Plan of Study for the Environmental Science & Engineering Track

of the Engineering Sciences SB Concentration

Effective for Students Declaring the Concentration after August 1, 2021

EMAIL:			
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This Plan of Study Form is for a (*Circle One*):

CLASS: _____

DECLARATION REVISION

The S.B. Program in Engineering Sciences must contain at least 20 courses: 4 courses in mathematics, 4 courses in basic sciences, and 12 courses in engineering topics. This Plan of Study is not final until this form has been signed, ensuring that the proposed plan meets the ABET distribution requirements.

(Circle or fill-in for courses planned in each category.)MathScienceTopics(FA/SP Year)Mathmatics (2-5 courses)Begin according to placement:	REQUIRED COURSES			Engr.	Semester
Mathematics (2-5 courses) Begin according to placement: Math 1a - Introduction to Calculus I (or Math Ma & Mb) Math 1b - Calculus, Series, and Differential Equations Math 21a - Multivariable Calculus (or Math 22a or 23b, or AM 21a or 22b) Math 21b - Linear Algebra and Differential Equations (or Math 22b or 23a, or AM 21b or 22a) Probability & Statistics (1 course, if starting in Math 1b or higher) Select one: AM 101 - Statistical Inference for Scientists & Engineers ES 150 - Intro to Probability with Engineering Applications Statistics 110 - Introduction to Probability Applied Mathematics (1 course, if starting in Math 21a or equivalent) Select one: AM 104 - Series Expansions & Complex Analysis AM 105 - Ordinary & Partial Differential Equations AM 106 - Applied Algebra AM 107 - Graph Theory & Combinatorics Physics as a Foundation for Sci. & Eng. Part I (or PS 12a or Physics 15a or 16) AP 50a - Physics as a Foundation for Sci. & Eng. Part II (or PS 10 - Chemistry: A Microscopic Perspective PS 10 - Chemistry: A Microscopic Perspective PS 10 - Chemistry 20 - Organic Chemistry (or PS 1 - Foundational Chemistry (or PS	(Circle or fill-in for courses planned in each category.)		Science	Topics	(FA/SP Year)
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Sophomore Forum	(or Chemistry 20 – Organic Chemistry)				
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R_{0}	Required non credit				

REQUIRED COURSES (Circle or fill-in for courses planned in each category)	Math	Science	Engr. Topics	Semester
Computer Science (1 course)	Witten	Science	Topics	
Select one:				
AM 10 – Computing with Python for Scientists and Engineers			1.0	
CS 50 – Introduction to Computer Science I				
CS 51 – Introduction to Computer Science II				
CS 61 – Systems Programming & Machine Organization				
Environmental Science & Engineering Core (5 courses)			1.0	
Environmental Science and Engineering 6			1.0	
Select four courses from (course titles shown on p. 4):			1.0	
Environmental Science and Engineering 109, 131, 132, 133,			1.0	
136, 137, 160, 161, 162, 163, 164, 166, 169			1.0	
Engineering Sciences 112, 123			1.0	
Engineering Breadth (3 courses)				
Select one upper-level course (>100) from each area, see lists on pp. 4-5. (Note: ES50, 54 may be used for the Electrical area.)				
Area: Mechanics & Materials				
Course:			1.0	
Area: Engineering Physics & Chemistry				
Course:			1.0	
Area: Electrical				
Course:			1.0	
Approved Engineering Elective (1 course)				
Select at least ladditional course on engineering topics*				
1.			1.0	
Engineering Design (2 courses)				
Engineering Sciences 96			1.0	
Engineering Sciences 100hf			1.0	
TOTALS	/4	/4	/12	

* Environmental Science and Engineering 6, Engineering Sciences 50, 51, and 53: No more than two of these courses may count towards concentration credit. Engineering Sciences 50 and 53 can only count as an Engineering Elective when taken during the freshman or sophomore year.

ES 91r may be included as an Engineering Elective in a Revised Plan of Study following the approval of a written petition and a signed certification that the project meets the ABET definition of an engineering topic.

For courses co-listed in another department, students must enroll in the Engineering Sciences offering.

Required Signatures:

Student

Assistant/Director of Undergraduate Studies

This plan *does / does not* meet the ABET distribution requirements.

Assistant Dean for Education

Date

Date

Date

3/6

Pre-approved Courses for the SB in Engineering Sciences

Engineering Courses

Sorted by Depth Area and fulfills requirement for ABET engineering topics. For courses colisted in another department, students must enroll in the Engineering Sciences offering.

Environmental

- ESE 6 Introduction to Environmental Science & Engineering
- ESE 109 Earth Resources and the Environment
- ES 112 Thermodynamics by Case Study
- ES 123 Intro to Fluid Mechanics & Transport Processes
- ESE 131 Introduction to Physical Oceanography and Climate
- ESE 132 Introduction to Meteorology and Climate
- ESE 133 Atmospheric Chemistry
- ESE 136 Climate and Climate Engineering
- ESE 137 Energy within Environmental Constraints
- ESE 160 Space Science: Theory and Applications
- ESE 161 Applied Environmental Toxicology
- ESE 162 Hydrology
- ESE 163 Pollution Control in Aquatic Ecosystems
- ESE 164 Environmental Chemistry
- ESE 166 State-of-the-art Instrumentation in Environmental Sciences
- ESE 169 Seminar on Global Pollution Issues

Mechanics and Materials

- ES 51 Computer Aided Machine Design
- ES 120 Intro to the Mechanics of Solids
- ES 123 Intro to Fluid Mechanics & Transport Processes
- ES 125 Mechanical Systems
- ES 128 Computational Solid & Structural Mechanics
- ES 181 Engineering Thermodynamics
- ES 183 Introduction to Heat Transfer
- ES 190 Intro to Materials Science & Engineering

Engineering Physics and Chemistry

- ES 112 Thermodynamics by Case Study
- ES 170 Engineering Quantum Mechanics
- ES 173 Introduction to Electronic and Photonic Devices
- ES 181 Engineering Thermodynamics
- ES 190 Intro to Materials Science & Engineering

Electrical

- ES 50 Intro to Electrical Engineering
- ES 54 Electronics for Engineers
- ES 151 Applied Electromagnetism
- ES 152 Circuits, Devices, and Transduction
- ES 153 Laboratory Electronics
- ES 154 Electronic Devices & Circuits
- ES 155 Systems and Control
- ES 156 Signals and Communications
- ES 157 Biological Signal Processing
- ES 158 Feedback Systems: Analysis and Design
- ES 159 Intro to Robotics
- ES 170 Engineering Quantum Mechanics
- ES 173 Introduction to Electronic and Photonic Devices
- ES 175 Photovoltaic Devices
- ES 177-Microfabrication Laboratory
- CS 141 Computing Hardware
- CS 146 Computer Architecture
- CS 148 Design of VLSI Circuits & Systems

Biological and Biomedical

- ES 53 Quantitative Physiology as a Basis for Bioengineering
- BE 110 Physiological Systems Analysis
- BE 121 Cellular Engineering
- BE 125 Tissue Engineering
- BE 128 Introduction to Biomedical Imaging and Systems
- BE 129 Introduction to Bioelectronics
- BE 130 Neural Control of Movement
- BE 131 Neuroengineering
- BE 191 Intro to Biomaterials
- ES 211 Microphysiological Systems
- ES 221 Drug Delivery
- ES 227 Medical Device Design
- ES 228 Biologically-Inspired Materials

General Engineering Electives (Cannot be used for Depth or Breadth Areas)

- ES 111 Intro to Scientific Computing
- ES 115 Mathematical Modeling
- ES 121 Intro to Optimization: Models & Methods
- CS 120 Introduction to Algorithms and their limitations

	rypically				
	Offered	Math	Chemistry	Physics	Other
Required (Required Courses				
ESE 6	Spring				
ES 96	Fall & Spring				Junior year
ES 100HF	Fall-Spring				ES 96
Selected Electives					
ESE 109	Spring (odd)				ESE 6
ESE 131	Spring (even)	21a,b		A	
ESE 132	Fall (even)	21a,b		A	
ESE 133	Spring	1b	PS 11		
ESE 136	Spring	1a	PS 11	A	
ESE 137	Fall (odd)	1a	PS 11		
ESE 160	Fall	21a,b		A,B	
ESE 161	Spring	1b	PS 11		
ESE 162	Fall (even)	21a,b		A	
ESE 163	Spring	21a			ESE 6
ESE 164	Fall (even)		PS 11		
ESE 166	Spring	1b	PS 11	A,B	
ESE 169	Spring (odd)	1b	PS 11		
ES 112	Spring				
ES 123	Spring	21a,b		Α	

Prerequisite Planning Table for the ES SB - Environmental Science & Engineering Track

¹Courses listed as Recommended Preparation, and not an enforced prerequisite, are shown in italics

²Equivalent courses are accepted for prerequisites (e.g., Phys 15a, PS 12a, or AP50a allcount for Physics A)