

**College of Engineering**  
**GREEN ENGINEERING MINOR**  
 FOR STUDENTS GRADUATING IN CALENDAR YEAR 2019

**APPROVED**  
 COMMISSION ON UNDERGRADUATE  
 STUDIES AND POLICIES

To complete a minor in Green Engineering, a student must take the 6 hours of required courses, 6 hours of engineering elective courses, and 6 hours of interdisciplinary elective courses from the approved courses below.

	REQUIRED COURSES	HOURS
ENGR 3124	Introduction to Green Engineering <sup>5</sup> and 1 of the following 3 courses	3 <sup>F,5</sup>
ENGR 4134 or CEE 4134 or ME/ESM 4194	Environmental Life Cycle Assessment <sup>1,5</sup> or Environmental Sustainability – A Systems Approach <sup>1,5</sup> or Sustainable Energy Solutions for a Global Society <sup>1,5</sup>	3 <sup>S</sup> 3 <sup>S</sup> 3 <sup>F</sup>
<b>Total Required Courses</b>		<b>6</b>

	ENGINEERING ELECTIVE COURSES	HOURS
AOE 4064	Fluid Flows in Nature <sup>5</sup>	3
BSE 3324	Small Watershed Hydrology <sup>5</sup>	3
BSE 3334	Nonpoint Source Pollution Assessment and Control <sup>5</sup>	3
BSE 3534	Bioprocess Engineering <sup>5</sup>	3
BSE 4304	Nonpoint Source Pollution Modeling & Management <sup>5</sup>	3
BSE 4394	Water Supply & Sanitation in Developing Countries <sup>5,7</sup>	3
BSE 4524	Biological Process Plant Design <sup>5</sup>	3
BSE/CEE 5244	Advanced GIS in Hydrological Analysis <sup>5</sup>	3
BSE 5354	Nonpoint Source Pollution Modeling <sup>5</sup>	3
CHE 3134	Separation Processes <sup>5</sup>	3
CHE 3184	Chemical Reactor Analysis & Design <sup>5</sup>	3
CEE 3104	Introduction to Environmental Engineering <sup>5,7</sup>	3
CEE 4104	Water and Wastewater Treatment Design <sup>5</sup>	3
CEE 4114	Fundamentals of Public Health Engineering <sup>5</sup>	3
CEE 4134	Environmental Sustainability – A Systems Approach <sup>1,5</sup>	3 <sup>S</sup>
CEE 4144	Air Resources Engineering <sup>5</sup>	3
CEE 4164	Environmental Microbiology <sup>5</sup>	3
CEE 4174	Solid and Hazardous Waste Management <sup>5</sup>	3
CEE 4264	Sustainable Land Development <sup>5</sup>	3
CEE 4304	Hydrology <sup>5</sup>	3
CEE 4344	Water Resources Planning <sup>5</sup>	3
CEE 4354	Environmental Hydrology <sup>5</sup>	3
CEE 4384	Coastal Engineering <sup>5</sup>	3
CEE 4554	Natural Disaster Mitigation and Recovery <sup>5</sup>	3
ECE 4304	Design in Power Engineering <sup>5</sup>	3
ECE 4364	Alternate Energy Systems ( <i>online</i> ) <sup>5</sup>	3
ENGR 4134	Environmental Life Cycle Assessment <sup>1,5</sup>	3 <sup>S</sup>
ISE 2204	Manufacturing Processes <sup>5</sup>	3
ISE 2214	Manufacturing Processes Laboratory <sup>5</sup>	1
ISE 4644	Occupational Safety and Hazard Control <sup>5</sup>	3
ISE 4304	Global Issues in Industrial Management <sup>5</sup>	3
MSE 2044	Fundamentals of Materials Engineering <sup>5</sup>	4
MSE 3344	Governmental Regulation of the Metal Casting Industry <sup>5</sup>	3
MSE 4055	Material Selection and Design <sup>5</sup>	3
ME 4034	Bio-Inspired Technology <sup>5</sup>	3
ME 4154	Industrial Energy Systems <sup>5</sup>	3
ME 4164	Energy Systems for Buildings <sup>5</sup>	3
ME/ESM 4194	Sustainable Energy Solutions for a Global Society <sup>1,5</sup>	3
ME 4204	Internal Combustion Engines <sup>5</sup>	3
ME 4554	Advanced Technology for Motor Vehicles <sup>5</sup>	3
ME 4724	Engineering Acoustics <sup>5</sup>	3
ME 5214	Combustion <sup>5</sup>	3
ME 5254	Fuel Cell Systems <sup>5</sup>	3
ME 5734	Advanced Engineering Acoustics <sup>5</sup>	3
ME 5814	Energy Harvesting <sup>5</sup>	3
MINE 3544	Mineral Processing Laboratory <sup>5</sup>	1
MINE 3554	Resource Recovery <sup>5</sup>	2
MINE 4544	Mine Reclamation and Environmental Management <sup>5</sup>	3
NSEG 3145	Fundamentals of Nuclear Engineering <sup>5</sup>	3
NSEG 3146	Fundamentals of Nuclear Engineering <sup>5</sup>	3
NSEG 3604	Radiation Detection, Protection, and Shielding <sup>5</sup>	3
NSEG 5204	Nuclear Fuel Cycle <sup>5</sup>	3
<b>Total Engineering Elective Courses</b>		<b>6</b>

**INTERDISCIPLINARY ELECTIVE COURSES** **HOURS**

AAEC 3314	Environmental Law <sup>7</sup>	3
AAEC 3324	Environmental & Sustainable Development Economics	3
AAEC 4314	Environmental Economic Analysis and Management	3
AAEC 4344	Sustainable Development Economics	3
APSC/DASC 3134	Animal Agriculture and the Environment	3
ARCH 4055	Environment and Building Systems <sup>5</sup>	3
ARCH 4056	Environment and Building Systems <sup>5</sup>	3
BC 3014	Building Physics & Environmental Systems	3
BC 4314	Building Performance & Energy Management	4
BC 4334	Sustainable Building Performance Management	3
BC 5134	Sustainable Facility Systems	3
BC 5144	Sustainable Infrastructure Systems	3
BIOL 2804	Ecology <sup>5</sup>	3
BIOL 4004	Freshwater Ecology <sup>5</sup>	4
BIOL 4014	Environmental Toxicology <sup>5</sup>	2
BIOL 4114	Global Change Ecology <sup>5</sup>	3
BIOL 4314	Plant Ecology <sup>5</sup>	4
BIOL 4334	Chemical Ecology <sup>5</sup>	3
CHEM 4514	Green Chemistry	3
CSES/ENSC 3644	Plant Materials for Environmental Restoration	3
CSES/BIOL/ENSC 4164	Environmental Microbiology <sup>4</sup>	3
CSES 4644	Land-Based Systems for Waste Treatment	3
CSES/CHEM/ENSC 4734	Environmental Soil Chemistry	3
CSES/ENSC 4764	Bioremediation	3
ECON 4014	Environmental Economics <sup>5</sup>	3
ENGL 3534	Literature and Ecology <sup>2,7</sup>	3
ENSC 3604	Fundamentals of Environmental Science <sup>7</sup>	3
ENSC/CSES 3634	Physics of Pollution	3
ENSC/CSES 4774	Reclamation of Drastically Disturbed Lands	3
ENSC/CSES 4854	Wetland Soils and Mitigation	3
ENT 2004	Insects and Human Society <sup>7</sup>	3
ENT/PPWS 4264	Pesticide Usage	3
ENT/BIOL 4354	Aquatic Entomology <sup>5</sup>	4
ENT/BIOL/FIW 4484	Freshwater Biomonitoring <sup>5</sup>	4
FIW 2114	Principles of Fisheries and Wildlife Sciences <sup>7</sup>	3
FIW 4614	Fish Ecology	3
FREC 2004	Forest Ecosystems	3
FREC 2114	Ecology of Appalachian Forests <sup>7</sup>	3
FREC 2124	Forests, Society and Climate	3
FREC/LAR 2554	Nature and American Values <sup>2</sup>	3
GEOG 3104	Environmental Problems, Population, & Development <sup>5</sup>	3
GEOG 4204	Geography of Resources <sup>7</sup>	3
GEOS 2104	Elements of Geology	3
GEOS 3014	Environmental Geosciences	3
GEOS 3034	Oceanography	3
GEOS 4634	Environmental Geochemistry	3
HIST 3144	American Environmental History	3
HORT/FREC 2134	Plants & Green Space in Urban Communities <sup>3</sup>	3
LAR 4034	Evolution of the American Landscape <sup>2</sup>	3
PHIL 2304	Global Ethics <sup>2,7</sup>	3
PSYC 3024	Environmental Psychology	3
RED 4604	Housing, Energy, and the Environment <sup>7</sup>	3
SBIO/FREC 2784	Global Forest Sustainability <sup>7</sup>	3
SBIO 3004	Sustainable Nature-Based Enterprise	3
SBIO 3114	Biodeterioration, Bioconversion, and Bioenergy	3
SBIO 3324	Green Building Systems	3
SBIO 3434	Chemistry and Conversion of Sustainable Biomaterials	3
SBIO 3444	Sustainable Biomaterials and Bioenergy	3
SBIO 3454	Society, Sustainability Biomaterials and Energy	3
SBIO 3554	Sustainable Biomaterials Enterprises	3
SBIO 4444	Sustainable Biomaterial Composites	4
STS 3334	Energy and Society <sup>3,7</sup>	3
UAP/PSCI 3344	Global Environmental Issues <sup>7</sup>	3
UAP 3354	Introduction to Environmental Policy and Planning	3
UAP 4264	Environmental Ethics and Policy <sup>2</sup>	3
UAP 4374	Land Use & Environment: Planning and Policy	3
UAP 4384	Pollution Control Planning and Policy	3



**FOOTNOTES:**

<sup>1</sup>These courses count either as a Core Requirement or Engineering Elective, but not both

<sup>2</sup>CLE Area 2 course

<sup>3</sup>CLE Area 3 course

<sup>4</sup>Cross-listed courses cannot be double-counted as both an engineering and non-engineering course

<sup>5</sup>Prerequisites and non-major enrollment restrictions are particularly limiting for these courses for non-majors

<sup>7</sup>CLE Area 7 course

<sup>F</sup>Fall Course

<sup>S</sup>Spring Course

**GENERAL NOTES:**

- Some courses that count toward the minor have prerequisites. Please consult the University Course Catalog or check with your Academic Advisor.
- Some classes are not offered every semester or year. In planning your schedule, consider carefully the prerequisites associated with each class as well as which semester(s) the class is offered.
- All courses must be taken with the letter grade (A/F) option. A minor GPA of 2.00 for the 18 credits of the minor is required.
- 1xxx level courses will not be considered for substitution for the minor.
- Senior Capstone Design projects and Undergraduate Research in engineering departments are eligible as engineering electives if the project focuses on the environmental impacts. See program advisor for advance approval of projects.
- Other courses, including Study Abroad, may be substituted on a case-by-case basis with approval from the Green Engineering Director and College of Engineering Associate Dean of Academic Affairs. For instance, NR/GEOG 3954 Study Abroad may be substituted if the Study Abroad trip is concerned directly with the environment and sustainability.
- Dr. Sean McGinnis, Director of Green Engineering (2090 Torgersen Hall), will act as an advisor for all students pursuing a Green Engineering Minor. (Email – [smcginn@vt.edu](mailto:smcginn@vt.edu), Website – [www.eng.vt.edu/green](http://www.eng.vt.edu/green))