Civil Engineering

Faculty: Bechtel (*Chair),* Al-Omaishi, Brennan, Horst, Krstic

Civil engineers plan, design, and supervise the construction of a wide variety of facilities essential to modern life. Projects include buildings, bridges, highways, mass transit systems, airports, foundations, tunnels, dams, flood controls, water and wastewater treatment plants, and offshore structures. The civil engineering program supports the following major areas of civil engineering: structural engineering, transportation engineering, water resources engineering, and geotechnical engineering. The program offers student laboratory activities in materials testing (structural), fluids measurements (water resources), and soils testing (geotechnical), CAD drafting, and surveying.

Program Educational Objectives

The civil engineering program has established the following educational objectives. These objectives outline what TCNJ civil engineers should be able to accomplish during the first few years after graduation.

- To contribute to the quality of life and protection of the environment through the practice of engineering or a related discipline;
- To become successful in their chosen career path, whether it is in the practice of engineering, in advanced studies in engineering or science, or in other complementary disciplines;
- To make progress towards leadership roles in industry or public service;
- To maintain career skills through life-long learning and be on the way towards achieving professional licensure.

Civil Engineering Program Outcomes

The program outcomes listed below are expected of all graduates of the civil engineering program. These outcomes outline what TCNJ civil engineering graduates are expected to know and be able to do at graduation. These outcomes outline the knowledge, abilities, tools, and skills the program gives the graduates to enable them to accomplish the School of Engineering educational objectives.

Civil engineering graduates will have:

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 judgements, 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 judgement to draw conclusions;
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Additionally, students will have:

- An ability to apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of science, consistent with the program educational objectives;
- An ability to conduct civil engineering experiments and analyze and interpret the resulting data;
- An ability to design a system, component, or process in more than one civil engineering context;
- An ability to explain basic concepts in management, business, public policy, and leadership;
- An ability to apply knowledge of four technical areas appropriate to civil engineering;
- An ability to explain the importance of professional licensure.

Academic Policies and Standards

A student may repeat any course without seeking approval. However, if a student wishes to repeat a course more than once, permission must be obtained from the chair of the department or coordinator of the program of study and, if appropriate, the chair of the department offering the course. Permission to repeat a major course more than once will be granted only in cases of extreme extenuating circumstances, e.g., illness, financial, etc. When an engineering course is repeated, only the most recent earned grade is counted in the grade point average, although all grades earned will appear on the student's transcript.

Seniors pursuing a bachelor of science degree in civil engineering are required to take the Fundamentals of Engineering Examination for the Professional Engineer's License prior to graduation.

Program Entrance, Retention, and Exit Standards

Every major program at the College has set standards for allowing students to remain in that program, to transfer within the College from one program to another, and to graduate from a program. The following are the standards for engineering majors. Minimum grades are noted in parentheses.

1. Retention in the engineering programs is based on the following performance standards in these "critical content courses": PHY 201 (C–); MAT 127 (C–), MAT 128 (C-). A student who does not achieve these minimum performance standards, earns a grade of F, and/or has a cummulative GPA of less than 2.0 will be placed on the Engineering Programs Retention List. Placement on the Retention List for two consecutive semesters or three non-consecutive semesters will result in dismissal from the major. Students dismissed from the major may appeal for re-entry into the major.

2. To ensure academic success, first year, sophomore, and first-semester junior students will not be permitted to take more than 4.5 course units unless they have a GPA of 2.75 or greater. Upper class students can register for 5.5 course units if they are in good academic standing.
3. Entrance (internal transfer) into the engineering programs from another program within the College is based upon the following performance standards in these "foundation courses": PHY 201 (C); MAT 127 (C). Internal transfer within engineering programs will be considered as long as enrollment limits are not exceeded.
4. Graduation requires an in-major cummulative GPA of 2.0.

Bachelor of Science in Civil Engineering

First Year

Fall

ECO 101	Principles of Microeconomics	1 course unit
ENG 144	Fundamentals of Engineering Design &	
CIV 145	Introduction to Civil Engineering	
or		
CSC 217	Computer Science I for Science and Engineering	1 course unit
ENG 095	Introduction to Engineering	0 course unit
ENG 091	Engineering Seminar I	0 course unit
FYS	First Year Seminar	1 course unit
MAT 127	Calculus A	1 course unit
PHY 201	General Physics I	1 course unit

Spring

CHE 201	General Chemistry I	1 course unit
CSC 217	Computer Science I for Science and Engineering	
or		
ENG 144	Fundamentals of Engineering Design &	
CIV 145	Introduction to Civil Engineering	1 course unit
ENG 092	Engineering Seminar II	0 course unit
MAT 128	Calculus B	1 course unit
PHY 202	General Physics II	1 course unit
FYW	First Year Writing	(1 course unit)

Sophomore Year

Fall

CIV 211	Surveying	.5 course unit
CIV 213	CAD Laboratory	.5 course unit
ENG 222	Statics	1 course unit
ENG 272	Advanced Engineering Mathematics I	1 course unit
PHY 120	Introduction to Geology	1 course unit
	Liberal Learning Elective	1 course unit

Spring

CIV 251	Strength of Materials	1 course unit
CIV 343	Civil Engineering Prob and Statistics	1 course unit
ENG 262	Dynamics	1 course unit

MAT 229	Multivariable Calculus	1 course unit
	Liberal Learning Elective	1 course unit

Junior Year

Fall

CIV 311	Structural Analysis	1 course unit
CIV 331	Soil Mechanics	1 course unit
CIV 333	Soil Mechanics Laboratory	.5 course unit
CIV 361	Fluid Mechanics	1 course unit
CIV 411	Transportation Engineering	1 course unit
ENG 093	Engineering Seminar III	0 course unit

Spring

CIV 351	Structural Steel Design	1 course unit
CIV 363	Fluid Measurement Laboratory	.5 course unit
CIV 372	Construction Plan & Est.	1 course unit
CIV 385	Hydraulic Engineering and Hydrology	1 course unit
CIV 431	Foundation Engineering	1 course unit
CIV 444	Intro to Finite Element Analysis	1 course unit
ENG 094	Engineering Seminar IV	0 course unit
ENG 099	Senior Professional Seminar	0 course unit

Senior Year

Fall

CIV 371	Civ Eng. Materials and Structures	1 course unit
CIV 421	Reinforced Concrete Design	1 course unit
CIV 451	Civil Eng Econ and Mng	1 course unit
CIV 495	Senior Project I	.5 course unit
CIV XXX	Civil Engineering Elective*	1 course unit
CIV XXX	Civil Engineering Elective*	1 course unit
ENG 098	Fundamentals of Engineering Review	0 course unit

Spring

CIV 496	Senior Project II	.5 course unit
CIV XXX	Civil Engineering Elective*	1 course unit
CIV XXX	Civil Engineering Elective*	1 course unit
IDS 252	Society, Ethics, and Technology	1 course unit
	Liberal Learning Elective	1 course unit
Total course units		**39 course units**

**By advisement only.*

Civil Engineering Electives

CIV 321 Numerical Methods
CIV 381 Environmental Engineering
CIV 441 Structural Steel Design II
CIV 442 Architecturally Informed Structural Design
CIV 443 Foundation Engineering II
CIV 445 Water Resources Engineering
CIV 446 Hydraulic Structure Design
CIV 461 Reinforced Concrete Design II
CIV 471 Transportation Engineering II
CIV 481 Structural Analysis II

Research Track

The civil engineering department offers a research track for eligible students. Upon permission by the instructor and Chair, students can enroll in CIV 497 in 4 different semesters and receive a total of up to 2 course units (0.5 course units per semester) which can be used as a course substitution towards civil engineering elective courses.