

law, theology, or medicine; or (4) are considering graduate work in philosophy itself, usually with the intention of teaching in the field.

Undergraduate study in philosophy is not meant to train specifically for a first job. Instead, it serves to sharpen basic skills in critical thinking, problem solving, research, analysis, interpretation, and writing. It also provides critical perspective on and a deep appreciation of ideas and issues that have intrigued humanity throughout the ages, including those central to the Western intellectual heritage. This prepares students for a great variety of positions of responsibility, especially when coupled with specialized training in other disciplines. Those with the highest potential for advancement generally have more than just specialized training; rather, they bring to their work breadth of perspective, intellectual flexibility and depth, and well-honed skills in critical thought and communication.

#### *Why a Philosophy Requirement*

Students who take philosophy engage in a systematic and sustained examination of the basic concepts of life, such as justice, knowledge, goodness, and the self. By scrutinizing methods, assumptions, and implications, they are able to explore lifelong questions of meaning, thought, and action. They acquire historical perspective on the diversity of human thought and tolerance for the considered opinions of others. Through the collective exploration of, and reasoned argument over, difficult ideas, students develop autonomy in their decision-making. Philosophy is vital to the formation of meaning and purpose in students' lives and provides an indispensable framework for developing a sense of vocation - Who am I? What values should we hold? What really is the common good to which I might contribute? What kind of life should I live? In short, the active study of philosophy is essential "to empower students for lives of thoughtful inquiry, service, leadership and care — for other persons, for the community and for the earth."

#### *General Education Program (GenEd) Element*

The GenEd element of four semester hours in philosophy may be satisfied with any course offered except for PHIL 233: Formal Logic.

The initial course in philosophy is customarily PHIL 121, PHIL 125, or a 200-level course that provides a more focused topic but is still at the introductory level (PHIL 220, 223, 228, 230, 238, 253). The 300-level courses are suited for students with particular interests who are capable of working at the upper-division level. Courses offered through correspondence, on-line, and independent studies are not accepted to meet the general university requirement in philosophy.

#### **BACHELOR OF ARTS MAJOR**

*Minimum of 32 semester hours, including:*

- PHIL 233, 499
- One course from PHIL 331, 333, 334
- One course from PHIL 335, 336, 338
- On approval of the department, one course (four hours) in another field of study may be used for a double major in

philosophy if it has a direct relationship to the student's philosophy program. Transfer students will normally take 16 or more of their 32 hours at PLU. Students intending to major in philosophy should formally declare this with the department chair and choose a departmental advisor

- Students must be a declared philosophy major in order to be eligible for departmental scholarships.

#### **Honors Major**

In addition to the above requirements for the major:

**PHIL 493: Honors Research Project**, including an honors thesis written under the supervision of one or more faculty members and presented to the department.

Completion of the departmental reading program of primary sources. Honors majors in philosophy are expected to complement their regular courses by reading and discussing three or four important works under the personal supervision of department faculty. The reading list should be obtained at an early date from the department chair. It is best that the reading program not be concentrated into a single semester, but pursued at a leisurely pace over an extended period.

At least a 3.30 grade point average in philosophy courses, including at least a "B" in PHIL 493.

#### **MINOR**

**16 semester hours, including at least four upper-division hours.**

For transfer students, at least eight hours must be taken at PLU. Non-PLU courses must be approved by the department chair.

*To view Philosophy (PHIL) courses, go to the PLU Directory of Approved Courses on page 203.*

## Physics

253.535.7534

[www.nsci.plu.edu/physics@plu.edu](http://www.nsci.plu.edu/physics@plu.edu)

Physics is the scientific study of the material universe at its most fundamental level: the mathematical description of space and time, and the behavior of matter from the elementary particles to the universe as a whole. A physicist might study the inner workings of atoms and nuclei, the size and age of the universe, the behavior of high-temperature superconductors, or the life cycles of stars.

Physicists use high-energy accelerators to search for quarks; they design new laser systems for applications in medicine and communications; they heat hydrogen gases to temperatures higher than the sun's core in the attempt to develop nuclear fusion as an energy resource. From astrophysics to nuclear physics to optics and crystal structure, physics encompasses some of the most fundamental and exciting ideas ever considered.

**Faculty:** Louie, *Chair*; Gerganov, Greenwood, Hay, Rush, Starkovich.

## PHYSICS MAJOR

The physics major offers a challenging program emphasizing a low student-teacher ratio and the opportunity to engage in independent research projects. There are two introductory course sequences, College Physics and General Physics; the General Physics sequence incorporates calculus and is required for the Bachelor of Science major.

### BACHELOR OF ARTS MAJOR

PHYS 153, 154; 163, 164, 223, 499A, 499B.

**Plus:** Eight additional, upper-division semester hours in physics.

**Required supporting courses:** MATH 151, 152, 253.

### BACHELOR OF SCIENCE MAJOR

PHYS 153, 154, 163, 164, 223, 331, 332, 333, 336, 354, 356, 499A, 499B.

**Strongly recommended:** PHYS 401 and 406

Chemistry 341 or PHYS 321 may be substituted for PHYS 333

**Required supporting courses:**

CHEM 115; MATH 151, 152, 253

A typical B.S. physics major program is as follows:

<b>First Year</b>	PHYS 153, 163; MATH 151, 152
<b>Sophomore Year</b>	PHYS 154, 164, 223, 354; MATH 253
<b>Junior Year</b>	PHYS 331, 332, 336, 356; CHEM 115
<b>Senior Year</b>	PHYS 333, 401 or 406, 499A, 499B

### MINOR

PHYS 153; 154; 163; 164; 223.

**Plus** eight additional semester hours in physics (excluding PHYS 110), of which at least four must be upper division.

### BACHELOR OF SCIENCE MAJOR IN APPLIED PHYSICS

Also available is a major in Applied Physics, which includes a substantial selection of courses from engineering to provide a challenging and highly versatile degree. Applied Physics can lead to research or advanced study in such areas as robotics—with application in space exploration or joint and limb prosthetics; growth of single-crystal metals, which would be thousands of times stronger than the best steels now available; mechanics of material failure, such as metal fatigue and fracture; turbulence in fluid flow; photovoltaic cell research for solar energy development; or applications of fluid flow and thermodynamics to the study of planetary atmospheres and ocean currents.

While many Applied Physics graduates pursue professional careers in industry immediately after graduation from PLU, the program also provides excellent preparation for graduate study in nearly all fields of engineering.

PHYS 153, 154, 163, 164, 223, 331, 334, 354, 356, 499A, 499B  
CSCE 131

**Plus: Four courses, one of which must be upper division, selected from:**

CSCE 245, 345, 346

PHYS 210, 240, 333;

PHYS 336 may be substituted for PHYS 240

CHEM 341

or PHYS 321 may be substituted for PHYS 333

**Required supporting courses:**

CHEM 115 CSCE 144 MATH 151, 152, 253

A typical applied physics program is as follows:

<b>First Year</b>	PHYS 153, 163; CSCE 131; MATH 151, 152
<b>Sophomore</b>	PHYS 154, 164, 240, 354; MATH 253
<b>Junior</b>	PHYS 223, 333, 356; CHEM 115; CSCE 144
<b>Senior</b>	PHYS 331, 333A, 499A, 499B; CSCE 245

To view Physics (PHYS) courses, go to the PLU Directory of Approved Courses on page 205.

## Political Science

253.535.7595

[www.plu.edu/political-science](http://www.plu.edu/political-science)

[pols@plu.edu](mailto:pols@plu.edu)

The student of politics seeks to understand how governments are organized and structured, how political processes are employed, and the relationship of structures and processes to societal purposes. Political activity embodies and reflects the full range of human values. The study of politics includes real world events while at the same time asking how well political systems work, what purposes they ought to serve, and what effects result from political activity. Political science encourages a critical understanding of government and politics in the belief that a knowledgeable, interested, and aware citizenry remains vital to a democratic society.

**Faculty:** Grosvenor, *Chair*; Chavez, Dwyer-Shick, Kelleher, Olufs.

Courses in political science explore various topics in American government and politics, international relations and foreign policy, comparative government and area studies, political philosophy and theory, and public policy and law. The department provides pre-professional training leading to careers in teaching, law, government, and related fields.

Students of political science are strongly encouraged to combine the academic study of government and politics with practical experience by participating in one of the internship programs sponsored by the department.

The department sponsors or otherwise encourages active student participation in political life through class activities and through such campus organizations as the Young Democrats and the Young Republicans.

There are no prerequisites for political science courses, except as noted. Prior consultation with the instructor of any advanced course is invited. Students wishing to pursue a major or minor

(such as Alain Locke, Jane Addams, Josiah Royce, Alfred N. Whitehead). Links with current feminist and continental thought will be explored. (4)

***PHIL 338: Continental Philosophy - PH***

Focus on recent issues in contemporary Continental philosophy such as hermeneutics, phenomenology and existentialism, and critical social theory. (4)

***PHIL 350: God, Faith, and Reason – PH***

Classical and contemporary views of traditional issues regarding the nature and rationality of religious belief, with a focus on monotheistic religions and a unit on religious pluralism. **Prerequisite:** One course in philosophy or religion. (4)

***PHIL 353: Topics in Philosophy – PH***

Study of selected topics in philosophy, such as value theory, science, metaphysics, epistemology, feminism, film or health care. May be repeated for credit. (2-4)

***PHIL 493: Honors Research Project***

The writing of an honors thesis and final completion of the reading program in primary sources required for the honors major. Presentation of thesis to department majors and faculty. (4)

***PHIL 499: Capstone: Advanced Seminar in Philosophy – SR***

Exploration in a seminar format of an important philosophical issue, thinker, or movement. Topic to be announced at the time course is offered. **Prerequisite:** Three philosophy courses or consent of instructor. May be repeated once for credit. (4)



**Physics (PHYS)**

<b>Fall</b>	PHYS 110, 125, 135, 153, 154, 163, 164, 240, 331, 333, 356, 499A
<b>Spring</b>	PHYS 126, 136, 153, 154, 163, 164, 210, 223, 321, 332, 334, 336, 354, 499B
<b>Summer</b>	PHYS 110, 125, 126, 135, 136
<b>Alternate Years</b>	PHYS 321, 332, 334, 336, 401, 406

*A grade of C- or better is required in all prerequisite courses.*

***PHYS 110: Astronomy – NS, SM***

Stars and their evolution, galaxies and larger structures, cosmology, and the solar system. Emphasis on observational evidence. Evening observing sessions. **Prerequisites:** MATH 115 or Math placement score of 115 or above. (4)

***PHYS 125: College Physics I – NS, SM***

An introduction to the fundamental topics of physics. It is a non-calculus sequence, involving only the use of trigonometry and college algebra. Concurrent registration in (or previous completion of) PHYS 135 is required. **Prerequisites:** MATH 128 or 140 (or equivalent by placement exam) with a C- or higher. (4)

***PHYS 126: College Physics II – NS, SM***

An introduction to fundamental topics of physics. It is a non-calculus sequence, involving only the use of trigonometry and college algebra. Concurrent registration in (or previous completion of) PHYS 136 is required. **Prerequisite:** PHYS 125 with a C- or higher.

***PHYS 135: College Physics I Laboratory***

Basic laboratory experiments are performed in conjunction with the College Physics sequence. Concurrent registration in PHYS 125 is required. (1)

***PHYS 136: College Physics II Laboratory***

Basic laboratory experiments are performed in conjunction with the College Physics sequence. Concurrent registration in PHYS 126 is required. (1)

***PHYS 153: General Physics I – NS, SM***

A calculus-level survey of the general fields of physics, including classical mechanics, wave motion, and thermodynamics. Concurrent registration in (or previous completion of) PHYS 163 is required. Concurrent registration in (or previous completion of) MATH 152 is strongly recommended. **Prerequisite:** MATH 151 with a C- or higher. (4)

***PHYS 154: General Physics II – NS, SM***

A calculus-level survey of the general fields of physics, including electricity and magnetism, and optics. Concurrent registration in (or previous completion of) PHYS 164 is required. **Prerequisites:** MATH 152, PHYS 153 with a C- or higher. (4)

***PHYS 163: General Physics I Laboratory***

Basic laboratory experiments are performed in conjunction with the General Physics sequence. Concurrent registration in PHYS 153 is required. (1)

***PHYS 164: General Physics II Laboratory***

Basic laboratory experiments are performed in conjunction with the General Physics sequence. Concurrent registration in PHYS 154 is required. (1)

***PHYS 210: Musical Acoustics - NS, SM***

A study of sound and music using physical methods; vibrating systems; simple harmonic motion; wave motion; complex waves and Fourier synthesis; wave generation in musical instruments; physiology of hearing; architectural acoustics; electronic recording and amplification. Includes weekly laboratory. No prerequisites in physics or mathematics beyond the PLU entrance requirements are assumed. (4)

***PHYS 223: Elementary Modern Physics***

A selected treatment of various physical phenomena which are inadequately described by classical methods of physics. Interpretations which have been developed for these phenomena since approximately 1900 are presented at an elementary level. **Prerequisites:** PHYS 154 and MATH 253. (4)

***PHYS 240: Engineering Statics***

Engineering statics using vector algebra; equilibrium of rigid bodies; equivalent force and moment systems; centroids and center of gravity; trusses and frames; methods of virtual work; shear and bending moment diagrams; moments of inertia. **Prerequisite:** PHYS 153. (4)

***PHYS 321: Introduction to Astrophysics***

Application of physics to the study of stellar structure, galactic astronomy, and cosmology. Introduction to observational techniques. **Prerequisites:** PHYS 154 and MATH 253. Concurrent enrollment in PHYS 223 is recommended. (4)

***PHYS 331: Electromagnetic Theory***

Electrostatics, dipole fields, fields in dielectric materials, electromagnetic induction, and magnetic properties of matter, in conjunction with the development of Maxwell's equations. **Prerequisites:** PHYS 153, 154 and MATH 253. (4)

***PHYS 332: Electromagnetic Waves and Physical Optics***

Proceeding from Maxwell's equations, the generation and propagation of electromagnetic waves is developed with particular emphasis on their application to physical optics. **Prerequisite:** PHYS 331. (4)

***PHYS 333: Engineering Thermodynamics***

Classical, macroscopic thermodynamics with applications to physics, engineering, and chemistry. Thermodynamic state variables, cycles, and potentials; flow and non-flow systems; pure substances, mixtures, and solutions; phase transitions; introduction to statistical thermodynamics. **Prerequisites:** PHYS 153 and MATH 253. (4)

***PHYS 334: Engineering Materials Science***

Fundamentals of engineering materials including mechanical, chemical, thermal, and electrical properties associated with metals, polymers, composites, and alloys. Focus on how useful material properties can be engineered through control of microstructure. **Prerequisites:** PHYS 154; CHEM 115. (4)

***PHYS 336: Classical Mechanics***

Applications of differential equations to particle dynamics; rigid body dynamics, including the inertia tensor and Euler's equations; calculus of variations; Lagrange's equations and the Hamiltonian formulation of mechanics; symmetries and conservation laws. **Prerequisites:** PHYS 154 and MATH 253. (4)

***PHYS 354: Mathematical Physics I***

Ordinary differential equations, Laplace transforms, functions of a complex variable, and contour integration are developed in the context of examples from the fields of electromagnetism, waves, transport, vibrations, and mechanics. **Prerequisites:** PHYS 154 and MATH 253. (4)

***PHYS 356: Mathematical Physics II***

Fourier analysis, boundary-value problems, special functions, and eigenvalue problems are developed and illustrated through applications in physics. **Prerequisite:** PHYS 354. (4)

***PHYS 401: Introduction to Quantum Mechanics***

The ideas and techniques of quantum mechanics are developed. Concurrent registration in (or previous completion of) PHYS 356 is required. (4)

***PHYS 499A: Advanced Laboratory I - SR***

Selected experiments from both classical and modern physics are performed using state of the art instrumentation. With 499B meets the senior seminar/project requirement. (1)

***PHYS 499B: Advanced Laboratory II - SR***

Continuation of PHYS 499A with emphasis on design and implementation of a project under the guidance of the physics staff. With PHYS 499A meets the senior seminar/project requirement. **Prerequisite:** PHYS 499A. (1)

