

College of Engineering
VIA DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
Degree: Bachelor of Science in Civil Engineering (BSCE)
Major: Civil Engineering
For Students Entering Under UG Catalog 2023-2024
Credits Required for Graduation: 128

FALL SEMESTER FIRST YEAR		Credits	SPRING SEMESTER FIRST YEAR		Credits
CHEM 1035 General Chemistry (C-) [#] Pre: Eligible to enroll	3		ENGL 1106 First-Year Writing Pre: ENGL 1105	3	
CHEM 1045 General Chemistry Lab (C-) [#] Co: CHEM 1035	1		MATH 1226 Calculus of a Single Variable (C-) [#] Pre: MATH 1225 (C-)	4	
ENGL 1105 First-Year Writing	3		PHYS 2305 Foundations of Physics with lab (C-) [#] Pre: MATH 1225 or MATH 1226; Co: MATH 1226	4	
MATH 1225 Calculus of a Single Variable (C-) Pre: Eligible to enroll	4		ENGE 1216 Foundations of Engineering~ (C-) [#] Pre: ENGE 1215	2	
ENGE 1215 Foundations of Engineering~	2		Pathways Concept 2, 3, 6a or 7	3	
Pathways Concept 2, 3, 6a or 7	3				
TOTAL	16		TOTAL	16	
FALL SEMESTER SECOND YEAR		Credits	SPRING SEMESTER SECOND YEAR		Credits
ESM 2104 Statics~ (C-) [#] Pre: MATH 1226. Co: MATH 2204 or MATH 2204H or MATH 2406H.	3		ESM 2204 Mechanics of Deformable Bodies~ (C-) [#] Pre: (ESM 2104 or ESM 2114), (MATH 2204 or MATH 2204H)	3	
MATH 2114 Introduction to Linear Algebra~ Pre: MATH 1225 (min grade of B) or MATH 1226	3		MATH 2214 Differential Equations~ Pre: (MATH 2114 or MATH 2114H or MATH 2405H), MATH 1226	3	
MATH 2204 Multivariable Calculus~ Pre: MATH 1226	3		GEOS 2104 Elements of Geology (C-) [#] Pre: none	3	
CEE 2804 Introduction to Civil and Environmental Engineering (C-) [#] . Pre: none	3 ^[F]		CEE 2814 Civil and Environmental Engineering Measurements with lab ⁽¹⁾ (C-) [#] . Pre: (ENGE 1216 or ENGE 1414 or BC 1224), MATH 1226. Co: CEE 2834	4 ^[F,S]	
CEE 2834 Civil Engineering Drawings and Virtual Modeling ⁽¹⁾ (C-) [#] . Pre: none	3 ^[F,S]		CEE 3804 Computer Applications for Civil and Environmental Engineers (C-) [#] Pre: none	3 ^[F,S]	
TOTAL	15		TOTAL	16	
FALL SEMESTER THIRD YEAR		Credits	SPRING SEMESTER THIRD YEAR		Credits
CEE 3304 Fluid Mechanics for Civil and Environmental Engineering with lab Pre: ESM 2104, CEE 2804	4 ^[F,S]		CEE 3814 Analytics in CEE ⁽¹⁾ Pre: CEE 3804	3 ^[F,S]	
ISE 2014 Engineering Economy~ Pre: none	2 ^[F,S]		CEE Fundamental Program Elective with Lab ⁽¹⁾	4 ^[F,S]	
CEE Fundamental Program Elective with Lab ⁽¹⁾	4 ^[F,S]		CEE Fundamental Program Elective ⁽¹⁾	3 ^[F,S]	
CEE Fundamental Program Elective ⁽¹⁾	3 ^[F,S]		CEE Fundamental Program Elective ⁽¹⁾	3 ^[F,S]	
Pathways Concept 2, 3, 6a or 7	3		CEE 4804 Professional and Legal Issues in Civil Engineering Pre: CEE 2804; Co: CEE 3304.	3 ^[F,S]	
TOTAL	16		TOTAL	16	
FALL SEMESTER FOURTH YEAR		Credits	SPRING SEMESTER FOURTH YEAR		Credits
CEE Fundamental Program Elective ⁽¹⁾	3 ^[F,S]		CEE Advanced Program Elective-Design Project. If 4 cr. course taken, reduce Restricted Electives by 1 credit	3	
CEE Advanced Program Elective	3				
CEE Advanced Program Elective	3		CEE Advanced Program Elective	3	
Technical Elective. If 4 cr. course taken, reduce Restricted Electives by 1 credit.	3		Technical Elective. If 4 cr. course taken, reduce Restricted Electives by 1 credit.	3	
Restricted Elective	3		Restricted Elective	3	
Pathways Concept 2, 3, 6a or 7	3		Pathways Concept 2, 3, 6a or 7	3	
TOTAL	18		TOTAL	15	

General Information about Checksheet: Superscripts [F,S,SI,SI] in the Credits column indicates semesters when a CEE course is known to be offered. However, course offerings are subject to change and the availability of sufficient resources. Some CEE Advanced Program and Technical Elective courses are not offered each academic term. Students must confirm course offerings in advance with their CEE Advisor.

C- policy: A C- or better grade is required in any course that is a prerequisite for a course with a CEE designator. The notation (C-)[#] is provided for first and second-year advising purposes only and indicates that those courses are prerequisites for a course with a CEE designator. The (C-)[#] notation is not shown in subsequent years. Students must verify C- policy requirements for all planned courses.

⁽¹⁾Indicates a degree core requirement. Note: Six of the eight Fundamental electives partially satisfy degree core requirements.

~ See Additional Checksheet Comments on p. 5.

Pathways to General Education				
Consult: https://www.pathways.prov.vt.edu/about/pathways-guides.html for courses. Pathways courses must be completed prior to graduation.				
Pathways Concept 1: Discourse (9 credits)	<i>Foundational:</i> ENGL 1105	(3)	<i>Foundational:</i> ENGL 1106	(3)
	<i>Advanced:</i> CEE 2804+3304+4804			(3)
Pathways Concept 2: Critical Thinking in the Humanities (6 cr)		(3)		(3)
Pathways Concept 3: Reasoning in the Social Sciences (6 cr)		(3)		(3)
Pathways Concept 4: Reasoning in the Natural Sciences (7 cr)	PHYS 2305	(4)	CHEM 1035	(3)
Pathways Concept 5: Quantitative and Computational Thinking (11 cr): Minimum 3 cr. foundational and 3 cr. advanced.	<i>Foundational:</i> MATH 1225	(4)	<i>Advanced:</i> MATH 1226	(4)
	<i>Foundational or Advanced:</i> CEE 3804			(3)
Pathways Concept 6: Critique and Practice in Design and the Arts (6 cr)	Arts:			(3)
	<i>Design:</i> ENGE 1215 + ENGE 1216 or ENGE 1414			(3)
Pathways Concept 7: Critical Analysis of Identity & Equity in the US	Pathways 7 should be double-counted with either a Pathways 2, 3 or 6A course to avoid taking any additional credit hours.			(3)

<p>CEE Electives: The CEE department requires 44 credits of Program, Technical, and Restricted Elective courses broken down as follows:</p> <ol style="list-style-type: none"> 12 credits of CEE Fundamental Program Elective courses from the list on p. 3 8 credits of CEE Fundamental Program Elective courses with Lab from the list on p. 3 9 credits of CEE Advanced Program Elective courses from the list on p. 3 3 credits of CEE Advanced Program Elective course—Design Project from the list on p. 3 6 credits of Technical Electives selected from Fundamental and Advanced electives courses in the lists on p. 3 6 credits of Restricted Electives. <p>A. Program Electives—32 credits (C- policy applies)</p> <p>Program Electives consist of both Fundamental and Advanced courses arranged to provide adequate breadth across the discipline and depth of knowledge in specialty areas of interest. <i>Interdisciplinary Technical Elective courses do not satisfy these requirements but may be taken in B.</i></p> <p>Program Electives are selected from the lists on p. 3 and must meet the following criteria:</p> <ol style="list-style-type: none"> 1. Complete <i>Fundamental courses</i> in 6 of the 8 specialty areas, at least two of which must have a lab (20 credits). These courses count toward satisfying degree core requirements. 2. Complete 1 <i>Advanced course</i> in 3 of the 6 specialty areas in which Fundamental courses were selected in Step 1 (9 credits). 3. Complete an additional <i>Advanced course</i> in 1 of the 3 specialty areas in which advanced courses were selected in Step 2 (3 credits). 4. Within selections made in the above steps, complete at least one of the following <i>Design Project</i> courses: CEE 3434 (4 credit course. Reduce Restricted Electives by 1-credit if taken), 4014, 4104, 4274, 4334, 4544, 4654, or 4664. <p>B. Technical Electives—6 credits (C- policy applies)</p> <p>Technical Electives are selected from any of the courses listed on p. 3. This includes Fundamental, Advanced, and Interdisciplinary Technical Electives. Note: if a 4-credit course is taken, reduce Restricted Electives by 1 credit.</p> <p>C. Restricted Electives—6 credits. Restricted Electives (non-CEE) can be satisfied in one of the following ways:</p> <ol style="list-style-type: none"> 1. Complete 6 credits of courses from the list of approved courses on p. 4. All courses 3 credits unless noted otherwise. 2. <i>Complete</i> one of the approved minors listed on p. 5.

Fundamental (20 credits), Advanced (12 credits) and Technical Elective (6 credits) courses. See instructions under **A** and **B** on p. 2. C- policy applies. Courses in **bold font** are *Design Project* courses. Courses are 3 cr. unless noted.

<i>Construction Engineering and Management</i>	<i>Structural Engineering and Materials</i>
CEE 3014 Construction Management. (Fundamental) <i>Pre: Junior standing</i>	CEE 3404 Intro. to Structural Engineering. (Fundamental) <i>Pre: ESM 2204</i>
CEE 4014 Est, Prod & Cost Engr. <i>Pre: 3014</i>	CEE 3424 Reinforced Concrete Structures I. <i>Pre: (3404, 3684) or BC 2044</i>
CEE 4024 Const Control Tech. <i>Pre: 3014</i>	CEE 3434 Design of Steel Structures I (4cr). <i>Pre: (3404, 3684) or BC 2044</i>
CEE 4034 Smart Sustainable Infrastructure. <i>Pre: 3804</i>	CEE 4404 Intermediate Struct Analysis. <i>Pre: 3404</i>
CEE 4074 Const Means & Methods. <i>Pre: 3014 or CEM 2104</i>	CEE 4454 Masonry Structural Design. <i>Pre: 3684, 3424</i>
<i>Environmental Engineering</i>	<i>Materials</i>
CEE 3104 Intro to Environmental Engineering. (Fundamental) <i>Pre: (CHEM 1035, CHEM 1045), (MATH 1026 or MATH 1226 or MATH 2016 or MATH 2024), (PHYS 2305 or PHYS 2205)</i>	CEE 3684 Civil Engineering Materials, with Lab, 4 cr. (Fundamental). <i>Pre: (CHEM 1035, CHEM 1045), ESM 2204, CEE 2814, GEOS 2104</i>
CEE 4104 Water & Wastewater Design. <i>Pre: 3104</i>	CEE 4610 (ESM 4044) Mech. Composite Materials. <i>Pre: ESM 2204 or AOE 2024/P</i>
CEE 4114 Fund Public Health Engineering. <i>Pre: 3104</i>	CEE 4614 Concrete Materials. <i>Pre: 3684 or BC 2044</i>
CEE 4134 Sustainable Systems. <i>Pre: Senior standing</i>	CEE 4634 Infrastructure Condition Assessment. <i>Pre: 3684</i>
CEE 4144 Air Resources Engineering. <i>Pre: 3104</i>	CEE 4664 Pavement Design. <i>Pre: 3684</i>
CEE 4174 Solid & Haz Waste Mgt. <i>Pre: 3104</i>	
<i>Land Development</i>	<i>Geotechnical Engineering</i>
CEE 3274 Intro to Land Development. (Fundamental) <i>Pre: 2814, 2834</i>	CEE 3514 Intro to Geotechnical Engineering with Lab. 4 cr. (Fundamental) <i>Pre: GEOS 2104, ESM 2204</i>
CEE 4264 Sustainable Land Development. <i>Pre: 3274</i>	CEE 4514 Methods in Geotechnical Engineering. <i>Pre: 3514</i>
CEE 4274 Land Development Design. <i>Pre: 3274</i>	CEE 4534 Earth Pressures & Foundation Structures. <i>Pre: 3514</i>
CEE 4284 Advanced Land Development Design. <i>Pre: 3274, Co: 4274</i>	CEE 4544 Design of Earth Structures. <i>Pre: 3514</i>
	CEE 4564 Intro to Coastal Marine Geotechnics. <i>Pre: 3514</i>
<i>Water Resources Engineering</i>	<i>Transportation Engineering</i>
CEE 3314 Water Resources Engineering with Lab. 4 cr. (Fundamental) <i>Pre: 3304</i>	CEE 3604 Intro to Transportation Engineering (Fundamental). <i>Pre: Junior standing</i>
CEE 4304 Hydrology. <i>Pre: 3304</i>	CEE 4604 Traffic Engineering. <i>Pre: 3604</i>
CEE 4314 Groundwater Resources. <i>Pre: 3304</i>	CEE 4624 Planning Transportation Facilities. <i>Pre: 3604</i>
CEE 4324 Open Channel Flow. <i>Pre: 3314</i>	CEE 4654 Geometric Design of Highways. <i>Pre: 3604</i>
CEE 4334 Hydraulic Structures. <i>Pre: 3314</i>	CEE 4674 Airport Planning and Design. <i>Pre: 3604</i>
CEE 4344 Water Resources Planning. <i>Pre: Senior standing</i>	CEE 4684 Transportation Safety. <i>Pre: 3604</i>
CEE 4384 Coastal Engineering. <i>Pre: 3304</i>	CEE 4694 Freight Operations. <i>Pre: 3604</i>
CEE 4394 Urban Water Sustainability.	
<i>Interdisciplinary Technical Electives*</i>	<i>5000-Level Advanced Electives</i>
CEE 4554 Natural Disasters. <i>Pre: Senior Standing</i>	Students in their senior year, with a 3.0 or better GPA, may enroll in 5000-level courses to satisfy undergraduate degree requirements with instructor permission.
CEE 4824 Intro to Forensic Engineering. <i>Pre: ESM 2204, 3684</i>	
CEE 4844 BIM and Integrated Practices. <i>Pre: Senior standing</i>	
CEE 4834 Cyber Phys. and Remote Sensing in CEE. <i>Pre: 3814 or BSE 3144</i>	
CEE 4974 Independent Study.	
CEE 4994 Undergraduate Research.	

*These courses do not satisfy Program Elective requirements but may be taken as Technical Electives.

Restricted Electives (6 credits). See **C** on p. 2 for instructions. Note: Enrollment restrictions apply to some courses.

Computer Science	Engineering Mechanics and Materials
CS 1044 Intro to Programming in C. <i>Pre: none. Not for students planning to major or minor in CS.</i>	ESM 3054 (MSE 3054) Mech Behavior of Materials. <i>Pre: ESM 2204, (MSE 2034 or MSE 2044 or MSE 3094 or AOE 3094 or CEE 3684)</i>
CS 1064 Intro to Programming in Python. <i>Pre: None</i>	ESM 2304 Dynamics. <i>Pre: (ESM 2104 or 2114), (MATH 2204 or MATH 2204H). Co: MATH 2214</i>
CS 1114 Introduction to Software Design. <i>Pre: None</i>	AOE 4054 (ESM 4444) Stability of Structures. <i>Pre: AOE 2024 or AOE 3024 or CEE 3404</i>
CS 2064 Intermediate Programming in Python. <i>Pre: CS 1064</i>	MSE 2034 Elements of Materials Engineering. <i>Pre: CHEM 1035. Co: PHYS 2305</i>
Public Policy and Planning	MSE 4304: Metals and Alloys. <i>Pre: MSE 2034 or MSE 2044. Enrollment is on a space-available basis during drop add.</i>
SPIA 2244 (GEOG 2244) Sustainable Urbanization. <i>Pre: none, Fee required.</i>	SBIO 2124 Structure and Properties of Sustainable Biomaterials. <i>Pre: BIOL 1005, CHEM 1035</i>
SPIA 2314 (HNFE 2314) Active Transportation for a Healthy, Sustainable Planet. <i>Pre: None</i>	SBIO 3324 Green Building Systems. <i>Pre: none</i>
SPIA 2554 Collaborative Policy-Making & Planning. <i>Pre: None</i>	SBIO 4314 (CEM 4314) (CNST 4314): Design of Wood Structures. <i>Pre: SBIO 3314 or CEE 3404</i>
SPIA 3554 Transdisciplinary Problem Solving for Social Issues. <i>Pre: None</i>	SBIO 4714 Performance of Sustainable Biomaterials in Buildings. <i>Pre: SBIO 2124</i>
SPIA 3704 Urban Contention and Mobilization. <i>Pre: None</i>	ISE 3204 Manufacturing Processes. <i>Pre: ENGE 1216 (Min grade C-) or ENGE 1414 (Min grade C-). Enrollment is on a space-available basis during drop add.</i>
SPIA 4454 Future of Cities. <i>Pre: None</i>	Statistics and Math
SPIA 4464 Data and The Art of Policy-Making and Planning. <i>Pre: None</i>	MATH 3414 (CS 3414): Numerical Methods. <i>Pre: (CS 1044 or CS 1705 or CS 1114 or CS 1124), MATH 2406H or (CMDA 2005, CMDA 2006) or (MATH 2214 or MATH 2214H), (MATH 2204 or MATH 2204H)</i>
UAP 3014 Urban Policy and Planning. <i>Pre: UAP 1024 (Min grade B-)</i>	MATH 4564 Operational Methods for Engineers. <i>Pre: (MATH 2214 or 2214H) or MATH 2406H or CMDA 2006</i>
UAP 3024 Urban and Regional Analysis. <i>Pre: None</i>	STAT 4604 Statistics for Engineers. <i>Pre: MATH 1206 or MATH 1226</i>
UAP 3224 Policy Implementation. <i>Pre: UAP 3014 (Min grade B-), STAT 3604 (Contact UAP Undergrad. Advisor during drop add to enroll)</i>	Basic and Applied Science
Real Estate	BIOL 1105 Principles of Biology. <i>Pre: none</i>
AAEC 4754 Real Estate Law. <i>Pre: Junior standing</i>	CHEM 1036 General Chemistry. <i>Pre: CHEM 1035 or CHEM 1055 or CHEM 1055H</i>
UAP 2004 (REAL 2004) Principles of Real Estate. <i>Pre: None</i>	PHYS 2306 Foundations of Physics (4cr). <i>Pre: (MATH 1206, or MATH 1206H, or MATH 1226), PHYS 2305</i>
Sustainability, Environment, Climate Change	GEOS 3014. Environmental Geosciences. <i>Pre: None</i>
AAEC 3314 Environmental Law. <i>Pre: None</i>	GEOS 3304 (CSES 3304) (GEOG 3304) Geomorphology. <i>Pre: GEOG 1104 or GEOS 1004 or GEOS 2104 or GEOS 2024.</i>
BSE 3324 - Small Watershed Hydrology. <i>Pre: PHYS 2305</i>	GEOS 4634: Environmental Geochemistry. <i>Pre: MATH 1225, CHEM 1035.</i>
CEM 3074 Global Design and Construction for Sustainable Development. <i>Pre: Junior Standing preferred</i>	GEOS 4824 Engineering Geology. <i>Pre: (GEOS 1004 or GEOS 2024 or GEOS 2104), (PHYS 2305 or PHYS 2205), (MATH 1225 or MATH 1025), (CHEM 1035 or CHEM 1015)</i>
FREC 2124 Forests, Society and Climate. <i>Pre: none</i>	GIS
FREC 4464 (WATR 4464) (AAEC 4464) Water Resources Policy & Economics. <i>Pre: AAEC 1005 or ECON 2005</i>	GEOG 2084 Principles of GIS. <i>Pre: None</i>
FREC 4784 Wetland Hydrology and Biogeochemistry. <i>Pre: None</i>	Business, Management and Economics
ENGR 3124 Green Engineering. <i>Pre: None. Restricted to those in Green Engineering Minor until drop/add.</i>	AAEC 2104 Personal Financial Planning. <i>Pre: None</i>
ENGR 4134 Engineering Life Cycle Assessment. <i>Pre: ENGR 3124.</i>	AAEC 3324 Environment and Sustainable Development Economics. <i>Pre: AAEC 1005 (MIN grade of P) or AAEC 1006 (MIN grade of P) or ECON 2005 (MIN grade of P)</i>
MINE 2114 Energy and Raw Materials: Geopolitics and Sustainable Development. <i>Pre: None</i>	ECON 2005 Principles of Economics. <i>Pre: None</i>
SBIO 2504 Circular Economy Analytics for Sustainable Systems. <i>Pre: MATH 1225 or MATH 1524 or MATH 1535 or MATH 1525</i>	ECON 2006 Principles of Economics. <i>Pre: ECON 2005</i>
UAP 3354 Introduction to Environmental Policy and Planning. <i>Pre: None</i>	ISE 4304 Global Issues in Industrial Management. <i>Pre: None. Enrollment is on a space-available basis during drop add.</i>
UAP 4374 Land Use and Environment: Planning and Policy. <i>Pre: None</i>	

Approved Minors. The required 6 credits of Restricted Electives can be satisfied by <i>completing</i> one of the minors listed below. Minor checksheets located under “Minors” at https://www.registrar.vt.edu/graduation-multi-brief/checksheets.html	
Business (BUSR)	Green Engineering** (GREN)
Construction (BCMN)	Industrial Design (IDS)
Computer Science (CS)	Innovation (INNO)
Data and Decisions (DTDC)	Mathematics (MATH)
Economics (ECAS)	Professional and Technical Writing (PTW)
Engineering Science & Mechanics (ESM)	Public and Urban Affairs (PUA)
Entrepreneurship – New Venture Growth (ENVG)	Real Estate (REAL)
Environmental Policy & Planning (EPP)	Smart and Sustainable Cities (SSC)
Geographic Information Science (GIS)	Statistics (STAT)
Geosciences (GEOS)	Watershed Management (WSM)

**Note: Electives choices in the GREN minor must include 6 credits of non-CEE courses that do not also satisfy BSCE degree requirements.

Change of Major Requirements: Please see https://eng.vt.edu/em
Foreign Language Requirements: Students must have completed two years of a foreign language in high school or one year at the college level (6 credit hours) of the same language. College-level credits used to meet this requirement do not count towards the degree.
Satisfactory Progress Towards Degree: University Policy 91 outlines university-wide minimum criteria to determine if students are making satisfactory progress towards the completion of their degrees. The CEE Department fully supports this policy. Specific expectations for satisfactory progress for Civil Engineering majors are as follows: <ul style="list-style-type: none"> • Each student must meet the minimum University-wide criteria as described in Policy 91 and summarized in the Undergraduate Catalog (https://www.undergradcatalog.registrar.vt.edu). • A 2.0 overall GPA and a 2.0 in-major GPA must be maintained for continued enrollment in CEE. The in-major GPA consists of all courses taken with a CEE designator. • Upon completion of 64 GPA hours, a student must have satisfactorily completed CEE 2804, CEE 2814, and CEE 2834. • Be enrolled in at least one 3-credit CEE course each fall and spring semester.
*Prerequisites: Some courses on this checksheet have pre-/corequisites; please consult the University Course Catalog (https://www.undergradcatalog.registrar.vt.edu), or check with your advisor for the most current pre-requisites. There are no hidden pre-requisites in the program of study.
Graduation Requirements. Specific graduation requirements include the following: Students must pass all required courses and both the in-major and overall GPA must be at least 2.0 for graduation. The in-major GPA consists of all courses taken under the CEE designation.
~ Additional Checksheet Comments <ul style="list-style-type: none"> • ENGE 1414 (4 cr) may be substituted for ENGE 1215 (2 cr) + ENGE 1216 (2 cr) • MATH 2405H (5 cr) may be substituted for MATH 2114 (3 cr) • MATH 2405H (5 cr)+MATH 2406H (5 cr) may be substituted for MATH 2114 (3 cr)+MATH 2204 (3 cr)+MATH 2214 (3 cr) • ESM 2114 (3 cr) may be substituted for ESM 2104 (3 cr) • ME 3024 (3 cr) may be substituted for ISE 2014 (2 cr) • ESM 2114 (3 cr) + AOE 2024 (3 cr) may be substituted for ESM 2104 (3 cr) and ESM 2204 (3 cr)

Approved by the CEE Curriculum Committee: 29 November 2022