Plan of Study for the Environmental Science & Engineering AB Concentration

Effective for Students Declaring the Concentration after August 1, 2021

NAME: _____ CLASS: _____

EMAIL: _____ DATE: _____

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

REQUIRED COURSES (Circle or fill-in for courses planned in each category.)	**Semester** (FA/SP Year)
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)	_____ _____ _____ _____
Physics (2 courses) AP 50a – Physics as a Foundation for Sci. & Eng. Part I (or PS 12a or Physics 15a or 16) AP 50b – Physics as a Foundation for Sci. & Eng. Part II (or PS 12b or Physics 15b)	_____ _____
Chemistry (2 courses) *Select two:* PS 11 ***(Recommended)*** – Foundations and Frontiers of Modern Chemistry: A Molecular and Global Perspective (or PS 1 – Chemical Bonding, Energy, and Reactivity) LS 1a – An Integrated Introduction to the Life Sciences (or LPS A – Foundational Chemistry and Biology) PS 10 – Quantum and Statistical Foundations of Chemistry CHEM 17 – Principles of Organic Chemistry. (or Chemistry 20 – Organic Chemistry) CHEM 60 – Foundations of Physical Chemistry	_____ _____
Environmental Science & Engineering Introductory Course (1 course) ESE 6 – Intro to Environmental Science & Engineering (may substitute GENED 1085, 1094, or 1137, or other appropriate course by petition)	_____
Sophomore Forum *Required, non-credit.*	_____

REQUIRED COURSES (Circle or fill-in for courses planned in each category.)	**Semester** (FA/SP Year)
Breadth in Environmental Science & Engineering (2 courses) *Strongly recommended to select one course on environmental physics and one course on environmental chemistry. With permission of the Director of Undergraduate Studies, students may substitute alternative ESE courses.* *One course on environmental physics:* ESE 101,129, 131, 132, 162 *One course on environmental chemistry:* ESE 133, 161, 164, ES 112	 _____ _____
Approved Electives (5 courses) *Select five from the options below (course titles are listed on page 3). With permission of the Director of Undergraduate Studies, up to two courses may be substituted with a relevant upper-level course from other areas of the natural sciences and engineering. Courses marked with an * are approved for the required design experience (see below). Only one course marked with an † can count as an elective.* • ESE 101, 102†, 109, 122, 129, 131, 132, 133, 136, 137, 138, 160*, 161, 162, 163*, 164, 166*, 168, 169* • ES 50, 54, 91r (one term), 96*, 112, 123, 181, 183 • EPS 53, 134, 187 • OEB 55, 120, 157 • AM 101†, 105†, 115†, 120†, CS 109a†	 _____ _____ _____ _____ _____
Design Experience *All students must take an approved course (see courses marked with an * above) with significant design experience as one of their ESE Breadth or Approved Electives. This requirement may also be satisfied with a design component within a senior thesis or independent research project (ES 91r).*	

Required Signatures:

_____ _____

Student Date

_____ _____

Assistant Director of Undergraduate Studies Date

ADUS indicate if a petition is needed: Yes_____ No_____

_____ _____

Director of Undergraduate Studies Date

COURSE TITLES FOR APPROVED ELECTIVES:

ESE 101 – Global Warming Science 101
ESE 102 – Data Analysis and Statistical Inference in the Earth and Environmental Sciences
ESE 109 – Earth Resources and the Environment
ESE 122 – Designing Satellite Missions: Research Methods through Lens of Earth Observing Systems
ESE 129 – Climate and Atmospheric Physics Lab
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 138 – Mysteries of Climate Dynamics
ESE 160 – Space Science and Engineering: 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 168 – Human Environmental Data Science: Agriculture, Conflict and Health
ESE 169 – Seminar on Global Pollution Issues

ES 50 – Introduction to Electrical Engineering
ES 54 – Electronics for Engineers
ES 91r – Supervised Reading and Research
ES 96 – Engineering Problem Solving and Design Project
ES 112 – Thermodynamics by Case Study
ES 123 – Intro to Fluid Mechanics & Transport Processes
ES 181 – Engineering Thermodynamics
ES 183 – Introduction to Heat Transfer

EPS 53 – Marine Geochemistry
EPS 134 – Global Warming Debates: The Reading Course
EPS 187 – Low Temperature Geochemistry II: Modern and Ancient Biogeochemical Processes

OEB 55 – Ecology: Populations, Communities, and Ecosystems
OEB 120 – Plants and Climate
OEB 157 – Global Change Biology

AM 101 – Statistical Inference for Scientists and Engineers
AM 105 – Ordinary and Partial Differential Equations
AM 115 – Mathematical Modeling
AM 120 – Applied Linear Algebra and Big Data

CS 109a – Introduction to Data Science

	Typically Offered	Math	Chemistry	Physics	Other
Required Courses					
ESE 6	Spring				
Selected Electives					
ESE 101	Spring	***21b***			
ESE 102	Spring	***21a,b***			
ESE 109	Spring (odd)				**ESE 6**
ESE 129	Fall	***21a***		**A**	
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 138	Fall (odd)	***21a,b***		***A***	
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		**PS 11**		
ESE 166	Spring	**1b**	**PS 11**	**A,B**	
ESE 168	Fall	***1b***	***PS 11***	***A***	
ESE 169	Spring (odd)	**1a or 1b**	**PS 11**		
ES 50	Spring				
ES 54	Spring				
ES 96	Fall/Spring				Preference given to SB students
ES 112	Spring				
ES 123	Spring	**21a,b**		**A**	
ES 181	Fall		**PS 12a**	**A**	
ES 183	Spring	**21b**	**PS 12a**	**A**	

[1]Courses listed as Recommended Preparation, and not an enforced perquisite, are shown in italics

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