Huangpi Water Purification Plant.

Program Features:

The program aims to cultivate students' application-oriented engineering practical abilities by linking theory with practice, allowing students' qualities and capabilities to be honed and enhanced through their participation in the research projects or engineering projects of the teaching faculty. The program adopts full-English teaching, invites professors from well-known overseas universities to participate in the teaching of core courses, and focuses on fostering internationalized and research-oriented talents. It specializes in water pollution control engineering, atmospheric pollution control engineering, solid waste treatment and disposal, and environmental biotechnology.

№1. The faculty adopts a "Five-in-One" model in undergraduate education to cultivate top-tier research-oriented engineering and technical talents, and it integrates the advantages of multiple disciplines to develop application-oriented talents in pollution control technology. It collaborates with leading enterprises in the industry to train innovative, entrepreneurial and creative

environmental protection talents, and it joins hands with renowned foreign universities to nurture internationalized talents with a global perspective.

№2. To build a first-class undergraduate program, the faculty integrates various resources and implements an undergraduate tutor system. It provides one-on-one guidance for all undergraduates throughout the entire process from enrollment to graduation, so as to implement the fundamental task of fostering virtue through education and achieve full-staff, whole-process and all-round education.

Degree Conferred:

Bachelor of Engineering

Core Courses:

Engineering Mechanics I; Fluid Mechanics and Heat Transfer II; Mass Transfer and Separation Engineering III; Water Pollution Control Engineering; Air Pollution Control Engineering; Solid Waste Treatment and Disposal; Environmental Engineering Microbiology; Comprehensive Experiment of Environmental Engineering.

Featured Courses:

All-English Taught Courses: All courses are taught in English except for courses such as Ideological and Political Education and Physical Education.

Frontier Courses: Theory and Technology of Carbon Neutrality

Entrepreneurship Education Course: Environmental Protection Industry Entrepreneurship Education ("Three Ones" Course)

Labor Education Course: Production Practice

1. Registration Form of Curriculum Credits

1.1 Credits Registration Form

Course Category	Requirement	Credits	Academic Hours	Remarks
General Education & Basic Courses	Compulsory	42	828	
	General Education	10.0	160	
Program Core Courses	Compulsory	54.5	1016	
Elective Courses	Elective	10.5	168	
Total		117.0	2172	
Practice-concentrated Training	Compulsory	26.0	31 weeks	
Credits Required for Graduation	117.0+26.0=143.0			

Suggested Credits for Each Semester	1	2	3	4	5	6	7	8
	21.5	23	20.5	22	22	19	4	11

Note: Students must complete the required credits of the professional teaching plan and obtain 5 credits of humanities education and 4 credits of innovation and entrepreneurship education in the Extracurricular Learning before graduation.

1.2 Category statistical table

Academic Hours					Credits						
Total	Include		Include		Total	Include		Include			Include
	Compulsory	Elective	Theory Course	Lab		Compulsory	Elective	Practice-concentrated Training	Theory Course Credits	Lab	Innovation and Entrepreneurship Education
2172	1844	328	1528	644	143.0	122.5	20.5	26	97	20	2

2. Courses Schedule

Course Category	Course No.	Course Title		C/E	Total Curriculum Hours					Credits	Semester
					Class Hours	Theoretical class hours	Lab Hours	Practice Hours	Other Hours		
General Education & Basic Courses	044101382	Academic English (I)	For English A class	C	48	48				3.0	1
	044102453	Academic English (II)		C	48	48				3.0	2
	044103681	College English (I)	For English B and C class	C	48	48				3.0	1
	044103691	College English (II)		C	48	48				3.0	2
	052100332	Sports (I)		C	36				36	1.0	1
	052100012	Sports (II)		C	36				36	1.0	2
	052100842	Sports (III)		C	36				36	1.0	3
	052100062	Sports (IV)		C	36				36	1.0	4
	006100112	Military theory		C	36	18			18	2.0	2
	045101644	University computer basics		C	32				32	0.0	1
	045102811	Python language programming		C	40	32			8	2.0	2
	040100591	Calculus I (I)		C	80	80				5.0	1
	040100662	Calculus I (II)		C	64	64				4.0	2
	040100404	Linear algebra and analytic geometry		C	48	48				3.0	1
	040100023	Probability theory and mathematical statistics		C	48	48				3.0	2
	041100582	College physics I (I)		C	48	48				3.0	2
	041101391	College physics I (II)		C	48	48				3.0	3
	041100671	College physics experiment (I)		C	32		32			1.0	2
	041101051	College physics experiment (II)		C	32		32			1.0	3
	074102163	Engineering drawing (I)		C	48	48				3.0	3
	074102173	Engineering drawing (II)		C	32	32				2.0	4
		Humanities and social sciences		General education	128	128				8.0	
		Science and technology			32	32				2.0	
	Total				988	722	64		202	52	

Note: Time spent on computer learning and practice can be included in the total hours.

2. Courses Schedule

Course Category	Course No.	Course Title	C/E	Total Curriculum Hours					Credits	Semester
				Class Hours	Theoretical class hours	Lab Hours	Practice Hours	Other Hours		
Program Core Courses	069100773	Introduction to environmental science	C	32	32				2.0	1
	037102523	Inorganic chemistry I	C	32	32				2.0	1
	037101622	Inorganic chemistry experiment (engineering) (I)	C	16		16			0.5	1
	037101632	Inorganic chemistry experiment (engineering) (II)	C	16		16			0.5	2
	037101791	Organic chemistry I	C	48	48				3.0	2
	037102571	Organic chemistry experiment I	C	32		32			1.0	2
	037102611	Analytical chemistry I	C	32	32				2.0	3
	037102651	Analytical chemistry experiments II	C	32		32			1.0	3
	033100573	Engineering mechanics I	C	48	42	2		4	3.0	3
	069100782	Environmental engineering microbiology	C	48	32	16			2.5	3
	069102281	Scientific and technological literature retrieval and paper writing	C	32	32				2.0	4
	069100573	Environmental planning and management	C	32	32				2.0	4
	069101194	Water pollution control project	C	48	48				3.0	4
	069101941	Water pollution control engineering experiment	C	16		16			0.5	4
	037101531	Physical chemistry I	C	48	48				3.0	4
	037102001	Physical chemistry experiments II	C	32		32			1.0	5
	024100213	Electrician and electronic technology II	C	64	64				4.0	4
	024100141	Electrician and electronic technology experiments	C	24		24			1.0	5
	069100741	Solid waste treatment and disposal	C	32	32				2.0	5
	069101961	Solid waste treatment and disposal experiment	C	16		16			0.5	5
	069101361	Environmental monitoring	C	32	32				2.0	5
	069102021	Environmental monitoring experiment	C	16		16			0.5	5
	069102191	Resource extraction technology		32	32				2.0	5
	037100271	Fluid mechanics and heat transfer II	C	48	48				3.0	5

	037100411	Mass transfer and separation engineering III	C	48	48				3.0	6
	047101721	Fluid dynamics and heat transfer experiments	C	16		16			0.5	5
	047101731	Mass transfer and separation for engineering experiments	C	16		16			0.5	6
	069102011	Comprehensive experiment on environmental engineering		32		32			1.0	6
	069100321	Atmospheric pollution control project	C	48	48				3.0	6
	069102001	Atmospheric pollution control engineering experiment	C	16		16			0.5	6
	069102251	Engineering design, construction and management	C	32	32				2.0	6
	Total		C	1016	714	298		4	54.5	
Elective Courses	069101043	Environmental ecology	E	24	24				1.5	3
	069100693	Environmental chemistry	E	32	32				2.0	4
	069101292	Environmental statistics	E	24	24				1.5	4
	069100383	Hydraulics	E	48	48				3.0	4
	069100651	Marine environmental protection	E	24	24				1.5	4
	069101381	Environmental toxicology	E	32	32				2.0	5
	069101201	Energy and the environment	E	32	32				2.0	6
	069102301	Carbon neutralization theory and technology	E	24	24				1.5	6
	069100331	Environmental remediation technology	E	32	32				2.0	6
	069100562	Soil environment	E	24	24				1.5	6
	069102071	Environmental nanomaterials	E	24	24				1.5	6
	069101211	Entrepreneurship education in environmental protection industry	E	16	16				1.0	6
	020100051	Innovative research training	E	32	32				2.0	7
	020100041	Innovative research practice I	E	32	32				2.0	7
	020100031	Innovative research practice II	E	32	32				2.0	7
	020100061	Entrepreneurship practice	E	32	32				2.0	7
	Total		E	Minimum requirement for elective courses is 10.5 credits						

Note: Students can apply for a certain number of professional elective credits based on their research training projects, discipline competitions, publications, patents, and independent entrepreneurship (such as innovative research training, innovation research practice I, innovation research practice II, and entrepreneurship practice). The total number of credits for professional elective courses that can be applied for by each student shall not exceed 4 credits. Projects and competitions recognized and approved by the University as elective credits will not receive corresponding innovation credits in the Extracurricular Learning.

3. Practice-concentrated Training

Course No	Course Title	C/E	Total Curriculum Hours	Credits	Semester

			Practice weeks	Lecture Hours		
069100241	Understanding of internship	C	1 week		1.0	2
030100702	Engineering training I	C	2 weeks		2.0	4
069100301	Production practice	C	2 weeks		2.0	5
069100111	Environmental monitoring practice	C	2 weeks		2.0	5
023100041	Innovative experiment in electronic technology	C	2 weeks		1.0	5
069102051	Solid waste treatment and disposal design	C	2 weeks		2.0	6
069100251	Water pollution control engineering design	C	2 weeks		2.0	6
069100841	Atmospheric pollution control engineering design	C	2 weeks		2.0	7
069101371	Graduation internship	C	2 weeks		2.0	8
069100473	Graduation project	C	15 weeks		10.0	8
Total		C	31 weeks		26.0	

4.“Extracurricular Learning” Activities

“Extracurricular Learning” Activities are comprised of two parts, Humanities & Social Sciences Education and Innovation & Entrepreneurship Development.

(1) Basic Requirements of Humanities & Social Sciences Education

In addition to obtaining the required credits of the professional teaching plan, students should also participate in extracurricular humanities education activities according to their interests, accumulating no less than 5 credits. Among them, the university sports teaching team offers extracurricular sports courses, which are mandatory for senior undergraduate students, corresponding to 72 hours and 1 credit, which is included in the Extracurricular Learning humanities education credits. The university mental health education course, corresponding to 2 credits, is offered in the virtual third semester and included in the Extracurricular Learning humanities education credits.

(2) Basic Requirements of Innovation & Entrepreneurship Development

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in any one of the following activities: National Undergraduate Training Programs for Innovation and Entrepreneurship, Guangdong Undergraduate Training Programs for Innovation and Entrepreneurship, Student Research Program (SRP), One-hundred-steps Innovative Program, or any other extracurricular activities of Humanities & Social Sciences Education that last a certain period of time (e.g. subject contests, academic lectures), acquiring no less than four credits.