Plan of Study for the Environmental Science & Engineering Track

of the Engineering Sciences SB Concentration

Effective for Students Declaring the Concentration after August 1, 2018

NAME: _____ CLASS: _____

EMAIL: _____ DATE: _____

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

REQUIRED COURSES (Circle or fill-in for courses planned in each category.)	**Math**	**Science**	**Engr. Topics**	**Semester** (FA/SP Year)
Mathematics (2-4 courses)				
Begin according to placement:				
Math 1a – Introduction to Calculus I				
Math 1b – Calculus, Series, and Differential Equations	1.0			_____
AM 21a – Mathematical Methods in the Sciences I	1.0			_____
(or Mathematics 21a or 23a)	1.0			_____
AM 21b – Mathematical Methods in the Sciences II				
(or Mathematics 21b or 23b)	1.0			_____
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	(1.0)			_____
Statistics 110 – Introduction to Probability				
Applied Mathematics (1course, if starting in Math 21a or equivalent)				
Select one:				
AM 104 – Series Expansions & Complex Analysis				
AM 105 – Ordinary & Partial Differential Equations	(1.0)			_____
AM 106 – Applied Algebra				
AM 107 – Graph Theory & Combinatorics				
Physics (2 courses)				
AP 50a – Physics as a Foundation for Sci. & Eng. Part I				
(or PS 12a or Physics 15a or 16)		1.0		_____
AP 50b – Physics as a Foundation for Sci. & Eng. Part II				
(or PS 12b or Physics 15b)		1.0		_____
Chemistry/Life Sciences (2 courses)				
Select two (PS 11 strongly recommended):				
LS 1a – Intro to the Life Sciences				
(or LPS A – Foundational Chemistry & Biology)		1.0		_____
PS 10 – Chemistry: A Microscopic Perspective				
PS 11 – Foundations & Frontiers in Modern Chemistry		1.0		_____
(or PS 1 – Chemical Bonding, Energy, & Reactivity)				
Chemistry 17 – Principles of Organic Chemistry				
(or Chemistry 20 – Organic Chemistry)				

REQUIRED COURSES (Circle or fill-in for courses planned in each category.)	**Math**	**Science**	**Engr. Topics**	**Semester** (FA/SP Year)
Sophomore Forum *Required, non-credit.*				_____
Computer Science (1 course) *Select one:* CS 50 – Introduction to Computer Science I CS 51 – Introduction to Computer Science II CS 61 – Systems Programming & Machine Organization			1.0	_____
Environmental Science & Engineering Core (5 courses) Environmental Science and Engineering 6 *Select four courses from (course titles shown on p. 5):* Environmental Science and Engineering 109, 130, 131, 132, 133, 136, 137, 160, 161, 162, 163, 166, 169, Engineering Sciences 112, 123			1.0 1.0 1.0 1.0 1.0	_____ _____ _____ _____ _____
Engineering Breadth (3 courses) *Select one upper-level course (>100) from each area, see lists on pp. 5-6. (Note: ES54 may be used for the Electrical area.)* *Area*: Mechanics & Materials Course: *Area*: Engineering Physics & Chemistry Course: *Area*: Electrical Course:			1.0 1.0 1.0	_____ _____ _____
Approved Engineering Elective (1 course) *Select at least 1additional course on engineering topics** 1.			1.0	_____
Engineering Design (2 courses) Engineering Sciences 96 Engineering Sciences 100hf			1.0 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	Date
Associate/Director of Undergraduate Studies	Date

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

Assistant Dean for Education	Date

Pre-approved Courses for the SB in Engineering Sciences

Engineering Courses
Sorted by Depth Area and fulfills requirement for ABET engineering topics. For courses co-listed 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 130 – Biogeochemistry of Carbon Dioxide and Methane
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 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 135 – Phys & Chem: In the Context of Energy & Climate at the Global & Molecular Level
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 153 – Laboratory Electronics
ES 154 – Electronic Devices & Circuits
ES 155 – Biological Signal Processing
ES 156 – Signals & Systems
ES 158 – Feedback Systems: Analysis and Design
ES 159 – Intro to Robotics
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 130 – Neural Control of Movement
BE 160 – Chemical Kinetics
BE 191 – Intro to Biomaterials
ES 211 – Microphysiological Systems
ES 221 – Drug Delivery
ES 227 – Medical Device Design
ES 228 – Biologically-Inspired Matreials

Computer
CS 51 – Intro to Computer Science 2
CS 61 – Systems Programming & Machine Organization
CS 141 – Computing Hardware
CS 143 – Computer Networks
CS 146 – Computer Architecture
CS 148 – Design of VLSI Circuits & Systems
CS 175 – Computer Graphics

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