COLLEGE OF ENGINEERING
THE MYERS-LAWSON SCHOOL OF CONSTRUCTION
DEGREE: BACHELOR OF SCIENCE IN CONSTRUCTION ENGINEERING AND MANAGEMENT (BSCEM)
MAJOR: CONSTRUCTION ENGINEERING AND MANAGEMENT (CEM)
For students entering under UG Catalog 2023-2024
CREDITS REQUIRED FOR GRADUATION: 131

FALL SEMESTER FIRST YEAR	Credits	SPRING SEMESTER FIRST YEAR	Credits
CHEM 1035 General Chemistry **(C-)** *Pre: Eligible to enroll, Co: MATH 1025 or MATH 1225 (Pathway 4)*	3	ENGE 1216 Foundations of Engineering **(C-)** *Pre: ENGE 1215 (C-) (Pathway 6d)*	2
CHEM 1045 General Chemistry Lab **(C-)** *Co: CHEM 1035 (Pathway 4)*	1	ENGL 1106 First-Year Writing *Pre: ENGL 1105 (Pathway 1f)*	3
ENGE 1215 Foundations of Engineering **(C-)** *(Pathway 6d)*	2	MATH 1226 Calculus of a Single Variable **(C-)** *Pre: MATH 1225 (C-) (Pathway 5f)*	4
ENGL 1105 First-Year Writing *(Pathway 1f)*	3	MATH 2114 Introduction to Linear Algebra *Pre: MATH 1225 (B) or MATH 1226*	3
MATH 1225 Calculus of a Single Variable **(C-)** *Pre: Eligible to enroll (Pathway 5f)*	4	PHYS 2305 Foundations of Physics *Co: 2325 or (MATH 1206 or MATH 1206H or MATH 1226), Pre: (MATH 1205 or MATH 1205H or MATH 1225) or (MATH 1206H or MATH 1226) (Pathway 4)*	4
Pathway 2	3		
TOTAL	**16**	**TOTAL**	**16**

FALL SEMESTER SECOND YEAR	Credits	SPRING SEMESTER SECOND YEAR	Credits
CEM 2104 Introduction to CEM **(C-)** *(Pathway 1a)*	3	BC 2114 IT in Design & Construction *Pre: BC 1224 or CEM 2104*	3
CEM 2404[1] Construction Project Documents	1	CEM 2824[1] Construction Site Analysis **(C-)** *Co: CEM 2104 (C-) or BC 1224 (C-) or CEE 2834 (C-)*	3
ESM 2104 Statics *Pre: MATH 1226 Co: MATH 2204 or MATH 2204H or MATH 2406H*	3	CEE 4074[1] Construction Engineering Means & Methods *Pre: CEM 2104 (C-) or CEE 3014 (C-)*	3
GEOS 2104 Elements of Geology **(C-)**	3	ESM 2204 Mechanics of Deformable Bodies **(C-)** *Pre: (ESM 2104 or ESM 2114), (MATH 2224 or MATH 2224H or MATH 2204 or MATH 2204H)*	3
MATH 2204 Intro Multivariable Calculus *Pre: MATH 1226*	3	MATH 2214 Intro Differential Equations *Pre: (MATH 1114 or MATH 2114 or MATH 2114H or MATH 2405H or ISC 2105), MATH 1226 (Pathway 5a)*	3
ECON 2005 Principles of Economics (Pathway 3)	3	Pathways 2, 7	3
TOTAL	**16**	**TOTAL**	**18**

FALL SEMESTER THIRD YEAR	Credits	SPRING SEMESTER THIRD YEAR	Credits
BC 3114 Building Systems Technology *Pre: (BC 2024, PHYS 2305) or (CEM 2104, PHYS 2305)*	3	BC 3064 Integrated Construction II *Pre: (CEM 2104, BC 3114, PHYS 2305) or (BC 2064, BC 3114, PHYS 2305)*	3
CEE 3404[1] Introduction to Structural Engineering* *Pre: ESM 2204 (C-)*	3	CEE 3514[1] Intro to Geotechnical Engr* *Pre: ESM 2204 (C-), GEOS 2104 (C-)*	4
CEE 3684[1] CEE Materials* *Pre: CHEM 1035 (C-), CHEM 1045 (C-), ESM 2204 (C-), (CEE 2814 (C-) or CEM 2824 (C-)), GEOS 2104 (C-)*	4	CEM 3084 Construction Economy *Pre: CEM 2104 or BC 2024 (Pathway 1a)*	3
CEM 3024[1] Construction Estimating & Scheduling *Pre: CEM 2104 (C-)*	3	CEM/BC 3134[1] Temporary Structures in Construction *Pre: CEE 3684 or (BC 2044, BC 2024)*	3
ECON 2006 Principles of Economics *Pre: ECON 2005 (Pathway 3)*	3	Technical Elective	3
TOTAL	**16**	**TOTAL**	**16**

FALL SEMESTER FOURTH YEAR	Credits	SPRING SEMESTER FOURTH YEAR	Credits
BC 4064 Integrated Construction III *Pre: BC 3064*	3	CEM 4024[1] Construction Law & Contract Administration *Pre: Senior Standing*	3
CEM 4445[1] CEM Capstone I *Pre: BC 3064, Senior Standing Co: BC 4064*	3	CEM 4446 CEM Capstone II *Pre: CEM 3084, CEM 4445 (Pathway 1a)*	3
Advanced Course	3	Advanced Course	3
Technical Elective	3	Technical Elective	3
Technical Elective	3	Pathways 6a	3
Technical Elective	3		
TOTAL	**18**	**TOTAL**	**15**

General Information about the Checksheet: Superscripted annotation after the course number (1) indicates core course of the degree.
***** A C- or better grade may be required in this course if it is a prerequisite for one of the advanced courses. See the list below for advanced course options and prerequisites.**

Pathways to General Education (Pathways)

Consult the pathways courses table: https://www.pathways.prov.vt.edu/about/table.html. Pathways courses need to be completed prior to graduation.

Pathways Concept 1: Discourse (6 hrs foundational, 3 hrs advanced)	*Foundational:* **ENGL 1105**	(3)	*Foundational:* **ENGL 1106**	(3)
	Advanced: **CEM 2104+3084+4446**			(3)
Pathways Concept 2*: Critical Thinking in the Humanities (6 hrs)		(3)		(3)
Pathways Concept 3: Reasoning in the Social Sciences (6 hrs)	**ECON 2005**	(3)	**ECON 2006**	(3)
Pathways Concept 4: Reasoning in the Natural Sciences (8 hrs)	**CHEM 1035+1045**	(4)	**PHYS 2305**	(4)
Pathways Concept 5: Quantitative and Computational Thinking (8 hrs foundational, 3 hrs advanced)	*Foundational:* **MATH 1225**	(4)	*Foundational:* **MATH 1226**	(4)
	Advanced: **MATH 2214**			(3)
Pathways Concept 6: Critique and Practice in Design and the Arts (3 hrs arts, 4 hrs design)	*Arts:*			(3)
	Design: **ENGE 1215**	(2)	*Design:* **ENGE 1216**	(2)
Pathways Concept 7*: Critical Analysis of Identity and Equity in the United States (3 hrs)	*Pathway 7 should be double counted with either Pathway 2 or 6a to avoid taking additional credit hours.			(3)

Advanced Courses

The CEM degree requires 6 hours of advanced courses. Advanced courses may be selected from the following list:

- CEE 3424 (3) - Reinforced Concrete Structures (Pre: (3404 (C-), 3684 (C-)) or BC 2044)
- CEE 3434 (4) - Design of Steel Structures (Pre: (3404 (C-), 3684 (C-)) or BC 2044)
- CEE 4404 (3) - Intermediate Structural Analysis (Pre: CEE 3404)
- CEE 4454 (3) - Masonry Structural Design (Pre: CEE 3684 (C-), CEE 3424 (C-))
- CEE 4514 (3) - Methods in Geotechnical Engineering (Pre: CEE 3514 (C-))
- CEE 4534 (3) - Earth Pressures and Foundation Structures (Pre: CEE 3514 (C-))
- CEE 4544 (3) - Design of Earth Structures (Pre: CEE 3514 (C-))
- CEE 4564 (3) - Introduction to Coastal and Marine Geotechnics (Pre: CEE 3514 (C-))
- CEE 4610 (ESM 4044) (3) - Mechanics of Composite Materials (Pre: ESM 2204 or AOE 2024)
- CEE 4614 (3) - Advanced Structural Concretes (Pre: CEE 3684 (C-) or BC 2044)
- CEE 4634 (3) - Infrastructure Condition Assessment (Pre: CEE 3684 (C-))
- CEE 4664 (3) - Pavement Design (Pre: CEE 3684 (C-))
- CEM/SBIO 4314 (3) – Design of Wood Structures (Pre: SBIO 3314 or CEE 3404)

Technical Electives

The CEM degree requires 15 hours of technical electives. Students can choose to focus on one area of emphasis or can pick and choose courses from multiple areas. Directed electives may be any 3000-4000 level engineering course (courses with prefix: AOE, BMES, BSE, CEE, CEM, CHE, CS, CEC, ENGE, ENGR, ESM, ISE, ME, MINE, MSE, NSEG). Electives in CEM focus areas are listed below:

Virtual Design
- BC 4114 (3) - Building Information Modeling in Design and Construction (Pre: BC 2114, CS 1014 or (ENGE 1215, ENGE 1216))
- BC 4124 (3) - Digital Construction & Manufacturing (Pre: BC 2114)
- BC 4364 (3) – LifeCycle BIM for Facility Management (Pre: BC 2114, BC 3114)

Transportation
- CEE 3604 (3) - Intro to Transportation Engineering (Pre: Junior Standing)

Technical Electives (continued)

Management

       ACIS 1004 (3) - Accounting Foundations

       CEE 3804 (3) - Computer Applications for Civil and Environmental Engineers (Pre: Junior Standing)

       ISE 4004 (3) - Theory of Organization

       MGT 3304 (3) - Management Theory and Leadership Practice (Pre: Sophomore Standing)

Risk Management & Consulting

       CEE 4814 : Risk Assessment and Reliability Analysis in Civil and Environmental Engineering (Pre: CEE 3804)

       FIN 3054 (3) - Legal and Ethical Environment of Business (Pre: Junior Standing)

Safety

       CEM 3164 (3) - Construction Health and Safety (Pre: CEM 2104)

Smart Construction

       CEM 3154 (3) - Smart Construction (Pre: BC 2114)

       ECE 3054 (3) - Electrical Theory (Pre: PHYS 2305; Co: MATH 2214)

       CEM 4624 (3) – Construction Robotics & Automation (Pre: BC 2114)

       CEM 4634 (3) - Data Analysis & Visualization for Construction & Facilities Management (Pre: (2104 or BC 2024 or CEE 3014),
              (BC 2114 or CEE 3804)

Sustainability

       CEM 3064 (3) - Intro to Lean Construction (Pre: CEM 2104)

       CEM 3074 (3) - Global Design and Construction for Sustainable Development (Pre: Junior Standing)

       ENGR 3124 (3) – Introduction to Green Engineering (Pre: (CHEM 1035 or CHEM 1074), (ENGE 1216 or ENGE 1104 or ENGE 1114),
              PHYS 2306)

       ENGR 4134 (3) – Environmental Life Cycle Assessment (Pre: ENGR 3124)

       ME/ESM 4194 (3) – Sustainable Energy Solutions for a Global Society (Senior Standing. Pre: (CHEM 1035 or CHEM 1055), PHYS
              2306)

       CEE 4134 (3) – Environmental Sustainability – A Systems Approach (Pre: Senior Standing)

Others

       CEM 4964 (1-19)^ - Field Work/Practicum

       CEM 4974 (1-19)^ - Independent Study

       CEM 4994 (1-19)^ - Undergraduate Research

       REAL/UAP 2004 (3) - Principles of Real Estate

^ Course must be taken for 3 credit hours.

Change of Major Requirements: Please see https://eng.vt.edu/em

Foreign Language Requirements: Students must have had 2 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 Myers-Lawson School of Construction fully supports this policy. Specific expectations for satisfactory progress for CEM majors are as follows:

- Each student must meet the minimum University-wide criteria as described in Policy 91 and summarized in the Undergraduate Catalog (http://www.undergradcatalog.registrar.vt.edu.)
- Upon completion of 48 hours, students must have completed CEM 2104 with a C- or better. Upon completion of 80 hours, students must have completed CEM 2824 and ESM 2204 with a C- or better and have a minimum 2.0 in-major and a minimum 2.0 overall GPA.

In-Major GPA: consists of all courses taken under the CEE, CEM and BC designation.

Statement of Hidden Prerequisites: Pre-requisites for each course are listed after the course title. The letter grade notation, such as (C-) indicates the minimum grade students must earn in the pre-requisite course. There are no hidden pre-requisites in this program of study.

Graduation Requirements: Students must pass all required courses and both the in-major and overall GPA must be at least 2.0 for graduation.