ENGINEERING

Sylvania Campus
Science Technology Building (ST), Room 208
971-722-4159
pcc.edu/programs/engineering-transfer

CAREER AND PROGRAM DESCRIPTION
Engineering is a profession in which knowledge of mathematics and the sciences, gained through study and experience, is applied for the benefit of society. Engineers solve technical problems as members of project teams or as individual specialists. Work may involve research, development, planning, design, construction, manufacturing, supervision and management. Engineering is a licensed profession in all states.

PCC offers curricula equivalent to the first two years of study for most engineering disciplines at Oregon State University (OSU), Portland State University (PSU), the University of Portland (UP), Washington State University-Vancouver (WSUV) and Oregon Institute of Technology (OIT). These engineering disciplines include: Chemical Engineering, Civil Engineering, Computer Engineering, Construction Engineering Management, Electrical Engineering, Environmental Engineering, Industrial Engineering, Manufacturing Engineering, Mechanical Engineering and Renewable Energy Engineering.

Equivalent first and second year courses are also available for students interested in other majors or universities. (Note: not all majors listed are available at all the institutions listed.)

Advising guides outlining which engineering, mathematics, science and general education courses to take for the disciplines listed above have been prepared in cooperation with OSU, PSU, and OIT. Following these advising guides will prepare students to transfer for their upper division studies. It is recommended that students prepare for transfer by selecting courses that meet lower division university requirements rather than by seeking a degree. Students interested in a degree should refer to the Comprehensive Degree Requirements section of this catalog for information concerning the granting of degrees.

ADMISSION PREREQUISITES

Academic Prerequisites
- All students must have an advising interview with an engineering faculty advisor.
- Students must place in WR 115 and MTH 251. High school courses in chemistry, physics and microcomputer literacy are highly recommended. Students lacking these courses are encouraged to take CH 151, PHY 101 and/or CIS 120 as appropriate, prior to beginning the program.
- Students lacking the necessary prerequisites may upgrade their skills by taking writing, mathematics, science and microcomputer literacy courses or by completing the first year of one of PCC’s two-year engineering technology programs (civil, electronic, or mechanical). See a program advisor for information. To arrange a meeting with an engineering advisor, call the Engineering department at 971-722-4159 or visit www.pcc.edu/programs/engineering-transfer/ for more information.

Other Prerequisites
- None

PROGRAM REQUIREMENTS

Academic Requirements
- None

Other Requirements
- The use of a scientific, programmable, graphing calculator is required for the program.

ENGR 100. Exploring Engineering. 1 Credit.
Focuses on engineering careers, and what engineers “do”. Presents various engineering disciplines and associated occupations through class discussions, presentations by practicing engineers, laboratory activities, and viewing of occupational videos. Designed to inform students of the attributes of a career in engineering and the academic preparation it requires. Audit available.

ENGR 101. Engineering Fundamentals. 4 Credits.
Introduces basic engineering problem solving, analysis and design. This course covers basic concepts of curve fitting, statistics, electricity, and mechanics, including vector algebra. It utilizes spreadsheet and computer programming applications as problem solving tools. Students will be introduced to non-technical aspects of engineering, such as registration laws and ethics. Labs may include group engineering project work. Prerequisite: Placement in MTH 251. Prerequisite/concurrent: (WR 115 or IRW 115). Audit available.

ENGR 102. Engineering Graphics. 3 Credits.
Introduces manual and computer-aided drafting including hand sketching, drafting standards, pictorial drawings, and dimensioning. Includes creation of 2-D drawings and 3-D solid models with AutoCAD. Prerequisite: Department approval or ENGR 101. Audit available.

ENGR 105. 3-D Modeling and Engineering Graphics. 3 Credits.
Introduces manual and computer-aided drafting used to design parts and assemblies. Covers sketching, basic drawing and dimensioning, geometric construction, and multiple views. Focuses on 3-D modeling techniques. ENGR 105, CAD/3D 237 cover similar material and cannot both be applied to graduation requirements. Prerequisite: ENGR 101 or (placement into MTH 111 and department approval). Prerequisite/concurrent: (WR 115 or IRW 115 or higher). Audit available.

ENGR 114. Engineering Programming. 4 Credits.
Introduces structured programming with applications to engineering problems. Prerequisite: ENGR 101 or department-approved equivalent. Audit available.

ENGR 171. Introduction to Digital Logic Design. 5 Credits.
Introduces analysis and computation of basic logic problems and circuits. Covers number systems, Boolean algebra, and logic circuit simplification techniques to produce simplified logic for minimal realization. Includes the creation of designs utilizing basic logic families, flip-flops, registers, and/or counters. Prerequisite/Concurrent: ENGR 221. Audit available.

ENGR 211. Statics. 4 Credits.
Analysis of forces acting on particles and rigid bodies. Force systems, centroids, and moments of inertia are covered. Scientific, programmable, graphing calculator required. Prerequisites: MTH 252, PHY 211; ENGR 101. Audit available.

ENGR 212. Dynamics. 4 Credits.
Kinematics and kinetics of particles and rigid bodies are analyzed by Newton’s laws, work-energy and impulse-momentum methods. Prerequisite: ENGR 211. Audit available.

ENGR 213. Strength of Materials. 4 Credits.
Relationships between stress and strain in deformable solids is studied. Analysis is applied to axially-loaded members, circular shafts, beams and columns. Combined stresses, statically indeterminate systems and properties of structural materials are included. Prerequisite: ENGR 211. Audit available.

ENGR 221. Electrical Circuits I. 5 Credits.
Introduces students to basic circuit elements and circuit analysis techniques. Covers Ohm’s and Kirchhoff’s Laws, network theorems, node voltage analysis and mesh current analysis. Operational amplifiers, inductors, capacitors, RC and RL transient response are also covered. Circuit simulation, math analysis software, and laboratory experiments are incorporated to solidify classroom theory and practice. Recommend: MTH 253 and PHY 213. Prerequisites: ENGR 101; MTH 252. Audit available.

ENGR 222. Electrical Circuits. 5 Credits.
Covers RL circuits, transformers, AC power, and three phase power. Explores steady state sinusoidal analysis and phasor techniques. Introduces the Laplace Transform. Also incorporated is circuit simulation, math analysis software, and laboratory experiments to solidify classroom theory and practice. Prerequisite: ENGR 221. Audit available.

ENGR 223. Electrical Circuits III. 5 Credits.
Covers Laplace Transform analysis. The transfer function, convolution, bode plots, and Fourier series are used to analyze circuits. Passive and active filters are designed and analyzed using these new circuit analysis techniques. Circuit simulation, math analysis software, and laboratory experiments are incorporated to solidify classroom theory and practice. Prerequisite: ENGR 222 Prerequisite or concurrent enrollment: MTH 256. Audit available.
ENGR 226. Plane Surveying. 4 Credits.
Introduces basic concepts of plane surveying. Includes use of tape, level, and electronic total station, along with horizontal and vertical control networks. Includes network calculations and adjustments, angles and bearings, and topographic surveying and mapping. Prerequisite: ENGR 102 and (MTH 112 or CMET 123). Audit available.

ENGR 231. Material Science. 4 Credits.
Selection of materials for modern engineering applications. Structure and properties of metals, ceramics and polymers starting with fundamental atomic arrangements. Microstructural control through terminal and mechanical processing and effects of service environment are covered. Prerequisites: PHY 211; MTH 252; (CH 201 or 222). Audit available.

ENGR 262. Manufacturing Processes. 4 Credits.
Introduces the interaction of design with industrial materials and processes. Emphasizes the connection of design, materials, and processes with technical and economic feasibility, trade-offs, and automation. Prerequisites: (CMET121 and 122); or (ENGR101 and PHY211). Audit available.

ENGR 271. Digital Logic Design. 4 Credits.
Explores shift register devices and circuits; design, timing analysis, and application of synchronous state machine circuits using discrete devices and programmable logic devices. Includes timing analysis of asynchronous state machines, arithmetic circuits and devices; internal architecture of a microprocessor; design and interfacing of memory systems. Introduces design for test techniques. Reinforces the systematic design methodology, documentation standards, and use of computer-based tools. Prerequisite: ENGR 171. Audit available.