

ENGINEERING

Sylvania Campus
Science Technology Building (ST), Room 208
971-722-4159

www.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, UP, WSUV 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.

PREREQUISITES AND REQUIREMENTS

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 100, 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 email to engineering@pcc.edu.

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

See the Course Description (ENGR prefix) section of this catalog for individual Engineering courses and course prerequisites.

COURSE DESCRIPTIONS

ENGR 100 Exploring Engineering 1.00 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 4.00 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 or concurrent: WR 115. Audit available.

ENGR 102 Engineering Graphics 3.00 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: ENGR 101. Audit available.

ENGR 114 Engineering Programming 4.00 Introduces structured programming with applications to engineering problems. Prerequisite: ENGR 101 or department-approved equivalent. Audit available.

ENGR 171 Introduction to Logic Design 5.00 Introduces switching theory and logic design. Number systems, logic families, Boolean algebra, minimization, flip-flops, registers and counters, are covered. Analysis and design of finite state machines with discrete and programmable devices. Prerequisite: ENGR 221. Audit available.

ENGR 211 Statics 4.00 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 4.00 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 4.00 Relationships between stress and strain in deformable solids are 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 5.00 Introduces students to basic circuit elements and circuit analysis techniques. Covers Ohm's and Kirchoff'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 II 5.00 Covers RLC 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 5.00 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 4.00 Introduces basic concepts of plane surveying. Includes use of tape, level, transit, electronic total station (ETS), along with horizontal and vertical control networks. Includes network calculations and adjustments, angles and bearings, and topographic surveying and mapping. Prerequisite: ENGR 101 and 102. Audit available.

ENGR 231 Material Science 4.00 Selection of materials for modern engineering applications. Structure and properties of metals, ceramics and polymers starting with fundamental atomic arrangements. Microstructural control through thermal 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 4.00 The interaction of design with industrial materials and processes is considered in connection with technical and economic feasibility, trade-offs and automation. Prerequisite: ENGR 101 and 102 Audit available.

ENGR 275 Microprocessor Systems 4.00 Introduces X86 microprocessor architecture and assemble language programming for the IBM PC compatible computer, including the use of BIOS and DOS functions calls and the use of procedures. Structured programming techniques will be used to write programs that accept keyboard input and create displayed results. Appropriate program testing and debugging methods will be emphasized. Includes a 3-hour per week laboratory. Prerequisite or concurrent: ENGR 171. Audit available.

ENGR 280A Cooperative Education: Engineering For students employed in an approved co-op education position with a local company. Credits do not ordinarily transfer for an engineering degree. Department permission required. Audit available.