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University Registrar

VIRGINIA TECH

College of Engineering

GREEN ENGINEERING MINOR

FOR STUDENTS ENTERING UNDER UG CATALOG 2022-2023

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 for 18 hours total from the approved courses below.

	REQUIRED COURSES	SEMESTER	HOURS
ENGR 3124	Introduction to Green Engineering	F, S	3
	AND 1 OF THE FOLLOWING 3 COURSES		
ENGR 4134	Environmental Life Cycle Assessment[ł]	S	3
or	**or**		
CEE 4134	Environmental Sustainability – A Systems Approach[ł,*]	S	3
or	**or**		
ME/ESM 4194	Sustainable Energy Solutions for a Global Society[ł]	F, S	3
TOTAL REQUIRED COURSE HOURS			**6**
	ENGINEERING ELECTIVE COURSES		
AOE 4064	Fluid Flows in Nature[*]	S, O	3
AOE 4634	Wind Turbine Technology and Aerodynamics[*]	S	3
BSE 3324	Small Watershed Hydrology[*]	F	3
BSE 3334	Nonpoint Source Pollution Assessment and Control[*]	S	3
BSE 3534	Bioprocess Engineering[*]	S	3
BSE 4304	Introduction to Watershed Modeling[*]	S	3
BSE 4394	Water Supply & Sanitation in Developing Countries[*,7]	S	3
BSE 4524	Biological Process Plant Design[*]	F	3
CHE 3134	Separation Processes[*]	S	3
CHE 3184	Chemical Reactor Analysis & Design[*]	S	3
CEE 3104	Introduction to Environmental Engineering[*,7]	F, S	3
CEE 4104	Water and Wastewater Treatment Design[*]	F	3
CEE 4114	Fundamentals of Public Health Engineering[*]	S	3
CEE 4134	Environmental Sustainability – A Systems Approach[ł,*]	S	3
CEE 4144	Air Resources Engineering[*]	S	3
CEE 4174	Solid and Hazardous Waste Management[*]	F	3
CEE 4264	Sustainable Land Development[*]	F	3
CEE 4304	Hydrology[*]	F	3
CEE 4314	Groundwater Resources[*]	F	3
CEE 4334	Hydraulic Structures[*]	S	3
CEE 4344	Water Resources Planning[*]	S	3
CEE 4354	Environmental Hydrology[*]	F	3
CEE 4384	Coastal Engineering[*]	S	3
CEE 4394	Urban Water Sustainability[*]	S	3
CEE 4554	Natural Disaster Mitigation and Recovery[*]	S	3
ECE 4324	Microgrids	F	3
ECE 4364	Alternate Energy Systems[*]	S, O	3
ENGR 4134	Environmental Life Cycle Assessment[ł]	S	3
ISE 2204	Manufacturing Processes[*]	F	3
ISE 2214	Manufacturing Processes Laboratory[*]	F, S	1
ISE 4304	Global Issues in Industrial Management[*]	S	3
ISE 4654	Principles of Industrial Hygiene[*]	S	3
ISE 4644	Occupational Safety and Hazard Control[*]	S	3
MSE 2044	Fundamentals of Materials Engineering[*]	F, S	4
MSE 3344	Governmental Regulation of the Metal Casting Industry[*]	F	3
MSE 4055	Material Selection and Design[*]	F	3
ME 4034	Bio-Inspired Technology[*]	F	3
ME 4164	Energy Systems for Buildings[*]	S	3
ME/ESM 4194	Sustainable Energy Solutions for a Global Society[ł]	F, S	3
ME 4204	Internal Combustion Engines[*]	S	3
ME 4554	Advanced Technology for Motor Vehicles[*]	F	3
ME 4724	Engineering Acoustics[*]	F	3
MINE 2114	Energy & Raw Materials: Geopolitics & Sustainable Development	F	3
MINE 3544	Mineral Processing Laboratory[*]	S	1
MINE 3554	Resource Recovery[*]	S	2
MINE 4544	Mine Reclamation and Environmental Management[*]	S	3
NSEG 3145	Fundamentals of Nuclear Engineering[*]	F	3
NSEG 3146	Fundamentals of Nuclear Engineering[*]	S	3
NSEG 3604	Radiation Detection, Protection, and Shielding[*]	F	3
TOTAL ENGINEERING ELECTIVE HOURS			**6**

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	INTERDISCIPLINARY ELECTIVE COURSES	SEMESTER	HOURS
AAEC 3314	Environmental Law	S	3
AAEC 3324	Environmental & Sustainable Development Economics[3, 7]	S	3
AAEC 4314	Environmental Economic Analysis and Management	S	3
AAEC 4344	Sustainable Development Economics	F	3
APSC/DASC 3134	Animal Agriculture and the Environment	S	3
ARCH 4055	Environment and Building Systems*	F	3
ARCH 4056	Environment and Building Systems*	F	3
BC 3014	Building Physics & Environmental Systems	S	3
BC 4314	Building Performance & Energy Management	F	4
BC 4334	Sustainable Building Performance Management	S	3
BIOL 2804	Ecology*	F	3
BIOL 4004	Freshwater Ecology*	F	4
BIOL 4014	Environmental Toxicology*	F	2
BIOL 4114	Global Change Ecology*	F	3
BIOL 4314	Plant Ecology*	F	3
BIOL 4334	Chemical Ecology*	F	3
CHEM 4514	Green Chemistry	S	3
CSES/ENSC 3644	Plant Materials for Environmental Restoration	S	3
CSES/BIOL/ENSC 4164	Environmental Microbiology*	S	3
CSES/ENSC 4314	Water Quality	S	3
CSES/FREC 4334	Agroforestry	F	3
CSES/ENSC 4444	Managed Ecosystems, Ecosystem Services, and Sustainability	S	3
CSES 4644	Land-Based Systems for Waste Treatment	F	3
CSES/CHEM/ENSC 4734	Environmental Soil Chemistry	S	3
CSES/ENSC 4764	Bioremediation	F	3
ECON 4014	Environmental Economics*	F	3
ENGL 3534	Literature and Ecology[1a or 2]	F	3
ENSC 3604	Fundamentals of Environmental Science[7]	F	3
ENSC/CSES 3634	Physics of Pollution	F	3
ENSC/CSES 4774	Reclamation of Drastically Disturbed Lands	F	3
ENSC/CSES 4854	Wetland Soils and Mitigation	F	3
ENT 2004	Insects and Human Society[4]	F	3
ENT/PPWS 4264	Pesticide Usage	S	3
ENT/BIOL 4354	Aquatic Entomology*	S	4
ENT/BIOL/FIW 4484	Freshwater Biomonitoring*	F	4
FIW 2114	Principles of Fisheries and Wildlife Sciences[4]	S, Summer	3
FIW 2234	Fishing, Fish, and Conservation	F	3
FIW 4614	Fish Ecology	S	3
FREC 2004	Forest Ecosystems[4]	S	3
FREC 2114	Ecology of Appalachian Forests[4]	F	3
FREC 2124	Forests, Society and Climate[3 or 4]	S	3
FREC/LAR 2554	Leadership for Global Sustainability[2 or 3]	F	3
FREC/WATR 3104	Principles of Watershed Hydrology	S	3
FREC 3604	Climate Science	S	3
FREC 3754	Watersheds and Water Quality Monitoring	F	3
GEOG 3104	Environmental Problems, Population, & Development[3]	S	3
GEOG 4204	Geography of Resources	F	3
GEOS 2104	Elements of Geology	F	3
GEOS 3014	Environmental Geosciences	F	3
GEOS 3034	Oceanography	S	3
GEOS 4634	Environmental Geochemistry	F	3
GEOS 4804	Groundwater Hydrology	F	3
HIST 3144	American Environmental History[2 or 3]	F	3
HORT/FREC 2134	Plants & Green Space in Urban Communities[4]	F	3
LAR 3154	Watershed Sensitive Site Design and Construction	F	3
LAR 4034	Evolution of the American Landscape[1a or 2]	S	3
PHIL 2304	Global Ethics[2]	F, O	3
PSYC 3024	Environmental Psychology[3,7]	F	3
RED 4604	Housing, Energy, and the Environment[3,7]	S	3
SBIO 2124	Structure and Properties of Sustainable Biomaterials	F	3
SBIO 2504	Circular Economy Analytics[5a]	F	3
SBIO/FREC 2784	Global Forest Sustainability	F	3
SBIO 3004	Sustainable Nature-Based Enterprise	F	3
SBIO 3114	Biodeterioration, Bioconversion, and Bioenergy	F	3

SBIO 3324	Green Building Systems	F	3
SBIO 3434	Chemistry and Conversion of Sustainable Biomaterials	S	3
SBIO 3444	Sustainable Biomaterials and Bioenergy	S	3
SBIO 3454	Society, Sustainability Biomaterials and Energy	S	3
SBIO 3554	Sustainable Biomaterials Enterprises	S	3
SBIO 4444	Sustainable Biomaterial Composites	F	4
SPIA 4454	Future of Cities[3 or 6a, 6d]	S	3
STS 2454	Science, Technology, and Environment[2]	F	3
STS 3334	Energy and Society[2 or 3]	F	3
UAP/PSCI 3344	Global Environmental Issues	F	3
UAP 3354	Introduction to Environmental Policy and Planning	F	3
UAP 4374	Land Use & Environment: Planning and Policy	F	3
UAP 4394	Community Renewable Energy Systems	S	3
UAP 4854	Planning of the Urban Infrastructure	S	3
TOTAL INTERDISCIPLINARY ELECTIVE HOURS			**6**

FOOTNOTES:
[t]These courses count either as a Core Requirement or Engineering Elective, but not both
*Prerequisites and non-major enrollment restrictions are particularly limiting for these courses for non-majors

[1a] Pathways Concept 1a - Discourse
[2] Pathways Concept 2 - Critical Thinking in the Humanities
[3] Pathways Concept 3 - Reasoning in the Social Sciences
[4] Pathways Concept 4 – Reasoning in the Natural Sciences
[5] Pathways Concept 5 – Quantitative & Computational Thinking
[6a] Pathways Concept 6a – Critique and Practice in Design and the Arts
[7] Pathways Concept 7 – Critical Analysis of Identity and Equity in the US

Semester Designations:
F - Fall Course
S - Spring Course
O – Online Course

GENERAL NOTES:
- Many courses that count toward the minor have prerequisites. Please consult the University Course Catalog or check with your Academic Advisor.
- Confirm the semester information above since these change and some classes are not offered every 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*, Website – *www.eng.vt.edu/green*)