



Decision Number (2-4/2022-23)

The Fourth meeting for the Academic year 2022/2023

Date: Tuesday, June 20, 2023

The Council approved the Bachelor of Science in Environmental Science and Engineering, in the department of Civil and Environmental Engineering, College of Design and Built Environment, according to the description shown in the Appendix (2-1).

## **Appendix (2)**

### **BS in Environmental Science and Engineering, Civil and Environmental Engineering dept., College of Design and Built Environment**

Appendix (2-1): Degree plan of the BS in Environmental Science and Engineering.

Appendix (2-2): Course descriptions of the BS in Environmental Science and Engineering.

Appendix (2-1)  
Degree plan of the BS in Environmental Science and Engineering

Year	Term	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College or Department)	
Preparatory Year	Term 1	ENGL 01-xx	Prep. English I (First Quarter)	Required	None	4	Institution	
		ENGL 02-xx	Prep. English II (Second Quarter)	Required	None	4	Institution	
		MATH 001	Prep. Math I	Required	None	4	Institution	
		PYP 001	Prep. Physical Science	Required	None	2	Institution	
		PYP 003	Life Skills	Required	None	1	Institution	
		PE 001	Prep. Health and Physical Educ. I	Required	None	1	Institution	
		Total Credit Hours of Term 1						16
	Term 2	ENGL 03-xx	Prep. English III (Third Quarter)	Required	None	4	Institution	
		ENGL 04-xx	Prep. English IV (Fourth Quarter)	Required	None	4	Institution	
		MATH 002	Prep. Math II	Required	None	4	Institution	
		PYP 002	Prep. Computer Science	Required	None	1	Institution	
		PYP 004	Prep. Eng. Technology	Required	None	1	Institution	
		PE 002	Prep. Health and Physical Educ. II	Required	None	1	Institution	
Total Credit Hours of Term 2						15		
First Year (Freshman)	Term 1	CHEM 101	Principles of Chemical Science I	R	None	4	Institution	
		ENGL 101	Intro. To Academic Discourse	R	None	3	Institution	
		IAS 121	Language Foundation	R	None	2	Institution	
		MATH 101	Calculus I	R	None	4	Institution	
		PHYS 101	General Physics I	R	None	4	Institution	
		Total Credit Hours of Term 1						17
	Term 2	ENGL 102	Intro. To Report Writing	R	ENGL 101	3	Institution	
		IAS 111	Belief & Its Consequences	R	IAS 121	2	Institution	
		ICS 104	Intro. To Programm. In Python & C	R	None	3	Institution	
		MATH 102	Calculus II	R	MATH 101	4	Institution	
		PE 101	Health and Physical Education	R	None	1	Institution	
		PHYS 102	General Physics II	R	PHYS 101	4	Institution	
		Total Credit Hours of Term 2						17

Second Year (Sophomore)	Term 1	CE 202	Statics & Strength of Materials	R	PHYS 101	3	Department
		CHEM 102	Principles of Chemical Science II	R	CHEM 101	4	Department
		ME 203	Thermodynamics	R	MATH 102, PHYS 102	3	Department
		ENGL 214	Academic & Professional Communication	R	ENGL 102	3	Institution
		MATH 201	Calculus III	R	MATH 102	3	Institution
		Total Credit Hours of Term 1					16
	Term 2	BIOE 201	Biology for Engineers	R	None	3	Department
		ISE 291	Intro. To Data Science	R	ICS 104	3	Institution
		CE 230	Engineering Fluid Mechanics	R	(CE 201 or) CE 202 & MATH 102	3	Department
		MATH 208	Intro. To Diff. Eqs. & Linear Algebra	R	MATH 102	3	College
		ESE 231	Fundamentals of Environmental Science and Engineering	R	CHEM 101	3	Department
		IAS 212	Ethics and Governance	R	IAS 111	2	Institution
	Total Credit Hours of Term 2					17	
Third Year (Junior)	Term 1	CGS 392	Career Essentials	R	---	1	Institution
		CE 318	Numerical & Stat. Methods in CE	R	ICS 104 MATH 208	3	Department
		COE 292	Intro. To Artificial Intelligence	R	ISE 291	3	Institution
		CHEM 327	Environmental Chemistry	R	CHEM 102	3	Department
		ESE 371	Environmental Engineering Lab	R	CHEM 101	1	Department
		GS xxx	GS Elective	E	---	3	Institution
		IAS XXX	Islamic/Arabic Elective	E	IAS 212	2	Institution
	Total Credit Hours of Term 1					16	
	Term 2	BUS 200	Business & Entrepreneurship	R	---	3	Institution
		BIOE 377	Marine Pollution & Mitigation	R	Junior	3	Department
		CHEM 321	Instrumental Analysis for Engineers	R	CHEM 102	3	Department
		GEO 366	Environmental Management & Climate Change	R		3	Department
		XXX xxx	Free Elective	E		3	Institution
Total Credit Hours of Term 2					15		

Summer		ESE 399	Summer Training	R	ENGL 214	1	Department
Fourth Year (Senior)	Term 1	ME 441	Energy and the Environment	R	ME 203	3	Department
		CHE 470	Process Air Pollution Control	R	Senior	3	Department
		ESE 431	Water Treatment & Reuse	R	Senior	3	Department
		XXX xxx	ESE Elective I	E	---	3	Department
		XE xxx	Technical Elective	E	---	3	College
		ESE 411	Senior Design Project I	R	---	0	Department
		Total Credit Hours of Term 1					16
	Term 2	ESE 412	Senior Design Project II	R	---	3	Department
		XXX xxx	ESE Elective II	E	---	3	Department
		CHE 471	Industrial Wastewater Treatment	R	Senior	3	Department
		ESE 432	Solid & Hazardous Waste Mgmt.	R	Senior	3	Department
		GEO 466	Principles of Environmental Impact Assessment	R	Senior	3	Department
		Total Credit Hours of Term 2					15
	Total Credit Hours						129

\* Include additional levels if needed

\*\* Add a table for each track (if any)

Appendix (2-2)  
Course descriptions of the BS in Environmental Science and Engineering

No.	Course Number\code	Course Title	Course Bulletin Description
1.	CHEM 101	Principles of Chemical Science I	Matter, atomic structure and the periodic table, chemical bonding, stoichiometry of pure substances, reaction in aqueous solutions, states of matter (gases, liquids, and solids), mixtures (with emphasis on some physical aspects of solutions), and thermochemistry. Laboratory: Qualitative and quantitative aspects of general chemistry.
2.	CHEM 102	Principles of Chemical Science II	Chemical equilibria (gases, acids and bases, and solubility equilibria), chemical kinetics, spontaneity of reactions, coordination chemistry, nuclear chemistry, electrochemistry, chemistry of selected representative elements, organic structure and reactions, chemistry of materials.
3.	ME 203	Thermodynamics I	Control mass and control volume, properties of a pure substance and ideal gas, work and heat. First law of thermodynamics applied to closed and open systems, internal energy, enthalpy. Second law of thermodynamics, reversible and irreversible processes, Carnot cycle, entropy and entropy generation. Applications of steady state steady-flow, uniform-state uniform-flow, and other processes.
4.	BIOE 201	Biology for Engineers	Introduction to biology, chemical basis of life, biomolecules, cell structure and function, cell metabolism and energy transfer, DNA structure, replication, transcription and translation, cell division (mitosis and meiosis), patterns in inherited trait, human inheritance, and biotechnology.
5.	CE 202	Statics & Strength of Materials	Basic concepts and principles of mechanics; equilibrium of particles in two dimensions; definition of moment and couple; reduction of systems forces; equilibrium of rigid bodies in two dimensions; analysis of truss-type structures and internal forces; geometric properties of cross-section area; centroid and moments of inertia; shear and bending moment diagrams in beams; stress, Stress-strain relationships; stress and deformation of axially loaded members; stress-concentration; thermal stresses; pressure-vessels; torsion-stress and deformation; elastic bending and shear stresses in beams; compound stresses; stress transformation.

6.	CE 230	Engineering Fluid Mechanics	Properties of fluids, hydroStatics & Strength of Materials with applications to manometers, forces on plane and curved surfaces, bouncy, equations of continuity, energy and linear momentum with applications, dimensional analysis, dynamic similarity, open channel flow, and conduit flow.
7.	ESE 231	Fundamentals of Environmental Science and Engineering	Fundamentals related to environmental pollution sources and effects; ecology and environment; sustainable practices for environmental protection; water and wastewater management; ambient air quality and Process Air Pollution Control; modern practices in solid waste management and recycling; industrial hazardous wastes management; noise, marine and nuclear related pollution issues.
8.	CE 318	Numerical & Statistical Methods in CE	Introduction to numerical methods; error analysis; solution of system of linear and nonlinear equations; numerical integration; numerical solutions of ordinary differential equations; curve fitting and interpolation; statistical methods, descriptive statistics, probability distributions, analysis of variance and regression; introduction to linear programming and optimization problems; development and application of computer programs to case studies derived from civil engineering practices.
9.	CHEM 321	Instrumental Analysis for Engineers	Modern instrumental techniques in chemical analysis including electrochemical, spectroscopic and separation methods. Discussing the theoretical concepts, the components of the instruments, handling the data, calibration, optimization and output interpretation. Similarities and differences between various techniques will be emphasized. Laboratory: Experiments related to analysis using advanced instrumental techniques.
10	ESE 371	Environmental Engineering Lab	Introduction to professional environmental engineering laboratory practices; Bench scale experiments related to environmental engineering operations and processes including chemical equilibrium, chemical kinetics, adsorption, precipitation, coagulation, flocculation, sedimentation (Types I & II), water softening, and ion exchange.
11	BIOE 377	Marine Pollution & Mitigation	Introduction to marine and ecosystem pollution, human and industrial activities linked to pollution, pollution with organic, inorganic, oil spills, and others, concept of ecotoxicity, bioaccumulation, biotransformation, monitoring, and pollution abatements methods

12	CHEM 327	Environmental Chemistry	Environmental chemistry in global perspective, chemistry of earth's atmosphere, chemistry of urban and indoor atmospheres, global climate, chemistry of the hydrosphere, aquatic systems, water pollution, wastewater analysis and treatment chemistry, environmental chemistry of colloids and surfaces, microbiological processes, solid wastes, organic biocides.
13	GEO 366	Environmental Management & Climate Change	Scientific knowledge and understanding of the global environmental issues, including theories, policies and strategies for the management of environment in a sustainable manner. Description of Natural resources, and the major challenges such as pollution and climate change. Review of the earth climate history with emphasis on present global warming and future challenges.
14	ESE 399	Summer Training	A continuous period of eight weeks of summer working in the industry to gain exposure and appreciation of the environmental science and engineering profession. On-the-job training can be acquired in one of the specialties of environmental science and engineering. The student is required to write a brief report about his industrial experience. The report should emphasize duties assigned and completed by the student.
15	ME 441	Energy and the Environment	General introduction. Engineering and environment. Overview of environmental issues. Case studies in design for the environment. Automobiles and the environment. Batteries and the environment. Power plants and the environment. Refrigeration and the environment. Environmental life cycle assessments. Pollution control technologies and instrumentation. Thermodynamic assessment of environmental impacts. Case studies in mechanical engineering for environmental modeling. Smog control. CFCs and ozone layer. Acid rain. Global warming and climate change. Toxic metals. Environmental policy. Economic analysis. Environmental risk and decision.
16	CHE 470	Process Air Pollution Control	Sources and effects of air pollution; air quality, atmospheric reactions and scavenging processes. Meteorological setting for dispersion of air pollutants. Theory of atmospheric dispersion modeling. Process Air Pollution Control concepts, selection, evaluation and application of control devices for emission and control from chemical and petrochemical industries. Sustainability and minimization of environmental impact.



17	ESE 431	Water Treatment & Reuse	Water quality regulations and water treatment including turbidity control, hardness reduction, and disinfection; Introduction to wastewater reuse; Wastewater treatment including preliminary, primary, secondary and advanced treatment operations and processes for reuse purpose including case studies.
18	ESE 411	Senior Design Project I	This is the first part of the capstone design course. Students form teams to design a system on their own that relates to environmental science and engineering related issues. Students collect all the relevant design information under the guidance of a senior faculty.
19	ESE 412	Senior Design Project II	This is the second part of the environmental science and engineering capstone design project; a comprehensive design experience through a coherent study of all applicable principles, strategies and methodologies of design; Use of appropriate factors such as alternative designs, economic feasibility and social and environmental impacts.
20	CHE 471	Industrial Wastewater Treatment	Water quality and pollution, industrial wastewater characterization, classification of wastewater processes. Modeling and design of biological waste treatment processes. Analysis of chemical and physical processes for wastewater treatment in process industries. Sustainability and minimization of environmental impact.
21	ESE 432	Solid & Hazardous Waste Mgmt.	Integrated municipal solid waste management practices including characterization of municipal solid wastes and modern practices in waste resource recovery, recycling, composting, incineration, and landfill design. Industrial hazardous waste management including regulations, environmental audit, pollution prevention, reduce/recover/recycle concepts, risk assessment, and treatment.
22	GEO 466	Principles of Environmental Impact Assessment	An introduction to the principles of the environmental impact assessment (EIA) and an overview of its development and legislative context. Includes a step-by-step discussion of the EIA process and examines the current practices on both local and international levels.