ENGINEERING & PHYSICS

While there are small differences between the programs of each branch of engineering and physics, COCC works to provide the courses common to all programs. All engineering and physics programs share a common core of math, science, and skills courses. Basic skills in writing, reading, and mathematics are essential. These programs require a high degree of mathematical proficiency with calculus required for all transfer programs.

https://www.cocc.edu/programs/engineering/ (https://www.cocc.edu/programs/engineering/default.aspx)

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Science Center, Bend Campus

Department: Science
Department Chair: Carol Higginbotham

Programs

Transfer

- Engineering Emphasis - Associate of Science (AS) (https://catalog.cocc.edu/programs/engineering-physics/engineering-as/)
- Physics - Associate of Arts Oregon Transfer (AAOT) (https://catalog.cocc.edu/programs/engineering-physics/physics-aaot/)

Courses

ENGR 188 Special Studies: Engineering (1-6 Credits)
Provides an opportunity to explore an area of engineering by doing a special project or to gain practical experience by working with a professional engineer.

ENGR 199 Selected Topics: Engineering (1-6 Credits)
This course is in development.

ENGR 201 Electrical Fundamentals (4 Credits)
Recommended preparation: PH 202/212 and MTH 251/252.
Topics covered in this course include: DC and 1st order transient analysis, Ohm’s Law, Kirchhoff’s Law (KCL and KVL), nodal analysis, branch analysis, source transformations, Thevenin and Norton equivalent circuits, maximum power transfer, operational amplifiers, inductance, capacitance, and transient response of RL and RC.

ENGR 202 Electrical Fundamentals II (4 Credits)
Recommended preparation: ENGR 201 and MTH 251/252.
Topics covered in this course include: AC and 2nd order transient analysis, sinusoids and phasors, sinusoidal steady-state analysis, nodal analysis, branch analysis, source transformations, Thevenin’s and Norton’s equivalent circuits, sinusoidal steady-state power calculation, and balanced three-phase circuits.

ENGR 211 Statics (4 Credits)
Prerequisites: MTH 251 and PH 211.
Analyzes forces induced in structures and machines by various types of loading.

ENGR 212 Dynamics (4 Credits)
Prerequisites: ENGR 211 and MTH 252.
Studies kinematics, Newton’s law of motion, and work-energy and impulse-momentum relationships as applied to engineering systems.

ENGR 213 Strength Of Material (4 Credits)
Prerequisites: ENGR 211 and MTH 252.
Studies properties of structure materials. Analyzes stress and deformation in axially-loaded members, in circular shafts and beams and in statically indeterminate systems containing these components.

GE 101 Engineering Orientation (3 Credits)
Introduces students to many different engineering fields through guest lectures, field trips, and hands-on engineering projects and problem-solving exercises. Develops understanding of similarities and differences between the engineering fields. Discusses professional engineering testing and licensing requirements.

GE 102 Engineering Problem Solving and Technology (3 Credits)
Recommended preparation: MTH 112.
Introduces the use of Microsoft Excel for the solution of engineering problems and familiarizes students with the decision making and report preparation process in engineering design. Development of spreadsheets for analyzing engineering problems and preparation of final design reports that outline in detail design evaluation, recommendation and implementation.

GS 104 Physical Science: Physics (4 Credits)
Recommended preparation: one year of high school algebra or equivalent or concurrent enrollment in MTH 60.
Energy is used as the theme to develop basic understanding of introductory principles of physics. Energy topics include mechanical, acoustic, heat, electric, radiant and nuclear. Emphasis placed on practical application of various energy forms.

GS 107 Physical Science: Astronomy (4 Credits)
Recommended preparation: one year of high school algebra or equivalent or concurrent enrollment in MTH 60.
Introduction to astronomy including solar system, stellar systems and cosmology. Some individual observing may be required.

PH 201 General Physics I (5 Credits)
Studies Newtonian Mechanics beginning with basic math concepts and continuing into kinematics, dynamics, uniform circular motion, energy, momentum, and rotational equivalents of some of these topics. Lab addresses experiments and applied settings of Newtonian Mechanics along with explorations of diverse methods for analyzing and interpreting scientific data. Meets the basic requirements for many pre-health and life science programs. Should be taken in sequence. Recommended to be taken with MTH 111.

PH 202 General Physics II (5 Credits)
Studies basic electrostatic and magnetic interactions. Builds on concepts from PH 201 and continues into electrostatic forces, electric field concepts, electric potential, basic DC circuit concepts, magnetic interactions and forces, sources of magnetic fields and Faraday’s Law. Lab addresses concepts and measurements in thermal physics and continues to explore the processes by which science seeks answers to questions. Meets the basic requirements for many pre-health and life science programs. Should be taken in sequence. Recommended to be taken with MTH 112.
PH 203 General Physics III (5 Credits)
Studies periodic behavior and topics from modern physics. Builds on concepts from previous terms and considers the physics of periodic motion, mechanical waves, wave interference, standing waves, acoustic waves, electromagnetic waves, geometric optics, diffractions and topics from special relativity to quantum mechanics. Lab includes basic optical experiences along with a long-term project to affirm student abilities to integrate investigative lab concepts from previous terms. Meets the basic requirements for many pre-health and life science programs. Should be taken in sequence.

PH 211 General Physics I (5 Credits)
Recommended preparation: MTH 251.
Studies Newtonian Mechanics beginning with basic math concepts and continuing into kinematics, dynamics, uniform circular motion, energy, momentum, and rotational equivalents of some of these topics. At all stages, applications of calculus to the solving of problems will be explored. Lab addresses experiments and applied settings of Newtonian Mechanics along with explorations of diverse methods for analyzing and interpreting scientific data. Required for engineering students and most students planning programs in the physical sciences. Should be taken in sequence.

PH 212 General Physics II (5 Credits)
Recommended preparation: MTH 252 and PH 211.
Studies basic electrostatic and magnetic interactions. Builds on concepts from PH 211 and continues into electrostatic forces, electric field concepts, electric potential, basic DC circuit concepts, magnetic interactions and forces, sources of magnetic fields and Faraday’s Law. At all stages, applications of calculus to the solving of problems will be explored. Lab addresses concepts and measurements in thermal physics and continues to explore the processes by which science seeks answers to questions. Required for engineering students and most students planning programs in the physical sciences. Should be taken in sequence.

PH 213 General Physics III (5 Credits)
Recommended preparation: MTH 253 and PH 212; recommended to be taken with MTH 256.
Studies periodic behavior and topics from modern physics. Builds on concepts from previous terms and considers the physics of periodic motion, mechanical waves, wave interference, standing waves, acoustic waves, electromagnetic waves, geometric optics, diffractions and topics from special relativity to quantum mechanics. At all stages, applications of calculus to the solving of problems will be explored. Lab includes basic optical experiences along with a long-term project to affirm student abilities to integrate investigative lab concepts from previous terms. Required for engineering students and most students planning programs in the physical sciences. Should be taken in sequence.

PH 299 Selected Topics: Physics (1-5 Credits)
This course is in development.