PHIL 282. Seminar in Individual Philosophers (4) Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): graduate standing or consent of instructor. Considers a major figure in the history of philosophy. Students who submit a term paper receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade. Course is repeatable.

PHIL 283. Seminar in Contemporary Philosophy (4) Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): graduate standing or consent of instructor. Covers an aspect of contemporary philosophy. Students who submit a term paper receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade. Course is repeatable.

PHIL 290. Directed Studies (1-6) Term paper, 3-18 hours. Prerequisite(s): consent of instructor and graduate advisor. Directed study to meet special curricular needs. Course is repeatable.

PHIL 291. Individual Studies in Coordinated Areas (2-4) Prerequisite(s): graduate standing. A program of studies designed to advise and assist candidates who are preparing for the Comprehensive Examinations. Open to M.A. students only; does not count toward the unit requirement for the M.A. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

PHIL 292. Concurrent Analytical Studies in Philosophy (1-4) Prerequisite(s): consent of instructor. Each 292 course will be taken concurrently with some 100-series course, approved by the Graduate Advisor, but on an individual basis. It will be devoted to completion of a graduate paper based on research or criticism related to the 100-series course. Faculty guides and evaluations will be provided throughout the quarter. Graded Satisfactory (S) or No Credit (NC). May be repeated for credit.

PHIL 297. Directed Research (1-6) Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

PHIL 299. Research for Thesis or Dissertation (1-12) Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

Professional Courses

PHIL 301. Directed Studies in the Teaching of Philosophy (1) Seminar, 1 hour. Prerequisite(s): graduate standing. A program of orientation, lectures, and workshops designed to enhance the Teaching Assistant's understanding of teaching methods in philosophy and to provide opportunities to work closely with experts in college teaching in order to improve the quality of instruction. Required of all new Teaching Assistants. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

PHIL 302. Teaching Practicum (1-4) Prerequisite(s): employment as Teaching Assistant or Associate. Supervised teaching in lower-division courses and LWSO 100. Required of all teaching assistants in philosophy. Does not count toward the unit requirement for the M.A. degree. Graded Satisfactory (S) or No Credit (NC). May be repeated for credit.

PHIL 400. Research and Professional Development Workshop (1) Workshop, 8 hours per quarter; extra reading, 8 hours per quarter. Prerequisite(s): graduate standing. A series of presentations and workshops focused on a variety of issues in research, professional development, and teaching. Graded Satisfactory (S) or No Credit (NC). Course is repeatable to a maximum of 18 units.

Physical Sciences

College of Natural and Agricultural Sciences

The Physical Sciences major is not accepting new students at this time. For more information, contact the CNAS Undergraduate Academic Advising Center, 1223 Pierce Hall, or call (951) 827-7294.

Physics and Astronomy

Subject abbreviation: PHYS
College of Natural and Agricultural Sciences

Harry W.K. Tom, Ph.D., Chair
John A. Ellison, Ph.D., Vice Chair
Department Office, 3047 Physics
(951) 827-5331; **physics.ucr.edu**

Professors
Kenneth N. Barish, Ph.D.
Robert B. Clare, Ph.D.
Bipin R. Desai, Ph.D.
John A. Ellison, Ph.D.
J. William Gary, Ph.D.
Gail G. Hanson, Ph.D.
Ernest S. Ma, Ph.D.
Allen P. Mills, Ph.D.
Bahram Mobasher, Ph.D.
Umar Mohideen, Ph.D.
Richard K. Seto, Ph.D.
Jing Shi, Ph.D.
Harry W.K. Tom, Ph.D.
Chandra M. Varma, Ph.D.
Stephen J. Wimpenny, Ph.D.
Jose Wudka, Ph.D.
Jory A. Yarmoff, Ph.D.

Professors Emeriti
Frederick W. Cummings, Ph.D
Sun-Yiu Fung, Ph.D.
Peter E. Kaus, Ph.D.
Anne Kernan, Ph.D.
Nai-Li H. Liu, Ph.D.
Donald C. McCollum, Ph.D.
John C. Nickel, Ph.D.
Douglas E. MacLaughlin, Ph.D.
Raymond L. Orbach, Ph.D.
Michael Pollak, Ph.D.
Eugen S. Simanek, Ph.D.
R. Stephen White, Ph.D.
Allen D. Zych, Ph.D.

Associate Professors
Ward Beyermann, Ph.D.
E. Gabriela Canalizo, Ph.D.
Roland Kawakami, Ph.D.
Chun Ning "Jeanie" Lau, Ph.D.
Owen Long, Ph.D.
Leonid P. Pryadko, Ph.D.
Kirill Shtengel, Ph.D.
Gillian Wilson, Ph.D.

Assistant Professors
Shan-Wen Tsai, Ph.D.
Roya Zandi, Ph.D.

Major

The Department of Physics and Astronomy offers two degrees: the B.A. and B.S. in Physics. The **B.S. program** is designed for students with a strong interest in the sciences or engineering who wish to emphasize this aspect of their education and training. The B.S. degree provides a strong background for students who wish to continue on to graduate school.

The **B.A. program** follows the liberal arts tradition with a broader coverage of the humanities and social sciences. It is selected often by students who intend to obtain a teaching credential with a specialty in science or to pursue a career combining business management opportunities with a knowledge in science and technology.

The extensive course offerings and modern facilities within the Department of Physics and Astronomy, coupled with close, personal counseling by faculty advisors, provide students with a physics program that is characterized by its breadth and flexibility.

Career Opportunities

Graduates with a bachelor's degree in Physics generally begin their careers in government or industry. Professions include research and development, system modeling and analysis, and sales in a large variety of fields. A Physics degree provides one of the most flexible qualifications with direct applications to materials science, advanced electronics, lasers and microwave devices, computing and communications.

The federal government and national laboratories employ many physicists as do industries in medical and scientific instruments, computers, audio and telecommunications equipment, financial analysis and investments, material science, and engineering.

The bachelor's degree programs in the UCR Department of Physics and Astronomy are well suited for continued education in graduate school and for preparation in technical and professional careers. Colleges or universities, national laboratories, industry, and governmental agencies employ students with graduate training.

University Requirements

See Undergraduate Studies section.

College Requirements

See College of Natural and Agricultural Sciences, Colleges and Programs section.

Some of the following requirements for the major may also fulfill some of the college's breadth requirements. Consult with a department advisor for course planning.

Major Requirements

The major requirements for the B.S. and B.A. degrees in Physics are as follows:

1. Lower-division requirements (63–64 units)
   a) PHYS 040A, PHYS 040B, PHYS 040C, PHYS 040D, PHYS 040E
   b) MATH 008B or MATH 009A, MATH 009B, MATH 009C, MATH 010A, MATH 010B, MATH 046