Civil Engineering

Faculty: Horst, Chair, Al-Omaishi, Bechtel, Brennan, 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 cumulative 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 cumulative GPA of 2.0.

**Bachelor of Science in Civil Engineering**

**First Year**

**Fall**
- ECO 101 Principles of Microeconomics 1 course unit
- ENG 142 Fundamentals of Engineering Design
- or
- CSC 215 Computer Science I for Science/Engineering 1 course unit
- ENG 095 Introduction to Engineering 0 course unit
- ENG 091 Engineering Seminar I 0 course unit
- FSP First Seminar 1 course unit
- MAT 127 Calculus A 1 course unit
- PHY 201 General Physics I 1 course unit

*By advisement only.*

**Spring**
- CHE 201 General Chemistry I 1 course unit
- CSC 215 Computer Science I for Science/Engineering
- or
- ENG 142 Fundamentals of Engineering Design 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
- WRI 102 Academic Writing (if not exempted) (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 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

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<tr>
<td>CIV 311</td>
<td>Structural Analysis</td>
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<td>CIV 331</td>
<td>Soil Mechanics</td>
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<td>CIV 333</td>
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<td>CIV 361</td>
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<td>CIV 411</td>
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<td>CIV 363</td>
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<td>CIV 372</td>
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<td>CIV 385</td>
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<td>CIV 431</td>
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<td>CIV 444</td>
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### Senior Year

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<td>CIV 421</td>
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<td>CIV 451</td>
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<td>ENG 098</td>
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#### Spring

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<td>IDS 252</td>
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**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