Plan of Study for the Environmental Science & Engineering Track
of the Engineering Sciences AB Concentration
Effective for Students Declaring the Concentration after July 1, 2016

NAME: _________________________  CLASS: ________________

EMAIL: _________________________  DATE: ________________

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

<table>
<thead>
<tr>
<th>REQUIRED COURSES</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Circle or fill-in for courses planned in each category.)</td>
<td>(FA/SP Year)</td>
</tr>
<tr>
<td><strong>Mathematics</strong> (2-4 courses)</td>
<td></td>
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<tr>
<td><em>Begin according to placement:</em></td>
<td></td>
</tr>
<tr>
<td>Math 1a – Introduction to Calculus I</td>
<td></td>
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<tr>
<td>Math 1b – Calculus, Series, and Differential Equations</td>
<td></td>
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<tr>
<td>Applied Mathematics 21a – Mathematical Methods in the Sciences I</td>
<td></td>
</tr>
<tr>
<td>(or Mathematics 21a or 23a)</td>
<td></td>
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<tr>
<td>Applied Mathematics 21b – Mathematical Methods in the Sciences II</td>
<td></td>
</tr>
<tr>
<td>(or Mathematics 21b or 23b)</td>
<td></td>
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<tr>
<td><strong>Physics</strong> (2 courses)</td>
<td></td>
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<tr>
<td>AP 50a – Physics as a Foundation for Sci. &amp; Eng. Part I</td>
<td></td>
</tr>
<tr>
<td>(or PS 12a or Physics 15a or 16)</td>
<td></td>
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<tr>
<td>AP 50b – Physics as a Foundation for Sci. &amp; Eng. Part II</td>
<td></td>
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<tr>
<td>(or PS 12b or Physics 15b)</td>
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<tr>
<td><strong>Chemistry</strong> (2 courses)</td>
<td></td>
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<tr>
<td><em>Select two (PS 11 strongly recommended):</em></td>
<td></td>
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<tr>
<td>Life Sciences 1a – An Integrated Introduction to the Life Sciences</td>
<td></td>
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<tr>
<td>(or Life &amp; Physical Sciences A – Foundational Chemistry and Biology)</td>
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<tr>
<td>Physical Sciences 10 – Quantum and Statistical Foundations of Chemistry</td>
<td></td>
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<tr>
<td>Physical Sciences 11 – Foundations and Frontiers of Modern Chemistry</td>
<td></td>
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<tr>
<td>(or Physical Sciences 1 – Chemical Bonding, Energy, and Reactivity)</td>
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<tr>
<td><strong>Computer Science</strong> (1 course)</td>
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<tr>
<td><em>Select one:</em></td>
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<tr>
<td>CS 50 – Introduction to Computer Science I</td>
<td></td>
</tr>
<tr>
<td>CS 51 – Introduction to Computer Science II</td>
<td></td>
</tr>
<tr>
<td>CS 61 – Systems Programming &amp; Machine Organization</td>
<td></td>
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<tr>
<td><strong>Sophomore Forum</strong></td>
<td></td>
</tr>
<tr>
<td><em>Required, non-credit.</em></td>
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</tbody>
</table>

Engineering Sciences AB – ESE Track
Rev. Jul 2016  1/3
### REQUIRED COURSES
(Circle or fill-in for courses planned in each category.)

<table>
<thead>
<tr>
<th>Environmental Science &amp; Engineering Core (4 courses)</th>
<th>Semester (FA/SP Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES 6 – Intro to Environmental Science &amp; Engineering</td>
<td></td>
</tr>
<tr>
<td><strong>Select three:</strong></td>
<td></td>
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<tr>
<td>ES 109 – Earth Resources and the Environment</td>
<td></td>
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<tr>
<td>ES 112 – Thermodynamics by Case Study</td>
<td></td>
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<tr>
<td>ES 131 – Introduction to Physical Oceanography and Climate</td>
<td></td>
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<tr>
<td>ES 132 – Introduction to Meteorology and Climate</td>
<td></td>
</tr>
<tr>
<td>ES 133 – Atmospheric Chemistry</td>
<td></td>
</tr>
<tr>
<td>ES 135 – Physics &amp; Chemistry: In the Context of Energy &amp; Climate</td>
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<tr>
<td>ES 160 – Space Science: Theory and Applications</td>
<td></td>
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<tr>
<td>ES 161 – Applied Environmental Toxicology</td>
<td></td>
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<tr>
<td>ES 162 – Hydrology &amp; Environmental Geomechanics</td>
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<tr>
<td>ES 163 – Pollution Control in Aquatic Ecosystems</td>
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<tr>
<td>ES 164 – Environmental Chemistry</td>
<td></td>
</tr>
<tr>
<td>ES 165 – Water Engineering</td>
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</tr>
<tr>
<td>ES 166 – State-of-the-Art Instrumentation in Environmental Sciences</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Approved Electives (3 courses)</th>
<th>Semester (FA/SP Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Select three (course titles are listed on page 3):</strong></td>
<td></td>
</tr>
<tr>
<td>Earth &amp; Planetary Sciences 134, 136, 186, 187, 208, 236</td>
<td></td>
</tr>
<tr>
<td>No more than one from*: Engineering Sciences 50, 51, 53, or Earth &amp; Planetary Sciences 22</td>
<td></td>
</tr>
<tr>
<td>No more than one from: Engineering Sciences 52, 153, or 154</td>
<td></td>
</tr>
<tr>
<td>No more than one from: Engineering Sciences 111, 115, 121, 150, Statistics 110, Applied Math 101, 104, 105, or 108</td>
<td></td>
</tr>
</tbody>
</table>

* ES 50, 53, or EPS 22 may only be counted as an Approved Elective if taken during the Freshman or Sophomore year.

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

ES 91r – Supervised Reading and Research
ES 103 – Spatial Analysis of Environmental & Social Systems
ES 109 – Earth Resources and the Environment
ES 112 – Thermodynamics by Case Study
ES 123 – Intro to Fluid Mechanics & Transport Processes
ES 131 – Introduction to Physical Oceanography and Climate
ES 132 – Introduction to Meteorology and Climate
ES 133 – Atmospheric Chemistry
ES 135 – Phys & Chem: In the Context of Energy & Climate at the Global & Molecular Level
ES 137 – Energy within Environmental Constraints
ES 160 – Space Science and Engineering: Theory and Applications
ES 161 – Applied Environmental Toxicology
ES 162 – Hydrology & Environmental Geomechanics
ES 163 – Pollution Control in Aquatic Ecosystems
ES 164 – Environmental Chemistry
ES 165 – Water Engineering
ES 166 – State-of-the-art Instrumentation in Environmental Sciences
ES 169 – Seminar on Global Pollution Issues
ES 181 – Engineering Thermodynamics
ES 220 – Fluid Dynamics
ES 265 – Advanced Water Treatment
ES 267 – Aerosol Science and Technology
ES 268 – Chemical Kinetics
ES 269 – Environmental Nanotechnology
EPS 134 – Global Warming Debates: The Reading Course
EPS 136 – Introduction to Ocean Circulation Physics
EPS 186 – Low Temperature Geochemistry I: Introduction to Biogeochemical Cycles
EPS 187 – Low Temperature Geochemistry II: Modern and Ancient Biogeochemical Processes
EPS 208 – Physics of Climate
EPS 236 – Environmental Modeling

No more than one from:
ES 50 – Introduction to Electrical Engineering
ES 51 – Computer-Aided Machine Design
ES 53 – Quantitative Physiology as a Basis for Bioengineering
EPS 22 – The Fluid Earth: Oceans, Atmosphere, Climate, and Environment

No more than one from:
ES 52 – The Joy of Electronics - Part 1
ES 153 – Laboratory Electronics
ES 154 – Electronic Devices and Circuits

No more than one from:
AM 101 – Statistical Inference for Scientists and Engineers
AM 104 – Series Expansions & Complex Analysis
AM 105 – Ordinary & Partial Differential Equations
AM 108 – Nonlinear Dynamical Systems
ES 111 – Introduction to Scientific Computing
ES 115 – Mathematical Modeling
ES 121 – Introduction to Optimization: Models & Methods
ES 150 – Introduction to Probability with Engineering Applications
Statistics 110 – Introduction to Probability