

c) Third Tier (additional units to reach a total of 36 units for the B.A. or 52 units for the B.S.)

Select from upper-division courses listed under Neuroscience Core, Second Tier above not used to satisfy those requirements, and the additional courses listed below. The combined number of units taken under First Tier, Second Tier, and Third Tier must total either 36 if the B.A. is sought or 52 if the B.S. is sought.

BCH 102, BCH 110B, BCH 110C, BCH 120; BIOL 100/ENTM 100, BIOL 102, BIOL 105, BIOL 107A, BIOL 108, BIOL 109, BIOL 110, BIOL 151, BIOL 160, BIOL 161A, BIOL 161B; BIOL 162/ENTM 162; BIOL 171, BIOL 171L, BIOL 173/ENTM 173, BIOL 175, BIOL 185P; CBNS 169; up to 9 units from CBNS 191, CBNS 194, CBNS 197 and/or CBNS 199; CS 170; PHYS 139L; PSYC 132, PSYC 134, PSYC 135, ANTH 146/PSYC 146

Note No courses other than those listed may be used in the major unless specifically approved by the program chair or the program chair's designate.

Sample Program

Bachelor of Arts

Freshman Year	Fall	Winter	Spring
CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC	4,1	4,1	4,1
BIOL 005A, BIOL 05LA; BIOL 005B		3,1	4
ENGL 001A, ENGL 001B, ENGL 001C	4	4	4
MATH 008B or MATH 009A, MATH 009B	4	4	
Humanities/Social Sciences			4
Total Units	13	17	17
Sophomore Year	Fall	Winter	Spring
CHEM 112A, CHEM 112B, CHEM 112C	4	4	4
BIOL 005C	4		
CBNS 106	4		
PSYC 001, PSYC 002		4	4
General Physics	4	4	4
General Physics Lab	1	1	1
Foreign Language	1, 2	4	4
Total Units	17	17	17
Junior Year	Fall	Winter	Spring
BCH 100 or BCH 110A	4		
PSYC 011	5		
Upper-division BIOL, CBNS, or PSYC	4	8	8
Foreign Language	3, 4	4	4
Humanities/Social Sciences		4	4
Total Units	17	16	12
Senior Year	Fall	Winter	Spring
Upper-division BIOL, CBNS, or PSYC	4	4	4
Humanities/Social Sciences	8	4	4
Electives	4	8	8
Total Units	16	16	16

Bachelor of Science

Freshman Year	Fall	Winter	Spring
CHEM 001A, CHEM 001B, CHEM 001C, CHEM 01LA, CHEM 01LB, CHEM 01LC	4,1	4,1	4,1
MATH 008B or MATH 009A, MATH 009B	4	4	
BIOL 005A, BIOL 05LA; BIOL 005B		3,1	4
ENGL 001A, ENGL 001B, ENGL 001C	4	4	4
Humanities/Social Sciences			4
Total Units	13	17	17
Sophomore Year	Fall	Winter	Spring
CHEM 112A, CHEM 112B, CHEM 112C	4	4	4
BIOL 005C	4		
CBNS 106	4		
PSYC 001, PSYC 002		4	4
General Physics	4	4	4
General Physics Lab	1	1	1
Humanities/Social Sciences		4	4
Total Units	17	17	17
Junior Year	Fall	Winter	Spring
BCH 100 or BCH 110A	4		
PSYC 011	5		
Upper-division BIOL, CBNS, or PSYC	4	8	8
Humanities/Social Sciences	4	8	4
Total Units	17	16	12
Senior Year	Fall	Winter	Spring
Upper-division BIOL, CBNS, or PSYC	12	8	8
Electives	4	8	8
Total Units	16	16	16

Minor

A minor in Neuroscience is available. For more information on minor requirements, refer to the discussion of minors in the appropriate college section of the General Catalog.

1. First tier (14 units)
 - a) CBNS 106
 - b) CBNS 120/PSYC 120
 - c) CBNS 120L/PSYC 120L
 - d) CBNS 124/PSYC 124

2. Second Tier (6 units)

Select additional units from the list below so that the units from the First Tier combined with the units from the Second Tier equal at least 20.

BIOL 178; CBNS 101, CBNS 116, CBNS 121/PSYC 121, CBNS 125/PSYC 125, CBNS 126/PSYC 126, CBNS 127/PSYC 127; PSYC 129

Descriptions for all courses used in the Neuroscience major and minor may be found in the appropriate department section.

Neuroscience Graduate Program

Subject abbreviation: NRSC
College of Natural and Agricultural Sciences

Michael E. Adams, Ph.D., Director
Program Office, 1140 Batchelor Hall North
(951) 827-4716; (800) 735-0717
neuro.ucr.edu

Professors

Michael E. Adams, Ph.D.
(Cell Biology and Neuroscience/Entomology)
John Andersen, Ph.D. (Psychology)
Nancy E. Beckage, Ph.D.
(Entomology/Cell Biology and Neuroscience)
Curt Burgess, Ph.D. (Psychology)
Christine Chiarello, Ph.D. (Psychology)
Manuela Martins-Green, Ph.D.
(Cell Biology and Neuroscience)
Thomas H. Morton, Ph.D. (Chemistry)
B. Glenn Stanley, Ph.D.
(Cell Biology and Neuroscience/Psychology)
Raphael Zidovetzki, Ph.D.
(Cell Biology and Neuroscience)

Associate Professors

Maxim Bazhenov, Ph.D., (Cell Biology and Neuroscience)
Monica J. Carson, Ph.D. (Biomedical Sciences)
Margarita C. Currás-Collazo, Ph.D.
(Cell Biology and Neuroscience)
Scott N. Currie, Ph.D.
(Cell Biology and Neuroscience)
Iryna M. Ethell, Ph.D. (Biomedical Sciences)
Peter W. Hickmott, Ph.D. (Psychology)

Assistant Professors

Douglas L. Altshuler, Ph.D. (Biology)
Anupama Dahanukar, Ph.D. (Entomology)
Douglas W. Ethell, Ph.D. (Biomedical Sciences)
Todd Fiacco, Ph.D. (Cell Biology and Neuroscience)
Kelly J. Huffman, Ph.D. (Psychology)
Edward Korzus, Ph.D. (Psychology)
Anandasankar Ray, Ph.D. (Entomology)
Khaleel Razak, Ph.D. (Psychology)
Wendy G. Saltzman, Ph.D. (Biology)
Aaron Seitz, Ph.D. (Psychology)
Emma Wilson, Ph.D. (Biomedical Sciences)

Graduate Program

The multidisciplinary interdepartmental graduate program in Neuroscience offers instruction and research training leading to the Ph.D. degree in Neuroscience. The M.S. degree (Plan I, Thesis) is available in special circumstances when the work leading to the Ph.D. degree cannot be completed.

The goal of this program is to prepare students for careers in research, teaching and scientific administration. The program is aimed at providing high-quality graduate training for students who come from a variety of undergraduate backgrounds but share a commitment and an intense interest in nervous system research. Students are expected to learn the fundamentals of neuroscience, starting with a required core sequence, become knowledgeable concerning a range of research methods as taught in neuroscience laboratories and demonstrate capability in original

354 / Programs and Courses

research. Graduate student training reflects the research competence and specialties of the faculty. That is, the specific research training received by a graduate student is the responsibility of the major professor/mentor in whose laboratory the student carries out the research projects leading to the degree. Students benefit from an interdisciplinary training approach, tailored by the major advisor but enriched by the readily available expertise and laboratory facilities of program faculty with backgrounds ranging from chemistry to psychology.

Current UCR Neuroscience faculty have major appointments in several different departments but have a considerable degree of common interest in research problems and techniques. Furthermore, the three chief levels of analysis at which nervous systems are currently studied (molecular/cellular, systems, and behavioral) are more or less evenly represented by the interests and expertise of the faculty. Some faculty, as may be expected, carry out research programs that combine two or more of these levels of analysis. These levels of analysis, which characterize the faculty's research, indicate the breadth of integrated neuroscience at UCR but do not represent "fields of emphasis" in which students are to be trained.

Areas that faculty investigate include the following:

- Glial–neuron interactions
- Physiological actions of ion channel toxins
- Modulation of ion channels by neurotransmitters and hormones
- Synaptic transmission and neural plasticity in mammalian nervous systems
- Signal transduction in excitable cells
- Molecular mechanisms of exocytosis
- Molecular biology of ion channel structure and function
- Receptor–channel interactions
- Function of ligand-gated ion channels in neurons
- Influence of specific receptor proteins on function
- Synaptic and non-synaptic mechanisms in neuroendocrine systems
- Plasticity in adult central nervous system
- Regulation of genes specifying neuronal connections in developing and mature nervous systems
- Molecular mechanisms that trigger dendritic spine formation

Areas involving behaviors and diseases include the following:

- Neural control of eating behaviors
- Neuroendocrine regulation of innate behaviors
- Neural basis of language and reading
- Neural networks controlling locomotion in the spinal cord and brainstem
- Neural control of flight
- Neurolinguistics
- Cerebral hemisphere asymmetries and hemispheric interaction
- Computational models of high-dimensional memory

- Mechanisms of neuronal death in Alzheimer's disease, stroke, and other disorders

Admission Applicants must meet the general admissions requirements of the Riverside Division of the Academic Senate and the UCR Graduate Council as set forth in the Graduate Studies section of this catalog, including completion of an undergraduate degree (B.S. or B.A.). They should have an adequate background in biological and physical sciences, ideally including courses in the following or equivalent areas: General Biology, Genetics, General Chemistry, Organic Chemistry, Physics, Calculus, and Statistics. Additionally, at least 20 quarter-units of courses distributed among the following areas are required, although applicants may be admitted with limited course work deficiencies and required to make up deficiencies as specified by the admissions committee: Biochemistry; Cell Biology; Molecular Biology; Physiology; Behavioral Biology; Learning and Memory; Perception; Computer Science; and Neuroscience, Neurobiology, or Physiological Psychology, with laboratory.

Doctoral Degree

Course Work Core requirements include:

1. NRSC 200A/PSYC 200A, NRSC 200B/PSYC 200B, NRSC 200C/PSYC 200C
2. One Research Methods course selected from CBNS 120L/PSYC 120L, CHEM 125, CHEM 221A, CHEM 221B, CHEM 221C, CHEM 221D, NRSC 201, PHYS 139L, PSYC 211
3. Two courses or one course sequence selected from the following: BCH 110A, BCH 110B, BCH 110C, BCH 241/CHEM 241, BIOL 200/CMDB 200, BIOL 201/CMDB 201, BIOL 203, CBNS 120/PSYC 120, CBNS 127/PSYC 127, ENTM 201, PSYC 203A, PSYC 203B, PSYC 203C

The course option most appropriate to the student's career goals is determined by the student in consultation with his/her guidance committee.

4. During each quarter in academic residence every student enrolls and participates in the Colloquium in Neuroscience (CMDB 257 or NRSC 287/PSYC 287), and, until passing the oral qualifying examination, every student takes at least two seminars, Special Topics in Neuroscience (NRSC 289, 2 units), during each year of academic residence. One seminar per year is required after the qualifying examination is passed.
5. After completing the course requirements and no later than the ninth quarter in residence, the student is given a two-part qualifying examination, one written and one oral.
6. Regardless of whether financial support comes from fellowships or research assistantships, etc., students must be teaching assistants for at least two quarters in Neuroscience or related-area courses, such as those taught by their mentors.

7. Within three months of advancement to candidacy, the student must submit a written dissertation proposal to the dissertation committee for comments and approval. Before the dissertation is given final approval, the student must present a public lecture on the dissertation research to faculty and students in the program. Following the public lecture, the student meets with the dissertation committee for an oral defense in accordance with the regulations of the Graduate Division.

Normative Time to Degree 16 quarters

Graduate Courses

NRSC 200A. Fundamentals of Neuroscience (3)

Lecture, 3 hours. Prerequisite(s): graduate standing or consent of instructor. The fundamentals of neuroscience in molecular and cellular mechanisms, neural and hormonal systems, and neural control of behavior. Cross-listed with PSYC 200A.

NRSC 200B. Fundamentals of Neuroscience (3)

Lecture, 3 hours. Prerequisite(s): graduate standing or consent of instructor; NRSC 200A/PSYC 200A. The fundamentals of neuroscience in molecular and cellular mechanisms, neural and hormonal systems, and neural control of behavior. Cross-listed with PSYC 200B.

NRSC 200C. Fundamentals of Neuroscience (3)

Lecture, 3 hours. Prerequisite(s): graduate standing or consent of instructor; NRSC 200B/PSYC 200B. The fundamentals of neuroscience in molecular and cellular mechanisms, neural and hormonal systems, and neural control of behavior. Cross-listed with PSYC 200C.

NRSC 201. Neuroscience Laboratory (4) F

Laboratory, 6 hours; lecture, 2 hours. Prerequisite(s): NRSC 200A/PSYC 200A; graduate standing or consent of instructor. Presents theoretical and practical aspects of modern methods and techniques used in nervous system research. Faculty teach modules on methods in which they have special expertise. Methods include, but are not limited to, light and fluorescence microscopy, imaging ion concentrations within cells, immunocytochemistry, and electrophysiology of model systems.

NRSC 210. Computational Neurobiology: Introduction to Brain Modeling Techniques (4) S

Lecture, 3 hours; written work, 18 hours per quarter; term paper, 12 hours per quarter. Prerequisite(s): NRSC 200A/PSYC 200A; graduate standing or consent of instructor. An introduction to a variety of computer modeling techniques used to study the brain at the systems level. **Bazhenov**

NRSC 287. Colloquium in Neuroscience (1)

Colloquium, 1 hour. Prerequisite(s): graduate standing or consent of instructor. Involves oral presentations on current research topics in neuroscience by visiting scholars, faculty, and students. Graded Satisfactory (S) or No Credit (NC). Course is repeatable. Cross-listed with PSYC 287.

NRSC 289. Special Topics in Neuroscience (2)

Seminar, 2 hours. Prerequisite(s): graduate standing or consent of instructor. An interdisciplinary seminar consisting of student presentations and discussion of selected topics in neuroscience. Content and instructor(s) vary each time course is offered. Students who present a seminar receive a letter grade; other students receive a Satisfactory (S) or No Credit (NC) grade. Course is repeatable. Cross-listed with BCH 289, BIOL 289, CHEM 289, ENTM 289, and PSYC 289.

NRSC 290. Directed Studies (1-6)

Individual study, 3-18 hours. Prerequisite(s): graduate standing; consent of instructor. Individual study, directed by a faculty member, of specially selected topics in neuro-

science. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

NRSC 297. Directed Research (1-6) Outside research, 3-18 hours. Prerequisite(s): graduate standing; consent of instructor. Research and experimental studies conducted under the supervision of a faculty member on specially selected topics in neuroscience. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

NRSC 299. Research for the Thesis or Dissertation (1-12) Outside research, 3-36 hours. Prerequisite(s): graduate standing; consent of instructor. Original research in an area selected for the advanced degree. Graded Satisfactory (S) or No Credit (NC). Course is repeatable.

Peace and Conflict Studies Minor

Subject abbreviation: PCST
College of Humanities, Arts, and Social Sciences

Georgia Warnke, Ph.D., Chair
Department Office, HMNSS 1607
(951)827-2830; georgia.warnke@ucr.edu

Committee in Charge

June O'Connor, Ph.D. (Religious Studies)
Erith Jaffe-Berg, Ph.D. (Theatre)
Bronwyn Leebaw, Ph.D. (Political Science)
Christine Gailey, Ph.D. (Women's Studies)
Juliann Allison, Ph.D. (Political Science)
Victoria Bomberry, Ph.D. (Ethnic Studies)
Wendy Ashmore, Ph.D. (Anthropology)
Derek Burrill (Media and Cultural Studies)
Stephen E. Cullenberg, Ph.D.
Dean, College of Humanities, Arts, and Social Sciences, ex officio

Administered through the Interdisciplinary Studies Office, the Peace and Conflict Studies Minor provides opportunities for undergraduate students to give sustained attention to the diverse origins and expressions of conflict, to models for resolution advised by scholars and practitioners, to proactive peacemaking through the investigative and creative strategies fostered in higher education.

Students must take 5 upper-division courses as specified in sections 1 and 2 below.

1. Students must take at least one course from each of the following three rubrics plus a fourth course from the list below from any rubric:

- a) Perspectives from Religion, Philosophy, Literature and the Arts CLA 141/AST 145/CHN 141/CPAC 141/POSC 140, CPLT 115/GER 163/HISE 163/MCS 115, CPLT 132/FREN 132/GER 132, CPLT 134/GER 134/JPN 134/MCS 114, ENGL 135, RLST 116, RLST 174, RLST 175, RLST 176, THEA 191, VNM 162/AST 162/HIST 187/SEAS 162
- b) Social Scientific Perspectives ETST 111, POSC 123, POSC 124, POSC 124S, POSC 129, POSC 142L, POSC 150, POSC 159, POSC 160, POSC 169, SOC 122

- c) Historical Perspectives HISA 114, HISA 135/ETST 112, HISA 162/LNST 172, HISA 165, HISA 166, HISE 145, HISE 146, HIST 184/AST 160/SEAS 184/VNM 184, MCS 173 (E-Z)/CPLT 173 (E-Z), POSC 125, POSC 162/LNST 142

2. Capstone Course; one of the following:
PCST 190, PCST 197, PCST 198-I

See Minors under the College of Humanities, Arts, and Social Sciences in the Colleges and Programs section of this catalog for additional information on minors.

Upper-Division Courses

PCST 190. Special Studies (1-5) Consultation, 10 hours per quarter; extra reading, 6-9 hours; written work, 3-6 hours. Prerequisite(s): upper-division standing; consent of Peace and Conflict Studies Committee chair; consent of faculty advisor is required for students repeating the course. Individual study in the areas of conflict resolution and mediation. Examines theories in depth, as well as case studies introduced in previous courses. Course is repeatable.

PCST 197. Research for Undergraduates (4) Consultation, 10 hours per quarter; extra reading, 6 hours; written work, 3 hours. Prerequisite(s): upper-division standing; consent of Peace and Conflict Studies Committee chair. Directed original research in the fields of conflict resolution, mediation, and peace studies.

PCST 198-I. Individual Internship in Peace and Conflict Studies (4) Consultation, 1 hour; internship, 8 hours; written work, 3 hours. Prerequisite(s): upper-division standing; consent of Peace and Conflict Studies Committee chair; consent of faculty advisor is required for students repeating the course. Provides internship opportunities in organizations that engage in mediation and conflict resolution. Includes supervision under an assigned faculty member. Course is repeatable to a maximum of 16 units.

Pest Management

Subject Abbreviation: PSMT
College of Natural and Agricultural Sciences

The M.S. program in Pest Management is not currently accepting new students. For further information call (800) 735-0717 or (951) 827-5621.

Philosophy

Subject abbreviation: PHIL
College of Humanities, Arts, and Social Sciences

John M. Fischer, Ph.D., Chair
Department Office, 1604 Humanities
and Social Sciences
(951) 827-5208; philosophy.ucr.edu

Professors

Carl F. Cranor, Ph.D.
John M. Fischer, Ph.D. *President's Chair*
David K. Glidden, Ph.D.
Paul D. Hoffman, Ph.D.

Robin Jeshion, Ph.D.
John Perry, Ph.D.
Andrews Reath, Ph.D.
Eric Schwitzgebel, Ph.D.
Charles Siewert, Ph.D.
Georgia Warnke, Ph.D.
Gary Watson, Ph.D.
Howard K. Wettstein, Ph.D.
Mark A. Wrathall, Ph.D.
Larry Wright, Ph.D.

Professors Emeriti

David Harrah, Ph.D.
Bernd Magnus, Ph.D.

Associate Professors

Peter J. Graham, Ph.D.
Agnieszka Jaworska, Ph.D.
Pierre Keller, Ph.D.
Erich Reck, Ph.D.

Assistant Professors

Coleen Macnamara, Ph.D.
Michael Nelson, Ph.D.

Majors

The Department of Philosophy offers a major and minor in Philosophy and a major in Philosophy/Law and Society.

The **Philosophy major** is designed to introduce students to the important issues and arguments surrounding such subjects as morality, knowledge, the nature of the mind and of the physical world, science, and language. The program provides a rigorous background in the history of Western philosophy, and studies contemporary approaches (both analytic and Continental) to philosophical issues. The B.A. degree in Philosophy prepares students for graduate study in philosophy, and is also excellent preparation for law school. For students interested in a double major, philosophy also serves as an excellent complement to psychology, mathematics, political science, and the natural sciences.

The **Philosophy/Law and Society major** offers students a means of understanding complex relationships between social institutions and provides a strong basis for graduate studies in areas related to law and philosophy. The Philosophy/Law and Society curriculum is sound background for students planning on pursuing the study of law.

University Requirements

See Undergraduate Studies section.

College Requirements

See College of Humanities, Arts, and Social Sciences, Colleges and Programs section.

Major Requirements

The department offers two majors: the traditional Philosophy major, and a Philosophy/Law and Society major.

Philosophy Major

The major requirements for the B.A. degree in Philosophy are as follows:

Fifty-six (56) units of course work in Philosophy including at least 36 upper-division units.