

Construction Engineering

Department Information

- **Department Location:**
Engineering Bldg 106
- **Department Phone:**
701-231-6202
- **Department Web Site:**
www.ndsu.edu/construction/ (<http://www.ndsu.edu/construction/>)
- **Credential Offered:**
B.S.Cons.E.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/construction-engineering/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/construction-engineering/>)

The construction industry is one of the largest industries in the United States. It accounts for nearly 8 percent of the nation's gross national product and employs millions of people. The industry is divided into four sectors: residential building construction, industrial construction, commercial building construction, and heavy civil construction. The Department of Construction Management and Engineering provides quality educational programs that prepare nationally competitive undergraduate and graduate students for successful careers in the construction engineering and management professions.

The Program

Construction Engineering involves the planning, design, and management of construction facilities, such as highways, bridges, airports, railroads, buildings, dams, and reservoirs. The construction of such projects requires the knowledge of engineering, management, economics, and business. Construction Engineering is differentiated from Construction Management from the standpoint of the use of math, science, and engineering to design projects and processes and analyze problems. Construction Engineering is involved in a variety of construction disciplines, including: commercial, residential, transportation, and infrastructure systems. Construction Engineers are also involved in the engineering design of temporary structures, cost estimating, planning and scheduling, material procurement, selection of equipment, and cost control. Due to their diverse skills, there is a very high demand for Construction Engineers.

The Department offers a Bachelor of Science in Construction Engineering degree which offers a blend of engineering and construction courses. The program is designed for those who want to work in the construction industry and become prepared for licensure as a professional engineer. A thorough knowledge of the physical sciences, math, and engineering is developed during the first two years followed by construction management and engineering courses. The technical side of the program is balanced with requirements in writing, humanities, social science, and communications. The Bachelor of Science in Construction Engineering degree is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<https://www.abet.org/>).

Program Educational Objectives (PEO)

Program educational objectives (PEO's) are broad statements that describe what graduates are expected to attain within a few years after graduation. Program educational objectives are based on the needs of the program's constituencies. Graduates from the Bachelor of Science in Construction Engineering program are expected to be productive construction engineers who, within the first few years after graduation:

1. Begin to serve in a middle-level project leadership role in their construction engineering career.
2. Acquire and use new knowledge and skills in the construction engineering field.
3. Be respected construction engineers who are valued by their peers, customers, and the general public for their technical expertise and ethical conduct.

Student Outcomes (SO)

The Program Educational Objectives are further connected to seven Student Outcomes (SO), developed by the Engineering Accreditation Commission of ABET, www.abet.org, (<https://www.abet.org/>) which describe what students are expected to know and be able to do by the time of graduation. These outcomes relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program. The Student Outcomes are listed below:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

4+1 PROGRAMS

Option 1: the BSConE + MCM (4+1) program provides the opportunities for current students in the Construction Engineering program to pursue the Master of Construction Management (MCM) offered by the department. Students in the Construction Engineering program have an option to obtain a Master degree through the 4+1 accelerated BSConE + MCM program, which requires at least a total of 30 semester credits. Up to 9 credits (three courses) from the Construction Engineering BS program can be double counted to the MCM program. However, these courses must be taken in the 600 or 700 level. In that sense, the interested students could accelerate the master study by shortening three courses, so they could complete the remaining 21 credits plus the completion of the master thesis and graduate in one year, while the total and design credit requirements for the technical elective courses stay the same for the Construction Engineering BS degree.

A separate application to the 4+1 programs is required. Applicants could apply their admissions at their junior year (having accumulated more than 60 credits) with an average accumulative GPA above 3.5. The review procedure for applications will follow the existing policy of master graduate student admissions.

Application procedure:

- Interested and eligible students must submit a Combined/Accelerated Program Degree Program Declaration form to the department office at <https://www.ndsu.edu/fileadmin/registrar/forms/accelerated.pdf>.
- Next, the student's academic advisor will evaluate the substitution of the graduate level courses into the undergraduate program, followed by the final review and approval from the Department Chair. A maximum of 9 graduate student credits* may be applied to the undergraduate degree.
- After receiving the necessary approvals noted above, the student will submit this form to the Graduate College and formally apply for admission to the graduate program.
- All admissions to the Graduate College will be conditional. The minimum condition is completion of the bachelor's degree prior to full standing in master's program, and maintaining a 3.0 cumulative GPA in their graduate classes.
- No undergraduate course may be counted toward a master's degree.
- Students entering the master's degree with a bachelor's degree in hand may not use courses earned as part of the bachelor's program for master's requirements, even if those courses were graduate level courses.
- Students must meet all of the requirements that would ordinarily be expected of those enrolled in the MCM program.

The graduate-level courses** that can be taken:

- CM&E 605: Construction Support Operations (instead of CM&E 405: Construction Support Operations)
- CM&E 603: Scheduling and Project Control (instead of CM&E 403: Scheduling and Project Control)
- CM&E 715: Construction Specifications and Contracts (instead of CM&E 315: Specifications and Contracts)

* Graduate tuition will be assessed for graduate credits approved for double-counting toward requirements for both undergraduate and graduate programs of study. Double-counted graduate credits count toward totals for financial aid, but are not covered under the tuition cap. Mandatory Student fees, however, are capped at 12 credits, regardless of program.

** Note: A substitution form is required for the 600/700-level courses to officially apply to the BS degree. This is submitted after they have enrolled in the class(es).

Option 2: students in the Construction Engineering program have an option to obtain a Master degree through the 4+1 accelerated BSCE or BSConE + MSCE program, which requires at least a total of 24 semester credits and 6 master thesis credits. Up to 9 credits (three courses) from the Construction Engineering BS program can be double counted to the MS program in Civil Engineering. However, these courses must be taken in the 600 or 700 level. In that sense, the interested students could accelerate the master study by shortening three courses, so that they could complete the remaining 15 credits plus the completion of the master thesis and graduate in one year, while the total and design credit requirements for the technical elective courses stay the same for the Construction Engineering BS degree.

A separate application to the 4+1 program is required. Applicants could apply their admissions at their junior year (having accumulated more than 75 credits) with an average accumulative GPA above 3.5. The review procedure for applications will follow the existing policy of master graduate student admissions.

Faculty and Staff

The Department has a group of faculty and staff members dedicated to teaching, advising and career consultation. All full-time faculty members have doctoral degrees. Many of them have professional licenses such as the Professional Engineer (PE) and/or the Certified Professional Constructor (CPC),

and have construction related working experiences both nationally and internationally. Additionally, the department has many Adjunct professors who are currently working in the construction industry in supervisory roles.

Facilities

The Department has well equipped classrooms, computer labs and teaching and research labs for its students. Classrooms used by the department are equipped with a computer, a Blackboard course management system, Internet access, a projector, a document camera, and an apple TV/AirMedia system. In addition, the department maintains a computer lab, a virtual reality lab, a concrete lab and a soils lab and shares laboratory space with the Civil and Environmental Engineering Programs for the structural, geotechnical and surveying labs. The department has the most updated modern teaching and research equipment such as GPS units, robotic total stations, drones, etc.

Career Opportunities

Construction engineering graduates are in high demand after graduation by contractors in all types of construction, from design-construction firms to large owners who have continuing construction projects. Positions available include field engineer, office engineer, project engineer, project controls engineer, superintendent and project manager. Starting salary has been between \$50,000 and \$80,000 in the recent years. Summer internships or employment in the construction industry is also available to construction engineering students.

Industry advisory council

The Industry Advisory Council (IAC) consists of 35 members who specialize in different sectors throughout the construction industry. The IAC helps the program develop the professional body of knowledge appropriate to construction management and engineering. They serve as a liaison between the construction industry and the Department. They advance and support the highest quality faculty, and educational facilities for the student enrolled in the programs. Through active participation, the IAC offers advice, counsel, and provides industry's vision for the program.

Student Organizations

There are four student organizations in the Department of Construction Management and Engineering: Associated General Contractors of America (AGC), National Association of Home Builders (NAHB), Sigma Lambda Chi (SLC), and Student Advisory Board (SAB). AGC Student Chapter competes each year at the Associated Schools of Construction Competition and the Midwest Construction Quiz Bowl. NAHB Student Chapter competes each year at the Residential Construction Management Competition. SLC is an international construction honor society. SAB provides advising and best practices to first year freshmen, and provides student feedback to the program.

Scholarship Opportunities

The AGC of North Dakota and the Fargo/Moorhead Home Builders Care Foundation (a charitable arm of the Home Builders Association of Fargo-Moorhead) offer annual scholarships to incoming freshman and outstanding existing students. In addition, many other scholarships, such as Cossette Construction Management and Engineering Scholarship, Excellence in Construction Safety Scholarship and Interstates Construction Management and Engineering Scholarship, are available to students. Students can contact the Office of Admission for more information or check the department website at https://www.ndsu.edu/construction/current_students/scholarships/.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
CM&E 111		1 CM&E 212	3
CM&E 200		3 MATH 166	4
MATH 165 (Gen Ed R Category)		4 ENGL 120 (Gen Ed C Category)	3
ENGL 110 (Gen Ed C Category)		3 CHEM 122 (Gen Ed S Category)	3
CHEM 121 (Gen Ed S Category)		3 ME 221	3
CHEM 121L (Gen Ed L Category)		1 Economics (Gen Ed B/G Category)*	3
		15	19
Sophomore			
Fall	Credits	Spring	Credits
CM&E 204		3 CM&E 240	3
Social Behavior (Gen Ed B Category)		3 PHYS 252 (Gen Ed S Category)	4
MATH 128		1 COMM 110 (Gen Ed C Category)	3

MATH 259		3	MATH 266		3
ME 222		3	ME 223		3
GEOL 105 or 106 (Gen Ed S Category)		3	Wellness (Gen Ed W Category)		2
		16			18
Junior					
Fall	Credits	Spring		Credits	
CM&E 305		3	CM&E 301		3
CM&E 380		3	CM&E 315		3
CE 309		3	CE 303		2
CE 316		3	CE 303L		1
STAT 330 (Gen Ed R Category)		3	CE 343		4
			CM&E 405		3
		15			16
Senior					
Fall	Credits	Spring		Credits	
CM&E 403		3	CM&E 489		3
4XX Technical Elective**		3	4XX Technical Elective**		3
4XX Technical Elective**		3	4XX Technical Elective**		3
ENGL 320 or 321 (Gen Ed C Category)		3	Humanities/Fine Arts (Gen Ed A Category)		3
Humanities & Diversity (Gen Ed A&D Category)		3	BUSN 431		3
ENGR 402		1			
		16			15
Total Credits: 130					

*To satisfy the Gen Ed Category B requirements, a student can choose between two options: ECON 105 plus an additional course within Category B OR ECON 201 and ECON 202. Both options satisfy the Gen Ed Category G.

** Refer to list of Construction Engineering Technical Electives (https://www.ndsu.edu/fileadmin/construction/Documents/List_of_Technical_Electives.pdf) (CE 400 Level Courses) Minimum 12 Credits)

Gen Ed Category description can be found on the General Education page (<http://catalog.ndsu.edu/academic-policies/undergraduate-policies/general-education/>).