degree in Earth system science gives students a unique opportunity to work in the coupled system of atmosphere, ocean, and land. The curriculum for the B.S. degree in Earth System Science is designed to provide students with a comprehensive understanding of the Earth as a system, enabling them to address complex environmental challenges.

In addition to the regular B.S. degree, the department offers an Earth System Science Education with Secondary Teaching Certification option for those interested in teaching. Additionally, students can pursue concentrations in various areas, including Biogeochemistry and Earth's Climate, which focuses on the interactions between the biological and chemical processes that influence Earth's climate.

Undergraduate Areas of Study

Chemistry, B.S.
Concentrations:
- Biochemistry
- Chemistry Education with Secondary Teaching Certification option

Earth System Science, B.S.
Concentration:
- Geosciences Education with Secondary Teaching Certification Specializations:
  - Atmospheric Science
  - Oceanography
  - Hydrology and Terrestrial Ecosystems

Environmental Science, B.A.
Concentration:
- Geosciences Education with Secondary Teaching Certification

Mathematics, B.S.
Concentration:
- Mathematical Finance
- Mathematics for Education / Secondary Teaching Certification Specializations:
  - Applied and Computational Mathematics
  - Mathematical Biology
  - Mathematics for Education

Physics, B.S.
Concentrations:
- Applied Physics
- Biomedical Physics
- Computational Physics
- Philosophy of Physics
- Physics Education with Secondary Teaching Certification option
Specialization:
- Astrophysics

minors
- Earth and Atmospheric Sciences
- Mathematics
- Mathematics for Biology

Academic Offerings

Chemistry
UC Irvine’s chemistry faculty work at the forefront of knowledge in every major area of chemistry, and chemistry majors are well prepared to meet the challenges of the modern technological world. Courses are offered at introductory, upper-division, and graduate levels in a broad range of subjects, including physical, organic, inorganic, analytical, biological, atmospheric, and materials chemistry.

In addition to the regular B.S. degree in chemistry, the department offers an American Chemical Society-certified degree and concentrations in both biochemistry and chemistry education. Chemistry faculty conduct cutting-edge research in such exciting areas as chemical physics, organic synthesis, ultrafast spectroscopy, materials science, rational drug design, organometallic chemistry, polymers, and bio-organic chemistry. Undergraduate research opportunities are abundant, and many chemistry majors are directly involved in the drama of scientific discovery.

Earth System Science
The Department of Earth System Science has brought together some of the most accomplished environmental scientists in the world to study the Earth as a coupled system of atmosphere, ocean, and land. The curriculum for the B.S. degree in Earth system science gives students a unique opportunity to work in the classroom, laboratory, and field with a group of teachers and scholars who are playing a critical role in shaping the environmental future. The B.A. in environmental science trains and educates students interested in environmental problem solving by linking an understanding of natural science with socioeconomic factors and public policy.

Earth system science faculty conduct start-of-the-art research in the key areas of physical climate, biogeochemical cycling and atmospheric chemistry. Diverse approaches include field and laboratory analysis, computer simulations, and analysis of satellite remote sensing data. A number of faculty are interested in the links between biogeochemistry and Earth’s climate. Majors are encouraged to become involved in undergraduate research projects in conjunction with faculty, and to write a senior thesis based on this research. Students who are interested in teaching are encouraged to complete a concentration in geosciences education which is available for both the B.S. and B.A. degrees.

Mathematics
Mathematicians are frequently asked, “How can you do research in math? Hasn’t it all been done before?” The answer is no, there is still much to be discovered; in fact, about 50,000 mathematics research papers are published each year. The rapid growth in scientific and technological areas that rely on mathematical techniques has led to a dramatic growth in the number and kind of real-world problems confronting the mathematicians of the twenty-first century.

In recognition of these new areas and the need for specifically trained mathematicians, the department offers several program options for mathematics majors. In addition to the traditional B.S. degree, majors can complete formal specializations in applied and computational mathematics, mathematical biology, and mathematics for education. Other options include a concentration in mathematical finance and a concentration in mathematics for education.
The mathematics faculty includes many members with strong international reputations for their research in a variety of fields such as applied mathematics, geometry, logic, mathematical physics, number theory, and topology. Math majors are able to work with these faculty not only in the classroom, but also on a one-to-one basis through independent study courses.

**Physics**

Physics lies at the forefront of our understanding of nature. It includes the study of the universe on the largest scales – astronomy and cosmology, and on the smallest – the physics of quarks and leptons. UCI physicists study exciting topics like quantum mechanics, gravitation, the big bang, black holes, magnetism, and superconductivity. In addition, physics provides the background for high technology; lasers, nuclear power, semiconductors, and medical imaging all have their roots in physics.

Physics majors have the opportunity to work closely with faculty throughout their undergraduate years in large introductory courses; small lectures and laboratories are reserved for physics majors only. These special sections promote closer student-faculty interaction, and allow the small community of physics students to work together as they explore this fascinating but demanding field. The curriculum is flexible enough to accommodate a wide variety of interests, including astrophysics, biomedical physics, computational physics, philosophy of physics, business, law, and teaching. Students are guided through the program by faculty advisors who are specialists at working with students in different stages of their academic careers.

**Special Resources and Opportunities**

**Science and Mathematics Education**

In recognition of the critical educational role played by high school science and mathematics teachers, the physical sciences faculty has developed special degree programs for students interested in teaching careers. Option 1: Physical Sciences students who are interested in pursuing a teaching career should consider the UCI Cal Teach Science and Mathematics Program. This program offers chemistry, Earth system science, environmental science, mathematics, and physics majors an option to earn their bachelor’s degree concurrently with a California Preliminary Single Subject Teaching Credential. With careful, early planning, it is possible for students to complete their degree and teacher certification in four years. Option 2: A second option for students is to earn a teaching credential in a post-baccalaureate teacher preparation program after completing their bachelor’s degree. The concentration in chemistry education, the mathematics for education specialization, and the concentration in physics education work well for students following this option. Each provide strong grounding in the primary discipline, while emphasizing the breadth in natural sciences needed to help satisfy the requirements for a secondary teaching credential.

**Undergraduate Research**

Undergraduate research opportunities in all four departments are plentiful; typically about half of the graduating students have engaged in research with a faculty member during their time at UCI. Participation in research can lead to presentations at local and national conferences, and publication in scientific journals. The research experience helps students to clarify their educational and occupational goals, and provides valuable preparation for graduate school and careers in industry. Research is available through courses, summer opportunities and programs. In addition, some students are hired on faculty members’ grants to engage in paid research.

**Honors Offerings**

Courses:
- Honors General Chemistry
- Earth System Science
- Mathematics
- Physics

**Research Centers**

- AirUCI
- Center for Chemical and Material Physics Program (ChAMP)
- Center for Chemical and Structural Biology
- Center for Cosmology
- Center for Interdisciplinary Chemical Synthesis
- Center for Mathematical and Computational Biology
- Center for Solar Energy
- Chemistry at the Space-Time Limit (CaSTL)
- The Environment Institute: Global Change, Energy, and Sustainable Resources
- Institute of Geophysics and Planetary Physics (IGAPP)
- Institute for Surface and Interface Science (ISIS)
- Southern California Center for Galaxy Evolution (CGE)

**Research Facilities**

- Array of Enhanced Nodes Supercomputer (AENIAS)
- Computational and Applied Mathematics Infrastructure
- Earth System Modeling
- Electronics Facility
- Instrumentation Development Facility
- Integrated Nanosystems Research
- Laser Spectroscopy
- Molecular Modeling
- Nuclear Magnetic Resonance Spectroscopy (NMR)
- Stable Isotope Radio Mass Spectrometry (IRMS)
- UCI Observatory
- W.M Keck Carbon Cycle Mass Spectrometer
- X-Ray Crystallography

**Education Abroad Program**

The School of Physical Sciences encourages students in all majors to enhance their UCI education by studying abroad. There are programs for every major, and opportunities in more than 50 countries. Early academic planning is encouraged so that you can find the program that is the best match for you and graduate on time. Financial aid, including scholarship, grants and loans, applies to most study abroad programs. Studying abroad helps UCI graduates achieve the academic, personal, and professional skills necessary to be well-informed, engaged members of the global society. For detailed information, go to UCI’s Center for International Education: www.cie.uci.edu.

**Additional Information**

**School of Physical Sciences**

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www.editor.uci.edu/catalogue (PDF Version)

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