CIVIL ENGINEERING TECHNOLOGY

Sylvania Campus
Science Technology Building (ST), Room 200
971-722-4159
pcc.edu/programs/civil-engineering/

CAREER AND PROGRAM DESCRIPTION

Civil engineering technicians are problem-solvers, working as part of a team involved in the planning, design, construction, operation, and management of many types of projects. These may include buildings, bridges, dams, highways, rapid transit facilities, airport and coastal improvements, land development projects, residential and commercial complexes, utilities, and environmental protection facilities such as water and wastewater treatment plants, air pollution control systems, solid and hazardous waste disposal systems, and storm water control facilities. These skilled professionals work on a variety of assignments including: design calculations, computer-aided drafting, environmental sampling, engineering and boundary surveying, laboratory testing, specification writing, technical sales, scheduling, estimating, and construction management, among others. Employers of CET's include consulting engineering firms, government agencies, utilities, construction companies, manufacturers, and materials testing laboratories.

The PCC Civil Engineering Technology program is designed to develop marketable skills in a broad range of technical areas, as well as in problem analysis and solution, spoken and written communication, computer software use, and computer-aided drawing. While providing a curriculum strong in mathematics and engineering topics, our teaching format also emphasizes student involvement, teamwork, and extensive student-instructor interaction.

DEGREES AND CERTIFICATES OFFERED

ASSOCIATE OF APPLIED SCIENCE DEGREE
Civil Engineering Technology
Civil Engineering Technology: Green Technology and Sustainability Option

TWO-YEAR CERTIFICATE
Civil Engineering Technology

ADMISSION PREREQUISITES

Academic Prerequisites

• CET is a limited-entry program. Prospective students must meet with an engineering technology advisor prior to registering for any CMET courses.
• Civil Engineering Technology AAS:
  • WR 115 or IRW 115 or equivalent placement.
  • MTH 58 or MTH 60 or higher, or equivalent placement.
• Civil Engineering Technology: Green Technology and Sustainability AAS requirements
  • WR 121 or equivalent placement.
  • MTH 58 or MTH 60 or higher, or equivalent placement.
• Civil Engineering Technology Certificate requirements:
  • WR 115 or IRW 115 or equivalent placement.
  • MTH 58 or MTH 60 or equivalent placement.
• High school courses in chemistry and physics are helpful, but not required. Skill in keyboarding is highly recommended. A specific calculator is required.
• For students not meeting these requirements, advising is available to assist in preparing for entrance into the program and to earn credits which will apply toward the certificate or degree once accepted into the program.

Other Prerequisites

• Full-time students: CET is a limited enrollment program for students seeking a certificate or degree. Qualified applicants are accepted in the order in which the application process is completed. Program starts in fall and winter terms. See a program advisor for other term starts.
• Job-upgrade students: Non-program students seeking to upgrade job skills are welcome to enroll in individual courses. Students must meet individual course prerequisites and complete an advising interview with a CET faculty advisor prior to enrollment. Admission is granted on a space-available basis after the needs of the full-time students have been met.
• Continuing education: Students of this program may transfer to various out-of-state institutions to pursue a Bachelor of Science degree in civil or construction engineering technology or to Oregon State University for a degree in construction engineering management. Faculty advisors will provide assistance in the selection of additional course work appropriate to each student’s goals.

PROGRAM REQUIREMENTS

Academic Requirements

• None

Other Requirements

• None

ASSOCIATE OF APPLIED SCIENCE DEGREE

Civil Engineering Technology (p. 1)
Civil Engineering Technology: Green Technology and Sustainability Option (p. 2)

CIVIL ENGINEERING TECHNOLOGY AAS DEGREE

Minimum 101 credits. Students must also meet Associate Degree Comprehensive Requirements and Associate of Applied Science Requirements. Students must complete a total of sixteen credits of General Education. Some courses specified within the program may be used as General Education. Math/computation competency is met through the courses in the program of study indicated with a § symbol. Students should consult with program advisors for course planning.

COURSE OF STUDY

The coursework listed below is required. The following is an example of a term-by-term breakdown.

<table>
<thead>
<tr>
<th>First Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMET 110</td>
<td>Statics 4</td>
</tr>
<tr>
<td>CMET 111</td>
<td>Portland Design: Brews, Bridges and Bikes 3</td>
</tr>
<tr>
<td>CMET 112</td>
<td>Technical Algebra/Trigonometry 4</td>
</tr>
<tr>
<td>or MTH 95</td>
<td>Intermediate Algebra</td>
</tr>
<tr>
<td>ENGR 102</td>
<td>Engineering Graphics 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMET 121</td>
<td>Strength of Materials 4</td>
</tr>
<tr>
<td>CMET 122</td>
<td>Global Energy Physics 4</td>
</tr>
<tr>
<td>CMET 123</td>
<td>Technical Algebra with Analytic Geometry 4</td>
</tr>
<tr>
<td>or MTH 112</td>
<td>Elementary Functions</td>
</tr>
<tr>
<td>WR 121</td>
<td>English Composition 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMET 131</td>
<td>Applied Calculus 8</td>
</tr>
</tbody>
</table>

1 MTH 95
2 CMET 123
CIVIL ENGINEERING TECHNOLOGY

or MTH 251 & MTH 252
CMET 213
CMET 227
General Education

Fourth Term
CH 101
CMET 133
CMET 221
COMM 100
or COMM 111
ENGR 226

Fifth Term
CMET 211
CMET 212
CMET 228
CMET 241
CMET 255

Sixth Term
CMET 214
CMET 222
CMET 223
CMET 233
CMET 236

General Education

Sixth Term
CMET 241
CMET 255

Total Credits: 101

* Could be be used as General Education
1 Or any course for which MTH 95 is a prerequisite.
2 Or any course for which MTH 112 is a prerequisite.

GREEN TECHNOLOGY AND SUSTAINABILITY AAS DEGREE

Minimum 108 credits. Students must also meet Associate Degree Comprehensive Requirements and Associate of Applied Science Requirements. Students must complete a total of sixteen credits of General Education. Some courses specified within the program may be used as General Education. Math/computation competency is met through the courses in the program of study indicated with a § symbol. Students should consult with program advisors for course planning.

GREEN TECHNOLOGY AND SUSTAINABILITY DEGREE COURSES

CH 101 Inorganic Chemistry Principles
CMET 110 Statics
CMET 111 Portland Design: Brews, Bridges and Bikes
CMET 112 or MTH 95
CMET 121 Strength of Materials
CMET 122 Global Energy Physics
CMET 123 or MTH 112
CMET 131 Applied Calculus
CMET 211 Environmental Quality
CMET 212 Thermodynamics I

CMET 213 § Fluid Mechanics
CMET 214 Surveying II
CMET 221 Environmental Systems
CMET 222 Thermodynamics II
CMET 223 Project Management
CMET 227 Applied Electricity Fundamentals
CMET 228 Construction Materials
CMET 233 CET Applied Computer Aided Design
CMET 236 Structural Design
CMET 241 Structural Steel Drafting
CMET 255 Civil and Mechanical Professional Skills

CMET Human Relations Electives

CIVIL ENGINEERING TECHNOLOGY TWO-YEAR CERTIFICATE

Minimum 66 credits. Students must also meet certificate requirements.

COURSE OF STUDY

The coursework listed below is required. The following is an example of a term-by-term breakdown.

First Term
CMET 110 Statics
CMET 111 Portland Design: Brews, Bridges and Bikes
CMET 112 or MTH 95
ENGR 102 Technical Algebra/Trigonometry

Second Term
CMET 121 Strength of Materials
CMET 122 Global Energy Physics
CMET 123 or MTH 112
WR 121§ English Composition
WR 122§ English Composition
WR 227§ Technical and Professional Writing

Third Term
CMET 131 Applied Calculus
CMET 213 § Fluid Mechanics
CMET 227 Applied Electricity Fundamentals

Fourth Term
CMET Human Relations Electives
CIVIL ENGINEERING TECHNOLOGY

CH 101  Inorganic Chemistry Principles 5
CMET 133  Materials Technology 3
CMET 221  Environmental Systems 3
COMM 100  Introduction to Communication 4
or COMM 111  Public Speaking
ENGR 226  Plane Surveying 4

Total Credits: 66

§  Course cannot be substituted with another course.
1  Or any course for which MTH 95 is a prerequisite.
2  Or any course for which MTH 112 is a prerequisite.

CMET HUMAN RELATIONS ELECTIVES

CG 191  Exploring Identity and Diversity for College Success 4

PSY 101  Psychology and Human Relations 4
PSY 201A  Introduction to Psychology - Part 1 4
PSY 202A  Introduction to Psychology - Part 2 4
PSY 214  Introduction to Personality 4
PSY 215  Human Development 4
PSY 216  Social Psychology 4
PSY 222  Family & Intimate Relationships 4
PSY 231  Human Sexuality 4
PSY 232  Human Sexuality 4
PSY 236  Psychology of Adult Development and Aging 4
PSY 239  Introduction to Abnormal Psychology 4
PSY 240  Personal Awareness and Growth 4
SOC 204  Sociology in Everyday Life 4
SOC 206  Social Problems 4
SOC 213  Diversity in the United States 4
SOC 218  Sociology of Gender 4
SOC 232  Death and Dying: Culture and Issues 4
WS 101  Women’s Studies 4

CMET 120. Strength of Materials. 4 Credits.
Covers the relationship between stress and strain on deformable solids. Applies analysis to members subjected to axial, bending, and torsional loads. Covers combined stresses and properties of structural materials. Prerequisites: CMET 110, CMET 112, and (ENGR 102 or ENGR 105). Prerequisite/Concurrent: CMET 123. Audit available.

CMET 133. Materials Technology. 3 Credits.
Covers principles of classical thermodynamics. Develops understanding of mass, energy, heat, work, efficiency, ideal and real thermodynamic cycles and processes. Teaches first and second laws of thermodynamics, perfect gas law, properties of real gases, and the general energy equation for closed and open systems. Prerequisites: CMET 121, 123, CH 104, and (WR 115 or IRW 115). Audit available.

CMET 211. Environmental Quality I. 4 Credits.
Introduces physical, chemical and biological parameters relating to the quality of water. Presents sampling systems, data analysis techniques and computational methods, including mathematical models. Recommended: CMET 131. Prerequisites: CMET 123, CH 104, and (WR 115 or IRW 115). Prerequisite or concurrent: WR 121. Audit available.

CMET 212. Thermodynamics I. 4 Credits.
Covers principles of classical thermodynamics. Develops understanding of mass, energy, heat, work, efficiency, ideal and real thermodynamic cycles and processes. Teaches first and second laws of thermodynamics, perfect gas law, properties of real gases, and the general energy equation for closed and open systems. Prerequisites: CMET 131, CMET 122 and CH 104. Audit available.

CMET 213. Fluid Mechanics. 3 Credits.
Covers properties of fluids, laws of fluid mechanics and energy relationships for incompressible fluids. Studies flow in closed conduits, including pressure loss, flow measurement, pipe sizing and pump selection. Recommended: CMET 131. Prerequisites: CMET 110, CMET 122, CMET 123. Audit available.

CMET 214. Surveying II. 3 Credits.
Presents techniques for preliminary location and construction surveys. Includes elements of horizontal and vertical location for roadways, including circular and parabolic curves. Covers use of advanced capabilities of electronic total stations, include data logging. Prerequisite: ENGR 226. Audit available.

CMET 221. Environmental Systems. 3 Credits.
Explores ground water, air, hazardous waste, and water pollution problems. Presents data analysis techniques and computational methods. Examines technological solutions of these problems, including water, wastewater, and air pollution treatment, as well as alternatives. Prerequisites: CMET 123, (WR 115 or IRW 115). Audit available.

CMET 222. Thermodynamics II. 4 Credits.
Covers application of principles of thermodynamics in the analysis of vapor and gas power cycles, refrigeration and heat pump machinery, and air distribution systems. Combustion reactions, ideal gas mixtures, and properties of moist air (psychrometrics) are also studied. Prerequisite: CMET 212. Audit available.

CMET 223. Project Management. 3 Credits.
Administration of engineering projects. Covers owner-design professional-constructor relationships, law and contracts, specifications writing and interpretation, cost estimating, engineering economy, and planning and scheduling (CPM and time-scaled arrow diagrams). Recommended: COMM 100 or COMM 111. Prerequisites: CMET 123. Prerequisite or concurrent: WR 121. Audit available.

CMET 226. Dynamics. 3 Credits.
Covers kinematics and kinetics principles relating to the motion of particles and rigid bodies. Examines force, mass, acceleration and velocity relations. Includes practical linear and curvilinear motion problem solving. Covers work-energy and impulse-momentum methods. Prerequisite: CMET 110 and CMET 131. Audit available.
CMET 227. Applied Electricity Fundamentals. 2 Credits.
Introduces fundamental principles of electricity as applied to mechanical systems. Principle topics covered: basic electrical theory, electric motors, controls, and energy consumption considerations. Prerequisite: CMET 112. Audit available.

CMET 228. Construction Materials. 3 Credits.
Covers production, processing, and testing of aggregate, asphalt, concrete, soil and other materials in highway and commercial/industrial building projects. Includes quality assurance concepts, measurements and calculations, terminology and random sampling. Focuses on testing procedures common to construction in the northwest. Recommended: CMET 131. Prerequisites: CMET 121, 122, 123. Prerequisite/concurrent: WR 121. Audit available.

CMET 233. CET Applied Computer Aided Design. 3 Credits.
Presents advanced topics in civil engineering-oriented computer aided design and drafting meeting industry standards. Prerequisite: CMET 241; Prerequisite or concurrent: CMET 214. Audit available.

CMET 235. Machine Design. 3 Credits.
Examines fundamentals of machine design, including analysis and design of mechanical components. Covers shafts, fasteners, belt and chain drives, brakes, gears, springs and bearings. Includes predicting static and fatigue failures for various loadings and materials. Prerequisite: CMET 121, 226. Audit available.

CMET 236. Structural Design. 3 Credits.
Introduces design of steel, wood, and reinforced concrete structures with emphasis on steel buildings. Covers beam and column design along with bolted and welded connections. Recommended: CMET 131. Prerequisites: CMET 121, 122, 123, and (WR 115 or IRW 115). Audit available.

CMET 237. MET Applied Computer Aided Design. 3 Credits.
Presents topics in solid modeling for mechanical/manufacturing engineering computer aided design and drawing, meeting industry standards. Prerequisite: ENGR 102. Audit available.

CMET 241. Structural Steel Drafting. 3 Credits.
Introduces structural detail drafting of engineering design drawings and shop fabrication drawings for steel construction. Covers steel grades and shapes; and design, fabrication, and erection drawings for steel structures. Prerequisites: ENGR 102, CMET 121. Audit available.

CMET 254. Civil/Mechanical Engineering Technology Seminar. 1 Credit.
Topics include information on finding employment in the civil/mechanical/manufacturing industry, writing resumes, and interviewing. Prerequisite: WR 115 or IRW 115. Audit available.

CMET 255. Civil and Mechanical Professional Skills Development I. 2 Credits.
Covers job searching and resume building skills for civil and mechanical engineering technicians. Includes resumes, interviewing, communication skills, and professionalism in the workplace. Prerequisites: CMET 133, WR 121. Audit available.

CMET 280A. Cooperative Ed: Civil/Mechanical Engineering Technology. 1-5 Credit.
An opportunity to develop engineering technology skills in a department-approved work setting. Department permission required. Audit available.