

Computational Physics

Departments
and Programs
in the College
of Science

Biochemistry &
Biophysics

Biology

Botany & Plant
Pathology

Chemistry

Environmental
Sciences

Geosciences

Mathematics

Microbiology

Molecular &
Cellular Biology*

Physics

Pre-professional
Programs in the
Health Sciences

Professional
Science Masters*

Science &
Mathematics
Education*

Statistics*

Zoology

*graduate program only

... combining physics, computer science, and mathematics. Computational physics provides scientific solutions to real-world problems. The computational physics for under graduates (CPUG) program is a rigorous, multidisciplinary, four-year major that combines physics, computer science, and mathematics, leading to a bachelor's degree in computational physics. CPUG gives students experience with techniques common to areas such as environmental modeling, nuclear cleanup, material design, elementary particle physics, medical imaging and energy management. This new discipline is evolving hand-in-hand with the modern increase in computing power and accessibility.

Career Opportunities

A bachelor's degree in computational physics provides students with a solid platform in physics, computing, and mathematics, as well as valuable skills in complex problem-solving and team work. You will be recognized for your achievement in an exceptional program. An undergraduate degree in a multidisciplinary subject is rare, particularly in computational physics which comprises just a handful of such programs. With a bachelor's degree in computational physics, you have an excellent preparation for:

High-performance computing in science and engineering areas such as energy and aerospace, chemistry, finance, medicine, environmental science, oceanography, material science, computer science, and applied mathematics

Research in academic, industrial, or national laboratories

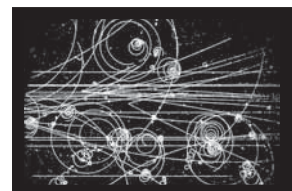
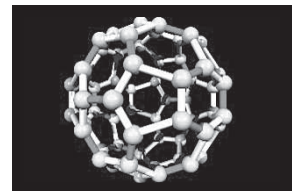
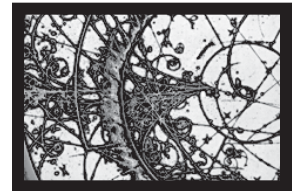
Graduate school

Teaching at all levels

The Department of Physics at Oregon State University grants separate bachelor's degrees in either physics or computational physics (or both). Minors in each field are also possible. CPUG is the only scientific computing degree in the College of Science, and it complements the computer science degrees offered in the College of Engineering. Faculty members in the Physics Department lead theoretical, computational, and experimental research programs in the specialties of atomic, optical, solid-state, and subatomic physics, with graduate students receiving M.S. and Ph.D. degrees.

The CPUG degree is a spin-off of this research. State-of-the-art hardware and software that were recently available only at national research laboratories are now provided to the CPUG major.

Research-grade super-minicomputers are available for computations in theoretical atomic, nuclear, and solid-state physics. A special laboratory has been established to train students to interface computers to laboratory equipment.



Computational Physics

Course of Study: A Research-rich Experience

The computational physics undergraduate program presents to students materials that have recently been developed in research laboratories and supercomputer centers. Students get actively engaged in a large number of projects and treat each as if it were an original scientific investigation. This is a mark of excellence in undergraduate education and is facilitated by OSU being a Carnegie Doctoral/Research-Extensive University. The final year of our program culminates in students doing experiments and a thesis project in an advanced, computational science lab. The “experiments” are simulations run on our 20-node Beowulf supercomputer and repeat successful M.S. and Ph.D. thesis research. During the summers our students may join computational research programs within OSU, at laboratory and industrial sites, and at the San Diego Supercomputer Center. Monetary support is often available.

Several National Science Foundation grants have led to the establishment of two computational physics teaching laboratories. In support of our advanced computational lab, we have constructed a Beowulf supercomputing cluster from 20 Sun Ultras. Our regular CPUG labs include 40, dual-processor, 3-GHz Dells running Linux. All these 24-hour facilities are open to everyone in the program and are separate from computers used by the research groups and in the general laboratories. This coherent and rigorous degree program is supported as a national leadership effort, and it helps give students access to internship programs and national conferences. In addition, students will be part of and assist in a curriculum development program that future generations of students will use.

Sample Curriculum

An official graduation checklist may be obtained from an advisor.

Freshman Year			credits		
General Physics with Calculus	PH 211	4	Physics Recitation	PH 221	1
Calculus	MTH 251, 252, 254	12	General Chemistry	CH 201, 202	6
Scientific Computing	PH/MTH 265	3	Introductory Computer Science	CS 161	4
CP/CS seminar		1	BC: Writing I	WR 121	1
BC: Fitness		3	BC: Perspectives		7

Sophomore Year			credits		
Scientific Computing II	PH 464	3	Introd. Computer Science	CS 162	4
General Physics with Calculus	PH 212, 213	8	Physics Recitation	PH 222, 223	2
Introductory Modern Physics	PH 314	4	Calculus & Differential Equa.	MTH 306, 255, 256	12
Linear Algebra	MTH 341	3	Discrete Mathematics	MTH 231	4
BC: Writing II		3	BC: Perspectives		3

Junior Year			credits		
Introductory Statistical Methods	ST 314	3	Paradigms in Physics	PH 421, 422, 424, 425, 426	12
Symmetries	PH 320	2	Quantum/Classical Mechanics	PH 435/461	3
Data Structures	CS 261	4	CP Seminar	PH 407	1
Computational Physics	PH 465, 466	6	BC: Synthesis		3
BC: Perspectives/Writing III		12			

Senior Year			credits		
Electromagnetism	PH 431	3	Thermal and Statistical Physics	PH 441	3
Quantum Physics	PH 451	3	Mathematical Physics	PH 461	3
Numerical Linear Algebra	MTH 451	3	Research & Thesis	PH 403, 403	
Web Authoring/Interactive Multimedia	CS 295/395	4	Social and Ethical Issues in CS	CS 391	3
Advanced Computational Lab	PH 467	3	Electives		12
BC: Synthesis		3			

What to know about Oregon State University

Head Advisor
College of Science
128 Kidder Hall
541-737-4811

OSU Admissions
104 Kerr Administration
541-737-4411
800-291-4192

OSU Financial Aid
Student Employment
Loans & Scholarships
College Work Study
218 Kerr Administration
541-737-2241

OSU Registrar
102 Kerr Administration
541-737-4331

OSU Housing
102 Buxton Hall
541-737-4771

OSU Website
<http://oregonstate.edu>

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Experience.
Explore.
Discover
Achieve.

Biochemistry & Biophysics

Biology

Botany & Plant Pathology

Chemistry

Environmental Sciences

Geosciences

Mathematics

Microbiology

Molecular & Cellular Biology*

Physics

Pre-professional Programs in the Health Sciences

Professional Science Masters*

Science & Mathematics Education*

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Zoology

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