

## Biomedical Physics – PHY courses

### **2130 (PS) General Physics. Cr. 4**

Prereq: high school algebra and trigonometry; coreq: PHY 2131. Satisfies General Education laboratory requirement only when taken concurrently with PHY 2131. No credit after PHY 2170. For general Liberal Arts and Sciences students and for students preparing for medicine, dentistry, pharmacy and health sciences. Mechanics, thermal physics, wave motions, and optics. (T)

### **2131 General Physics Laboratory. Cr. 1 (LAB: 2)**

Coreq: PHY 2130. Satisfies General Education laboratory requirement only when taken concurrently with PHY 2130. Laboratory experiments in mechanics, thermal physics, wave motions and optics. Material Fee as indicated in the Schedule of Classes (T)

### **2140 General Physics. Cr. 4**

Prereq: PHY 2130; coreq: PHY 2141. No credit after PHY 2180. Continuation of PHY 2130. Electricity, magnetism and introduction to modern physics. (T)

### **2141 General Physics Laboratory. Cr. 1 (LAB: 2)**

Coreq: PHY 2140. Laboratory experiments in electricity, magnetism and modern physics. Material Fee as indicated in the Schedule of Classes (T)

### **2170 (PS) University Physics for Scientists I. Cr. 4**

Prereq: MAT 2010; coreq: MAT 2020, PHY 2171. Satisfies General Education laboratory requirement only when taken concurrently with PHY 2171. No credit after PHY 2175. For students specializing in physics, biology, chemistry, mathematics or engineering. Statics, kinematics, dynamics, energy and linear momentum, rotational kinematics and dynamics, angular momentum, solids and fluids, vibrations and wave motion, thermodynamics. (T)

### **2171 University Physics Laboratory. Cr. 1 (LAB: 2)**

Coreq: PHY 2170. Satisfies General Education laboratory requirement only when taken concurrently with PHY 2170. Laboratory experiments in statics, kinematics, dynamics, energy and linear momentum, rotational kinematics and dynamics, angular momentum, simple harmonic motion, optics, continuum mechanics, thermodynamics. Material Fee as indicated in the Schedule of Classes (T)

### **2180 University Physics for Scientists II. Cr. 4**

Prereq: PHY 2170, MAT 2020; coreq: PHY 2181. No credit after PHY 2185. Electric forces and electric fields, electrical energy, capacitance, current, resistance, direct current circuits, magnetism, induced voltage and inductance, AC circuits, electromagnetic waves, geometric and wave optics. (T)

### **2181 University Physics Laboratory II. Cr. 1 (LAB: 2)**

Coreq: PHY 2180. Laboratory experiments in electrostatics, currents and circuit elements, magnetic fields, magnetic induction, AC circuits, electromagnetic waves, interference of waves. Material Fee as indicated in the Schedule of Classes (T)

### **3700 Mathematics for Biomedical Physics. Cr. 4**

Prereq: MAT 2020, PHY 2130 and 2140 (or PHY 2170 and 2180) with a cumulative grade of B or above. Training in specific applied topics of mathematics for biomedical physics majors. (F)

### **3750 Introduction to Computational Methods. Cr. 1**

Prereq: PHY 2130/2140 or PHY 2170/2180, MAT 2020. Introduction to the principles of computer programming with MATLAB or similar software. In addition to learning applications of the software, there will be opportunities for independent or group projects of interest to students. (F)

**4700 Introduction to Biomedical Physics. Cr. 4**

Prereq: PHY 2130/2140 or PHY 2170/2180; MAT 2020; PHY 3700. Basic and applied physical concepts used in biology, human anatomy, and physiology, as well as in medical diagnosis and treatment. (W)

**5340 Optics. Cr. 3**

Prereq: PHY 2140 or PHY 2180, MAT 2030 or PHY 3700; coreq. for PHY majors: PHY 5341. Electromagnetic radiation; geometrical, physical, and modern optics. (W)

**5341 Optics Laboratory. Cr. 2**

Prereq. or coreq: PHY 5340 or ECE 5760. Experiments involving geometrical, physical, and quantum optics. Material Fee as indicated in the Schedule of Classes (W)

**5620 Electronics and Electrical Measurements. Cr. 3**

Prereq: PHY 2140 or PHY 2180; Coreq: PHY 5621. Theory of amplifier circuits, operational amplifiers, oscillators, digital electronics, analog and digital measurements. Material Fee as indicated in the Schedule of Classes (F)

**5621 Electronics and Electrical Measurements Laboratory. Cr. 2**

Prereq: PHY 2140 or PHY 2180; Coreq: PHY 5620. Laboratory measurements related to amplifier circuits, operational amplifiers, oscillators, and digital electronics. The lab will also cover analog and digital measurements and will require a final project. Material Fee as indicated in the Schedule of Classes. (F)

**5750 Biological Physics. Cr. 4**

Prereq: PHY 3700, PHY 4700. Introduction to applications of physics to molecular biology. (F)

**5990 Directed Study. Cr. 1-3**

Prereq: junior standing and consent of advisor and instructor. Primarily for students who wish to continue in a field beyond material covered in regular courses, or who wish to study material not covered in regular courses, including certain research participation. (T)

**6710 Physics in Medicine. (ROC 6710) Cr. 3**

Required for B.S. in Biomedical Physics. Applications of physics in medicine including radioactivity; interaction of radiation in matter; x-ray, CT, MRI, ultrasound, and PET imaging; nuclear medicine; radiation oncology; nerve electrophysiology, electrocardiogram, pacemakers, and defibrillators. (W)

**6750 Applied Computational Methods. Cr. 2**

Prereq: PHY 3750 or PHY 3310. Development of concepts learned in PHY 3750 or PHY 3310 for computer applications in physics research, including applications in theoretical physics, data fitting, image analysis, and integration with experimental equipment. There will be opportunities for independent as well as group projects. Material fee as given in Schedule of Classes. (F)

**6780 (WI) Research Methods in Biomedical Physics. Cr. 3**

Prereq: PHY 3700, PHY 4700. Introduction to laboratory experience in biomedical physics research. Capstone course for biomedical physics majors. Material fee as given in Schedule of Classes. (W)