What is Civil Engineering?

Civil Engineering is a broad field that deals with the design, construction, and maintenance of civil infrastructure.

The water you drink,

The bridges you cross,

The roads you drive,

The environment you value.
Many Different Career Paths....

- Engineering Design
- Construction/Project Management
- Government Agencies
- Consulting (Business)
- Graduate Programs

---

What types of Questions do Civil and Environmental Engineers Ask?

- How can we protect the natural environment?
- How can we improve access to basic human needs?
- How can we improve society?
- How can we improve the built environment?
- How can I change the world for the better?
- How can we make it easier to move people and goods from place to place?
- How can we make the world around us more efficient?
Department Fast Facts

• 227 undergraduates
• 42% female
• 21 full-time faculty (47% female)
• $63,368 (2019)
• 20% of civil and environmental engineers pursue a graduate degree

Civil Engineering Specialty Areas

- Environmental Engineering • Drinking water, wastewater, waste disposal, contaminated sites, sustainability
- Water Resources Engineering • Stormwater, drinking water, flood controls
- Geotechnical Engineering • Foundations, retaining structures, dams, stormwater, landfills
- Transportation Engineering • Highways, railroads, airports, traffic control
- Structural Engineering • Bridges, buildings, dams
Related Minors

- Sustainability Studies
- Engineering Entrepreneurship
- Peace & Justice
- Real Estate Development
- Business
- Business (SBI)
- Mathematics
- & More!

Our Curricular Model

BSCE Curriculum

- Specialization in 1+ Areas
- Depth in 3+ Areas
- Fundamentals in 6 CEE Areas
- Engineering Sciences
- Math, Science, & Liberal Arts

Supplement curricular learning with a variety of research, service, and other opportunities.
Pedagogical Philosophies

- Active Learning Strategies
  - Flipped classrooms and extensive hands-on laboratories
- Project-Based Learning
  - Extensive open-ended projects at both ends of curriculum
- Use of Real-World Examples
  - Provide context for learning theoretical concepts
- Extensive Team Work
  - Reflect professional environment
- Development of Technical Communication Skills
  - Written, oral, and graphical

Freshman Year
(First Semester is common for all Engineering students)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career Compass A</td>
<td>0.5</td>
</tr>
<tr>
<td>Engr Interdisciplinary Project</td>
<td>3.0</td>
</tr>
<tr>
<td>Calculus I</td>
<td>4.0</td>
</tr>
<tr>
<td>General Chemistry I</td>
<td>4.0</td>
</tr>
<tr>
<td>General Chemistry Lab I</td>
<td>1.0</td>
</tr>
<tr>
<td>Core Humanities: Ancients</td>
<td>3.0</td>
</tr>
<tr>
<td>Theology</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>18.5</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career Compass A</td>
<td>0.5</td>
</tr>
<tr>
<td>Civil Eng Fundamentals (+ Lab)</td>
<td>4.0</td>
</tr>
<tr>
<td>Calculus II</td>
<td>4.0</td>
</tr>
<tr>
<td>General Chemistry II</td>
<td>4.0</td>
</tr>
<tr>
<td>Physics I - Mechanics</td>
<td>3.0</td>
</tr>
<tr>
<td>Core Humanities: Moderns</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>18.5</strong></td>
</tr>
</tbody>
</table>
### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career Compass B</td>
<td>0.5</td>
</tr>
<tr>
<td>Engineering Mechanics I (+ Lab)</td>
<td>4.0</td>
</tr>
<tr>
<td>Transportation Engineering</td>
<td>3.0</td>
</tr>
<tr>
<td>CE Project Development</td>
<td>3.0</td>
</tr>
<tr>
<td>Calculus III</td>
<td>4.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>17.5</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career Compass B</td>
<td>0.5</td>
</tr>
<tr>
<td>Mechanics of Solids</td>
<td>3.0</td>
</tr>
<tr>
<td>Geology for Engineers</td>
<td>3.0</td>
</tr>
<tr>
<td>Environmental Engr. Sci. (+ Lab)</td>
<td>4.0</td>
</tr>
<tr>
<td>Differential Equations</td>
<td>4.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>17.5</strong></td>
</tr>
</tbody>
</table>

### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career Compass C</td>
<td>0.5</td>
</tr>
<tr>
<td>Fluid Mechanics (+ Lab)</td>
<td>4.0</td>
</tr>
<tr>
<td>Soil Mechanics (+ Lab)</td>
<td>4.0</td>
</tr>
<tr>
<td>Unit Ops./Proc. in Env Egr (+ Lab)</td>
<td>4.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>18.5</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career Compass C</td>
<td>0.5</td>
</tr>
<tr>
<td>Structural Analysis</td>
<td>3.0</td>
</tr>
<tr>
<td>Civil Engr. Materials (+ Lab)</td>
<td>3.0</td>
</tr>
<tr>
<td>Hydraulics &amp; Hydrology (+ Lab)</td>
<td>4.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>16.5</strong></td>
</tr>
</tbody>
</table>
Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capstone Design I</td>
<td>3.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>15.0</td>
</tr>
<tr>
<td>Capstone Design II</td>
<td>3.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>Elective</td>
<td>3.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Senior Capstone

- Two semesters, project-based
- Selected examples of recent projects include:
  - Stream restoration for Malvern Borough
  - Development of an irrigation plan using recycled water for a county owned golf course
  - Design of green stormwater infrastructure for City of Knowledge, Panama
  - Layout and design of a mixed-use land development in West Goshen, PA
  - Redevelopment of Villanova SEPTA railway station including parking facility, new tunnel, and pedestrian bridge
  - Upgrade of a bridge on I-76 to accommodate dynamic shoulder running during rush hour
- Students formally present their design in written and oral form as part of CEE Day, end of April every year (parents and members of department advisory board are invited)
Electives (14 courses/42 credits)

- 2 Free Electives
- 5 Villanova Core Electives (common requirement for College of Engineering)
  - Humanities/Social Science (2), Ethics (1), Theology (1), Theology/Philosophy (1)
- 7 Technical Electives
  - Minimum of one elective from at least 3 of the 6 core CEE discipline areas (3+)
  - Minimum of one CEE software elective (1+)
  - Other technical electives may be fulfilled by additional courses in the above two categories or from a selection of:
    - Other engineering courses (maximum 1)
    - Math or science courses at the 2000+ level (maximum 1)
    - Professional development courses (maximum 1)

5-Year Combined BS/MS Programs

- Students accelerate electives in BS program through AP credit, summer courses, and/or overloads
- Students take graduate courses during senior year at no additional cost (up to 2 per semester subject to University credit hour limits)
- Students complete remainder of 10 graduate courses required for MS degree during 12 months after graduation (summer, fall, spring)
Villanova Difference: Faculty

- True commitment to both teaching and scholarship (research)
- All full-time faculty have terminal degree (PhD)
- Limited use of adjunct faculty in undergraduate courses (all who do are professional engineers)
- No TA’s/graduate students teaching courses
- Faculty advise students (continually through 4 years)
- Faculty know students personally and by name
- Our faculty are young, energetic, and engaged

Faculty Scholarship & Professional Activities

Our faculty are also actively engaged in cutting edge research and heavily involved in professional societies.
Villanova Difference: Undergraduate Research

Over a five-year period, CEE faculty have:
- Authored or co-authored 169 publications
- Published in 47 different scholarly journals
- Been a part of 55 different externally-sponsored research projects with over $5,000,000 in research expenditures

Students (both undergraduate and graduate) play a significant role in this research
- About 2/3 of publications include student authors

Student opportunities to engage in undergraduate research:
- Paid research assistantships
- Departmental undergraduate research course (CEE 4612)
- Villanova summer UG research fellowships
- Villanova freshman research match program
- NSF REU summer programs at other universities

Villanova Difference: Study Abroad

- Approximately 35% of our CEE students study abroad

- Most common timeframe:
  - Sophomore spring semester

- Most common destinations:
  - NUI: Galway, Ireland
  - Univ. of Technology: Sydney, Australia
  - Melbourne Univ.: Melbourne, Australia
  - American Univ.: Sharjah, UAE
  - Augustine & Architecture: Siena, San Gimignano, Italy
Villanova Difference: Service Learning and STEM

- Extracurricular service learning opportunities through Villanova Engineering Service Learning, Campus Ministry, and other organizations
- STEM activities through NovaCANE, NovaEdge, VESTED, and other departmental and college organizations
- Curricular service learning opportunities through Senior Design/Senior Capstone and other courses
  - Panama, Honduras, Kenya, India, and more
  - 20 consecutive years of at least one internationally focused capstone project presentation at CEE Day
  - CEE 4613 (Elective) – CEE Service Learning Project

Student Organizations and Competitions

- Steel Bridge
- Institute of Transportation Engineers
- Traffic Bowl
- Chi Epsilon
- National Society of Professional Engineers
- Concrete Canoe
- American Society of Civil Engineers
- Capstone Design Competitions
Where will Villanova Engineering Take You?

- 2019 Placement Stats (COE)
  - 97.7% successful placement rate
    - 77.1% employed
    - 13.3% continuing education
    - 7.3% other endeavors
    - 2.3% seeking opportunities

- CEE Department had 100% placement rate for Class of 2019

CEE-Specific Outcomes

- For the past four years, out of all CEE students beginning the sophomore year in the department:
  - 92% graduate with a BSCE from Villanova
  - 89% graduate with a BSCE from Villanova on time (4 years)

- About 85% of graduates say they would choose Villanova again
Featured Employers & Graduate Schools

- AECOM
- Accenture
- ARCO Design/Build
- Bohler Engineering
- Jacobs Engineering
- Stanford University
- Carnegie Mellon University
- Railroad Construction Company
- Skanska USA
- Turner Construction
- Urban Engineers
- Whiting-Turner Contracting
- University of Texas (Austin)
- Villanova University

Why Villanova Civil & Environmental Engineering

- Broad-based curriculum that emphasizes technical skills and creativity, appealing to head and heart
- Highly acclaimed faculty teach our undergraduate classes and offer research opportunities
- Flexibility for minors and study abroad opportunities
- Hands-on learning on student project teams, through international service opportunities and STEM outreach
- A commitment to professional development through unique Career Compass program
Be a Part of Nova Nation!

“My courses and internships provided an abundance of civil engineering knowledge and real-world experience, while I also enjoyed a research opportunity that would be reserved for graduate students at other schools.”

– Nathaniel Gallishaw, Civil Engineering (Seekonk, MA)

Contact Information

Shawn Gross
Associate Professor and Department Chair
shawn.gross@villanova.edu

Linda DeAngelis
Senior Administrative Assistant
linda.deangelis@villanova.edu

Department of Civil and Environmental Engineering
800 Lancaster Avenue
Villanova, PA 19085
(610) 519-4960