



# Physics & Engineering

## *Purposes*

- To prepare students for graduate studies in physics or engineering;
- To prepare students for a career in research or teaching;
- To prepare students for employment in various fields of applied physics and engineering;
- To satisfy pre-professional requirements for students choosing to attend engineering or architectural schools.

## *Tradition of Excellence*

The Department of Physics and Engineering offers a quality education in one of the best possible environments. The Department's newly updated curriculum places PLNU at the cutting edge of physics instruction. Recently, the laboratories have been remodeled and tens of thousands of dollars have been invested into state-of-the-art equipment. One of the advantages of PLNU is the ability to provide students with one-on-one instruction in smaller-sized classes, which means more time to talk with the faculty and more hands-on experience with the research-grade equipment. One of the most valuable resources offered at PLNU is the practical work experience students have the opportunity to gain next door to the University at the Space and Naval Warfare Systems Command (SPAWAR) of the U.S. Navy. Many students work part-time in Computer Aided Design (CAD), electronics, and computer science applications. Not only is this a rewarding experience with good pay, it also leads to a government security clearance which is very useful when applying for jobs in defense industries after graduation. Another tradition that has been established in the Department is the acceptance of the Junior Engineering Physics and Physics majors into summer research programs at major universities and government agencies. These summer research experiences provide an opportunity for the members of the junior class to begin establishing professional contacts with individuals around the country and significantly enhancing their entrance into the graduate school of choice.

## *Career Opportunities*

Most Physics majors continue their education in graduate school and eventually become research scientists or teachers. The Engineering Physics majors focus on electronic circuit and computer hardware design. Graduates with this major have the option to attend graduate school or enter the job market in industry or government immediately after graduation. Point Loma offers both a Bachelor of Science and a Bachelor of Arts in Physics as well as a Bachelor of Science in Engineering Physics.

## *Majors and Minor*

### *Majors*

Engineering Physics  
Physics

### *Minor*

Physics

## *Faculty*

Kendall Mallory, Ph.D.  
*University of California, Riverside*

Dee G. Punttenney, Ph.D.  
*Purdue University*

Paul Schmelzenbach, Ph.D.  
*Oregon State University*

Keith G. Walker, Ph.D., Chair  
*University of Oklahoma*

## **CORE CURRICULUM**

The following courses are required of all Physics and Engineering Physics majors:

<b>COURSE #</b>	<b>TITLE</b>	<b>UNITS</b>
EGR 110	Computational Methods for Engineers & Scientists I	1
EGR 120	Computational Methods for Engineers & Scientists II	1
PHY 241	University Physics I	4
PHY 242	University Physics II	4
PHY 304	Modern Physics	4

PHY 341*	Analytical Mechanics	4
PHY 361	Electricity, Magnetism, and Waves I	.3
PHY 401	Thermodynamics	.3
PHY 431	Quantum Mechanics	.3
PHY 495	Seminar in Physics	.1
MTH 164	Calculus I	.4
MTH 174	Calculus II	.4
MTH 274	Calculus III	.4
MTH 334	Applied Mathematics	.4
CHE 152	General Chemistry I	.4
	TOTAL	.48

\* *Engineering Physics majors may substitute Engineering 215 for Physics 341.*

**RECOMMENDATION**

COURSE #	TITLE	UNITS
CSC 142	Intro to Computer Science	.2
CSC 154	Fundamentals of Computer Science	.4

**Engineering Physics (B.S.) Major**

The courses listed below are required in addition to the core curriculum to obtain a B.S. degree in Engineering Physics.

COURSE #	TITLE	UNITS
EGR 130	Engineering Drawing I	.1
EGR 140	Engineering Drawing II	.1
EGR 215	Engineering Mechanics	.3
EGR 352	Analog Electronics	.2
EGR 422	Digital Electronics	.2
EGR 432	Computer Interfacing	.2
EGR 442	Mobile Robotics	.2
PHY 311	Nuclear Physics	.3
PHY 362	Electricity, Magnetism, and Waves II	.3
PHY 443	Solid State Physics	.3
	TOTAL	.22

**Physics (B.A.) Major**

The following courses are required in addition to the core curriculum to obtain a B.A. in Physics:

COURSE #	TITLE	UNITS
CHE 153	General Chemistry II	.4
<i>One of the following courses:</i>		
PHY 311	Nuclear Physics	.3
PHY 362	Electricity, Magnetism, and Waves II	.3
PHY 443	Solid State Physics	.3
	TOTAL	.7

**Physics (B.S.) Major**

The courses listed below are required in addition to the core curriculum to obtain a B.S. degree in Physics.

COURSE #	TITLE	UNITS
CHE 153	General Chemistry II	.4
PHY 311	Nuclear Physics	.3
PHY 362	Electricity, Magnetism, and Waves II	.3
PHY 443	Solid State Physics	.3
<i>At least four units from the following courses:</i>		
CHE 295	Organic Chemistry I	.5
EGR 422	Digital Electronics	.2
EGR 432	Computer Interfacing	.2
	TOTAL	.17-18

**Physics Minor**

COURSE #	TITLE	UNITS
PHY 241	University Physics I	.4
PHY 242	University Physics II	.4
PHY 304	Modern Physics	.4
• Eight (8) more hours of physics or engineering courses at level 300 or above.		
	TOTAL	.20

**Engineering Courses**

**EGR 110 (1) COMPUTATIONAL METHODS FOR ENGINEERS AND SCIENTISTS I**

An introduction to techniques used in scientific analysis, including graphing of data, curve fitting, numerical methods of problem solution, error analysis, and the use of computers for solving problems in physics and engineering. Three hours laboratory each week. Offered on a Quad basis.

**EGR 120 (1) COMPUTATIONAL METHODS FOR ENGINEERS & SCIENTISTS II**

Engineering and scientific computing utilizing MatLab software. Examples and applications taken From Engineering, Physics, chemistry, and biology. Three hours laboratory each week. Offered on a Quad basis.

*Corequisite: Engineering 110.*

**EGR 130 (1) ENGINEERING DRAWING I**

An introduction to orthographic projection and isometric pictorials. Visualization of 3-dimensional objects. Concepts are introduced using sketching followed by extensive use of computer-aided design (CAD). Applications relevant to the student's major. One two-hour lab each week.

**EGR 140 (1) ENGINEERING DRAWING II**

A continuation of the concepts introduced in Engineering 130, using more advanced drawing concepts and CAD commands. One two-hour lab each week.

*Corequisite: Engineering 130.*