

# ENGINEERING PHYSICS (ENGRPHYS)

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## ENGRPHYS 1020 Engineering Physics Systems 1 Credit

Hands-on engineering physics laboratory projects. PLC and microcontroller programming of electromechanical systems, with a final project.

**Components:** Laboratory

## ENGRPHYS 3240 Applied Mechanics 4 Credits

Particle and rigid body mechanics including viscous forces, vibrations, noninertial reference frames, collisions, planar and 3D dynamics, Lagrangian mechanics, and numerical solutions to more realistic problems. Includes a term design project.

**Components:** Class

**Prereqs/Coreqs:** P. "C-" or better in PHYSICS 2340 and GENENG 2130; C: MATH 3630

## ENGRPHYS 3640 Electric and Magnetic Fields 3 Credits

Electrostatics, magnetostatics, Maxwell's equations, plane waves, and transmission lines.

**Components:** Class

**Cross Offering:** ELECTENG 3140

**Prereqs/Coreqs:** P. "C-" or better in ELECTENG 2210, MATH 2840, MATH 3630 and PHYSICS 2340

## ENGRPHYS 3910 Advanced Instrumentation 1 Credit

This course is a laboratory class on non-destructive surface characterization techniques commonly used to evaluate materials properties or perform failure analysis. Optical methods, electron microscopy, and scanning probe techniques are introduced, culminating in an industry-relevant final project that utilizes multiple techniques to analyze and evaluate the structure, composition, or behavior of a given sample. Student teams schedule individual lab times to ensure that there is only one team using the lab equipment at any given time.

**Components:** Laboratory

**Prereqs/Coreqs:** P. PHYSICS 2340 AND (CHEMISTRY 1240 OR CHEMISTRY 1450)

## ENGRPHYS 3950 Engineering Physics Cooperative Education 2 Credits

Work experience in industry under the direction of the College of Engineering, Mathematics and Science Cooperative Education and Internship Program. During co-op the student is expected to be away from his/her studies at UW-Platteville and work for an industry for a semester and summer.

**Components:** Field Studies

## ENGRPHYS 3970 Engineering Physics Internship 1 Credit

Work experience in industry under the direction of the College of Engineering, Mathematics and Science Cooperative Education and Internship Program. NOTE: This program is separate and distinct from the cooperative education program and is principally designed to cover the summer work experience. Internship is designed to provide experiential learning experience to the student during the summer period. Credits do not fulfill graduation requirements.

**Components:** Field Studies

**Prereqs/Coreqs:** P. Junior standing

## ENGRPHYS 4010 Engineering Physics Lab 2 Credits

Experimental methods, error analysis, design of experiments, teaming and communications. Includes a term design project.

**Components:** Laboratory

**Prereqs/Coreqs:** P. PHYSICS 3140 with a "C-" or better

## ENGRPHYS 4140 Applied Optics 4 Credits

Geometric and physical optics to minimally include ray matrices, Cardinal Points, time-harmonic waves, phasors, interference, diffraction, thin films, Fresnel relations, and Gaussian Optics. The course also includes a laboratory component which covers basic geometric and physical optics.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** P. "C-" or better in PHYSICS 3140, ELECTENG 2210 and MATH 3630

## ENGRPHYS 4210 Sensor Lab 2 Credits

Study of the physics exploited by the most basic types of sensors, including photoelectric, electromechanical, resistive, inductive, capacitive, and chemical. Includes a study of the basic building blocks of a sensor system: the sensor itself, signal conditioning electronics, and computer interfacing.

**Components:** Laboratory

**Prereqs/Coreqs:** P. C- or better in PHYSICS 3140 and ELECTENG 2210 and COMPUTER 1430

**ENGRPHYS 4330 Engineering Quantum Mechanics 3 Credits**

Introduction of the quantum theories which are related to engineering applications. Applications of quantum mechanics, statistical mechanics, and solid state physics to nanoscale material structures, electronics, optoelectronics and other modern engineering technologies.

**Components:** Discussion, Class

**Prereqs/Coreqs:** P. "C-" or better in PHYSICS 3140

**ENGRPHYS 4530 Design, Fabrication, and Simulation of MEMS 3 Credits**

This course is an introduction to Microelectromechanical Systems (MEMS) technology. It covers basic microfabrication technologies, the governing physics for MEMS devices in different energy domains (mechanical, electrical, optical, thermal, and fluidic), and the analysis of micromachined miniature sensors and actuators. Fabrication and design of MEMS devices be illustrated using examples of existing research prototypes and commercial products. Students will also learn how to design, lay out, and fabricate MEMS using CAD based design and visualization software.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** P. "C-" or better in GENENG 2340 or PHYSICS 1450 or PHYSICS 2340

**ENGRPHYS 4930 Engineering Physics Senior Design 3 Credits**

Capstone, industry sponsored, comprehensive engineering design experience. Students work in teams with their sponsor to develop a solution to a real-world problem by a rigorous application of the engineering design process to include constraints and project management. This is the culminating course in the major and challenges students technically as well as technically and professionally.

**Components:** Laboratory, Class

**Prereqs/Coreqs:** P. "C-" or better in ENGRPHYS 4010 and student must be within one year of graduation

**ENGRPHYS 4980 Special Topics in Engineering Physics 1-3 Credits**

A presentation of selected contemporary topics in physics.

**Components:** Laboratory, Class

**ENGRPHYS 4990 Independent Study in Engineering Physics 1-4 Credits**

Study of special topics and/or developments of special projects having department approval.

**Components:** Independent Study