148. Introduction to Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: lower division standing; consent of instructor. Development of leadership and military skills required for promotion to junior non-commissioned officer level. Cadets learn to lead from company through individual levels. Interrelationship of squad and platoon organization. (P/NP grading only.)—S. (S.)

21. Military History, Study of Battles (2)
Lecture—2 hours. Prerequisite: course 22B or consent of instructor. Application of the Nine Principles of War to key battles in American and World history. Tactics on a strategic and operational level. Evaluation of leadership and decision-making processes of key leaders. (P/NP grading only.)—S. (S.)

22A. Innovative Team Leadership (2)
Lecture—2 hours. Prerequisite: lower division standing or consent of instructor. Leadership values, attributes and theories. Use of basic military skills such as land navigation and squad operations to enhance understanding of the Army. Types of military briefings. Practice in interpersonal skills. Presentation of a briefing.—F. (F.)

22B. Professional and Tactical Leadership (2)
Lecture—2 hours. Prerequisite: course 22A or consent of instructor. Leadership of tactical teams in complex operating environment. Self-assessment of leadership style. Basic military skills: terrain analysis, patrolling and operations orders. Dynamics of adaptive leadership in the context of military operations.—W. (W.)

24A. Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: courses 14A, B and C, enrolled in course 22A or consent of instructor. Develop and practice personal military leadership skills in extensive supervised leadership labs. Cadets perform basic military skills, improve on troop leading procedures and lead subordinates in tactical situations. Begin with drill and ceremony, land navigation and individual movement techniques. (P/NP grading only.)—F. (F.)

24B. Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: courses 14A, B and C, enrolled in course 22B or consent of instructor. Development and practice of personal military leadership skills in extensive supervised leadership labs. Performance of basic military skills, improvement on troop-leading procedures, leadership of subordinates in tactical situations. (P/NP grading only.)—W. (W.)

24C. Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: courses 14A, B and C, enrolled in course 21 or consent of instructor. Develop and practice personal military leadership skills in extensive supervised leadership labs. Begin with drill and ceremony, land navigation and individual movement techniques. Cadets perform basic military skills, improve on troop leading procedures and lead subordinates in tactical situations. (P/NP grading only.)—S. (S.)

Upper Division

131. Military Leadership and Management (2)
Lecture—2 hours. Prerequisite: upper division standing and consent of instructor. Leadership and management in organizational context. Team dynamics, leadership styles, professional ethics, development of a leadership framework. Management skills for planning, decision making, and organizing developed through definition of problems, development of courses of action, implementation of solutions. —F. (F.)

132A. Advanced Military Operations (2)
Lecture—2 hours. Prerequisite: upper division standing, course 131 or consent of instructor. Military small unit tactical operations as the basis for leadership development. Principles of war, contemporary operating environment, Geneva Law of Land Warfare, military offensive and defensive operations. Emphasis on development of critical thinking, problem solving, and communication skills.—W. (W.)

132B. Applied Leadership (2)
Lecture—2 hours. Prerequisite: upper division standing, course 132A or consent of instructor. Military small unit tactical operations serve as the basis for leadership development. Application of leadership styles and skills to complete problem-solving exercises and the development of an adaptable framework applicable to a variety of shifting environments and situations.—S. (S.)

134A. Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite: upper division standing, course 131 or consent of instructor. Small unit tactical operations serve as the basis for enhancement of leadership performance through tactical application. Assessment of leadership attributes, skills, and actions through participation in a variety of leadership roles in problem-solving exercises. (P/NP grading only.)—F. (F.)

134B. Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite: upper division standing, course 132A or consent of instructor. Small unit tactical operations serve as the basis for enhancement of leadership performance through tactical application. Assessment of leadership attributes, skills, and actions through participation in a variety of leadership roles in problem-solving exercises. (P/NP grading only.)—W. (W.)

134C. Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite: upper division standing, course 132B or consent of instructor. Small unit tactical operations are taught, serve as basis for students exploration, development. Serve in variety of leadership roles in which leadership attributes, skills, actions are closely assessed and developed while they are faced with series of problem solving exercises. (P/NP grading only.)—S. (S.)

141. Ethical Leadership (2)
Lecture—2 hours. Prerequisite: upper division standing; consent of instructor. Direct influence of leaders on individual, group, and group processes. The complexities of balancing moral, legal, and ethical obligations while applying fundamental business principles in determining the best possible outcome for competing values. (P/NP grading only.)—F. (F.)

142. Military Law (2)
Lecture—2 hours. Prerequisite: division standing and course 141, or consent of instructor. The United States Constitution and the Military Justice System. Basic law of war, with an emphasis on issues that might arise on the battlefield or during a national emergency.—W. (W.)

143. U.S. Army Management Systems (2)
Lecture—2 hours. Prerequisite: upper division standing and consent of instructor. Leadership and management, focusing on four management systems: planning, organizing, leading and controlling. Practical methodologies for assessing management decisions while balancing competing ethical, economic, technical and future growth trade-offs.—S. (S.)

144A. Military Training Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: upper division standing, course 141 or consent of instructor. Enhancement of student leadership performance through practical application. Small unit military tactical operations serve as the basis for student exploration and development. (P/NP grading only.)—F. (F.)
David K. Wilson, Ph.D., Professor

Secondary Section Members

John J. Harada, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Walt Dryer, Ph.D., Professor
Academic Senate Diversity Award
David J. P. Hsieh, Ph.D., Professor
Stephen C. Kowalczykowski, Ph.D., Distinguished Professor
William J. Kuzma, Ph.D., Professor
Bryan Mulloney, Ph.D., Professor
Sharron O'Neill, Ph.D., Professor
Martin L. Privalsky, Ph.D., Professor
Steven M. Thog, Ph.D., Professor
Larry N. Vanderhoef, Ph.D., Professor
Marvin Wilson, Ph.D., Professor

Emeriti Faculty

Peter B. Armstrong, Ph.D., Professor Emeritus
Sterling Chaykin, Ph.D., Professor Emeritus
James S. Clegg, Ph.D., Professor Emeritus
Eric E. Conn, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award, UIC Davis Prize for Teaching and Scholarship
Richard S. Criddle, Ph.D., Emeritus Professor
John H. Crowe, Ph.D., Emeritus Professor
Michael E. Dahmus, Ph.D., Distinguished Professor Emeritus
David W. Deamer, Ph.D., Emeritus Professor
Roy H. Dau, Ph.D., Emeritus Professor
Academic Senate Distinguished Teaching Award
Gordon J. Edlin, Ph.D., Emeritus Professor
Carol A. Erickson, Ph.D., Distinguished Professor Emeritus
Marjory E. Etzler, Ph.D., Professor Emeritus
Richard H. Falik, Ph.D., Professor Emeritus
Leslie D. Gottlieb, Ph.D., Emeritus Professor
Melinda G. Green, Ph.D., Emeritus Professor
Robert D. Grey, Ph.D., Emeritus Professor
Academic Senate Distinguished Teaching Award
Jerry L. Hedrick, Ph.D., Emeritus Professor
Distinguished Graduate Mentoring Award
John A. Kiger, Ph.D., Emeritus Professor
Julie A. Leary, Ph.D., Professor Emeritus
Mark G. McNamee, Ph.D., Emeritus Professor
Diana G. Myles, Ph.D., Emeritus Professor
Carl W. Schmid, Ph.D., Emeritus Professor
Irwin H. Segel, Ph.D., Distinguished Professor Emeritus
Pavel J. Shen, Ph.D., Emeritus Professor
Larry R. Sprechman, Ph.D., Senior Lecturer Emeritus

Lecturers

Silvia Carrasco Garcia, Ph.D., Lecturer, SOE
Marina Ellenson Crowder, Ph.D., Lecturer, SOE
Kenneth L. Hill, Ph.D., Lecturer
Monica M. Monulared, Ph.D., Lecturer, SOE
Larry Z. Morand, Ph.D., Academic Coordinator/ Lecturer
Mark F. Sanders, Ph.D., Lecturer Emeritus

Molecular and Cellular Biology offers three major programs: Biochemistry and Molecular Biology, Cell Biology, and Genetics and Genomics.

The Biochemistry and Molecular Biology Major Program

The Biochemistry and Molecular Biology major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically important molecules. Students who enjoy both chemistry and biology, and who are comfortable with quantitative approaches to problem solving will find this major a rewarding field of study.

The Program. The biochemistry and molecular biology program begins with the four-course, upper division common curriculum that provides an introduction to the principles of biochemistry, genetics, and cell biology. Majors then take a comprehensive and rigorous laboratory course to familiarize them with the most important aspects of biochemical research. Additional upper division courses in biochemistry and molecular biology examine detailed aspects of these subjects. Students are also required to take courses in other biological sciences and a full year of physical chemistry.

Career Alternatives. The biochemistry and molecular biology program provides a solid scientific background for students seeking a research, teaching, or service career in the life sciences. Positions are open to biochemists in bio-medical, biotechnological, pharmaceutical, agricultural research and chemical industries. Also, university-affiliated research laboratories, hospital laboratories, and government-sponsored research facilities provide employment opportunities. The major provides excellent preparation for advanced study in graduate or professional schools.

B.S. Major Requirements:

Preparatory Subject Matter

Biological Sciences 2A-2B-2C ............. 15
Chemistry 2A-2B, or 2AH-2BH-2CH .... 15
Mathematics 118A-118B-118C-118D (21C recommended) .................. 8-12
Physics 7A-7B-7C ............................... 12-15

Depth Subject Matter

Biological Sciences 101, 102, 103, 104 .......... 15
Chemistry 107A-107B or 110A-110B-110C .................. 6-12

Total Units for the Major

107-125

Advising. Biology Academic Success Center (BASC) 1023 Sciences Laboratory Building: 530-752-0410; http://basc.ucsdavis.edu/.

The Genetics and Genomics Major Program

The Genetics and Genomics major provides a broad background in the biological, mathematical, and physical sciences basic to the study of heredity, gene expression and evolution. The major is sufficiently flexible to accommodate students interested in the subject either as a basic discipline in the biological sciences or in terms of its applied aspects such as biotechnology, medicine, and agriculture.

The Program. The genetics and genomics program begins with the four-course, upper division core curriculum that provides an introduction to the principles of genetics, biochemistry, and cell biology. Students then take additional upper division courses in specialized areas of modern genetics including gene expression, evolution, development, human genetics and genomics, as well as laboratory courses in the principles of genetics and genomics. Additional upper division courses in biological sciences, as well as additional research coursework can be chosen to fulfill required elective units.

Career Alternatives. The genetics and genomics degree provides suitable preparation for a wide variety of careers, including teaching, research, work with biotechnology companies, medicine, and all the health sciences. It is also an excellent background for students wishing to continue their education in a graduate program, a teacher-training program, medical school, veterinary school, or other professional schools.

B.S. Major Requirements:

Preparatory Subject Matter

Biological Sciences 2A-2B-2C ............. 15

Depth Subject Matter

Biological Sciences 101, 102, 103, 104 .......... 15
Chemistry 2A-2B, or 2AH-2BH-2CH .... 15
Chemistry 107A-107B or 110A-110B-110C .................. 6-12

Total Units for the Major

107-125

Advising. Biology Academic Success Center (BASC) 1023 Sciences Laboratory Building: 530-752-0410; http://basc.ucsdavis.edu/.

The Cell Biology Major Program

The Cell Biology major program provides students with a comprehensive understanding of the cell, the basic structural and functional unit of all living organisms.

The Program. To understand living organisms, the biologist must understand the cell. Hence, cell biology lies at the core of the biological sciences. Students taking this major gain a solid foundation in biological principles. The major emphasizes how biologists contribute to the development, maintenance and reproduction of adult organisms. The major integrates the ways in which principles derived from the physical sciences, genetics, and cell biology are integrated in the study of living cells and emphasizes the experimental nature of the study of cell biology.

Career Alternatives. The major provides an excellent background for students wishing to enter postgraduate and professional programs in biological, health sciences or veterinary sciences; for students pursuing careers in teaching or research in the biological sciences; for students interested in careers in the biotechnological or pharmaceutical industries; or for students interested in careers related to the administrative, legal or commercial aspects of biomedical science.

B.S. Major Requirements:

Preparatory Subject Matter

Biological Sciences 2A-2B-2C ............. 15

Depth Subject Matter

Biological Sciences 101, 102, 103, 104 .......... 15
Chemistry 2A-2B, or 2AH-2BH-2CH .... 15
Chemistry 107A-107B or 110A-110B-110C .................. 6-12

Total Units for the Major

107-125

Advising. Biology Academic Success Center (BASC) 1023 Sciences Laboratory Building: 530-752-0410; http://basc.ucsdavis.edu/.

The Cell Biology Major Program

The Cell Biology major program provides students with a comprehensive understanding of the cell, the basic structural and functional unit of all living organisms.

The Program. To understand living organisms, the biologist must understand the cell. Hence, cell biology lies at the core of the biological sciences. Students taking this major gain a solid foundation in biological principles. The major emphasizes how biologists contribute to the development, maintenance and reproduction of adult organisms. The major integrates the ways in which principles derived from the physical sciences, genetics, and cell biology are integrated in the study of living cells and emphasizes the experimental nature of the study of cell biology.

Career Alternatives. The major provides an excellent background for students wishing to enter postgraduate and professional programs in biological, health sciences or veterinary sciences; for students pursuing careers in teaching or research in the biological sciences; for students interested in careers in the biotechnological or pharmaceutical industries; or for students interested in careers related to the administrative, legal or commercial aspects of biomedical science.

B.S. Major Requirements:

Preparatory Subject Matter

Biological Sciences 2A-2B-2C ............. 15

Depth Subject Matter

Biological Sciences 101, 102, 103, 104 .......... 15
Chemistry 2A-2B, or 2AH-2BH-2CH .... 15
Chemistry 107A-107B or 110A-110B-110C .................. 6-12

Total Units for the Major

107-125

Advising. Biology Academic Success Center (BASC) 1023 Sciences Laboratory Building: 530-752-0410; http://basc.ucsdavis.edu/.

The Genetics and Genomics Major Program

The Genetics and Genomics major provides a broad background in the biological, mathematical, and physical sciences basic to the study of heredity, gene expression and evolution. The major is sufficiently flexible to accommodate students interested in the subject either as a basic discipline in the biological sciences or in terms of its applied aspects such as biotechnology, medicine, and agriculture.

The Program. The genetics and genomics program begins with the four-course, upper division core curriculum that provides an introduction to the principles of genetics, biochemistry, and cell biology. Students then take additional upper division courses in specialized areas of modern genetics including gene expression, evolution, development, human genetics and genomics, as well as laboratory courses in the principles of genetics and genomics. Additional upper division courses in biological sciences, as well as additional research coursework can be chosen to fulfill required elective units.

Career Alternatives. The genetics and genomics degree provides suitable preparation for a wide variety of careers, including teaching, research, work with biotechnology companies, medicine, and all the health sciences. It is also an excellent background for students wishing to continue their education in a graduate program, a teacher-training program, medical school, veterinary school, or other professional schools.

B.S. Major Requirements:
121. Advanced Molecular Biology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 101 and one course from among Biological Sciences 102, 105, or Animal Biology 102 (Biological Sciences 102 or Animal Biology 102 may be taken concurrently although prior completion is recommended). Structure, expression, and regulation of eukaryotic genes. Chromosome structure and replication, metabolism and DNA processing, protein synthesis and translation control; development, immune system, and oncogenes. Open for credit to students who have completed course 161. GE credit: SciEng | QL, SE, SL—F, W, S. Burgess, Gasser, Harmer, Natzle, Powers

123. Behavior and Analysis of Enzyme and Receptor Systems (3)

Lecture—3 hours. Prerequisite: Biological Sciences 103. Introduction to the principles of enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include simultaneous equilibria, chemical and steady-state kinetics, allosteric enzymes, multireactor systems, enzyme assays, membrane transport and computer-assisted simulations and analyses. GE credit: SciEng | QL, SE—F, S. S. Fraser, Wilson

124. Macromolecular Structure and Function (4)

Lecture—4 hours. Prerequisite: Biological Sciences 103. Introduction to the principles of enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include simultaneous equilibria, chemical and steady-state kinetics, allosteric enzymes, multireactor systems, enzyme assays, membrane transport and computer-assisted simulations and analyses. GE credit: SciEng | QL, SE—F, W. S. Wilson

126. Plant Biochemistry (3)

Lecture—3 hours. Prerequisite: Biological Sciences 103 or 105. The biochemistry of important plant processes and metabolic pathways. Discussion of methods used to understand plant processes, including use of transgenic plants. (Same course as Plant Biology 126.) GE credit: SciEng | QL, SE—F, W. S. Callis, Tan

138. Undergraduate Seminar in Biochemistry (1)

Seminar—1 hour. Prerequisite: Biological Sciences 103. Discussion of the historical developments of modern biochemistry. Major research problems. May be repeated two times for credit when topic differs. (P/NP grading only.) GE credit: OL, SE—F, W, S. F. W. S. Callis, Carrasco, Gasser, Nunnari

139. Undergraduate Seminar in Biochemistry (2)

Seminar—2 hours. Prerequisite: Biological Sciences 103. Discussion of the historical developments of modern biochemistry. Major research problems. May be repeated two times for credit when topic differs. (P/NP grading only.) GE credit: SciEng | QL, SE—F, W, S. W. F. S. Callis, Gasser, Nunnari

140L. Cell Biology Laboratory (5)

Lecture—2 hours; laboratory—6 hours; discussion—1 hour. Prerequisite: Biological Sciences 104 (may be taken concurrently). Exercises illustrating the principles of cell biology. Emphasis on light microscopy. GE credit: SciEng | QL, QL, SE, SL—W. W. Kaplan, Morand, Nunnari

142. Advanced Cell Biology: Contractile and Motile Systems (4)

Lecture—3 hours; laboratory—2 hours. Prerequisite: Biological Sciences 102, 104 (may be taken concurrently). Mathematics 168. Advanced cell biology with emphasis on molecular, biophysical and cellular properties of contractile and motile systems. Offered irregularly. GE credit: SciEng | QL, SE—F. (S.) Chedin

143. Cell and Molecular Biophysics (3)

Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 103, 104. Physical chemical principles by which molecules form and function in living cells. Physical nature of cytoplasm; molecular structure/banding in macromolecules, macromolecular assemblies and protein structure. Physical techniques and modeling of cytokskeletal motor dynamics and function during intracellular transport, mitosis and motility. GE credit: SciEng | QL, SE—F. S. Al-Bassam

144. Mechanisms of Cell Division (3)

Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 104. The molecules and mechanisms that allow eukaryotic cells to coordinate cell growth, DNA replication, segregation of chromosomes and cell division. GE credit: SciEng | SE, WE—F. (F.) McNally

145. Assembly and Function of Cell Signaling Machinery (3)

Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 104. Molecular basis of cell signaling, including positioning of cellular machinery, components of various signaling pathways, and downstream effects of signaling on cell adhesion, cell differentiation, and programmed cell death. GE credit: SciEng | SE—F. S. Albeck, Erickson

148. Undergraduate Seminar in Cell Biology (2)

Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and results of undergraduate research may be included. May be repeated for credit (P/NP grading only). Offered irregularly. GE credit: OL, SE—F. W. S. N. Draper, Natzle

150. Developmental Biology (4)

Lecture—4 hours. Prerequisite: Biological Sciences 101. Analysis of the mechanistic basis for animal development with a focus on experimental evidence and the relevant fundamental experimental strategies. Fertilization and early development, morphogenesis and patterning, cell differentiation, regulation of cell proliferation and tissue growth. GE credit: SciEng | QL, SE, SL—F. W. (W.) Draper, Natzle

158. Undergraduate Seminar in Developmental Biology (2)

Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and results of undergraduate research may be included. May be repeated for credit (P/NP grading only). GE credit: OL, SE—F, W. S. (F., S.)

160L. Principles of Genetics Laboratory (5)

Laboratory—6 hours; lecture—2 hours; discussion/lab—1 hour. Prerequisite: Biological Sciences 101. Laboratory work in basic molecular genetics including gene mapping, isolation and characterization of mutants in eukaryotic model systems, reverse genetics, gel electrophoresis, recombinant DNA techniques, and PCR. Not open for credit to students who have completed Genetics 100L. GE credit: SciEng | QL, SE, VL, WE—F, W, S. F. W. S. Ellenson-Crowder, Engebret, Harmer, Natzle, Rose, Wirtz

162. Human Genetics and Genomics (3)

Lecture—3 hours. Prerequisite: Biological Sciences 101. The human genome and genetic variation in human populations, molecular and genomic approaches in the practice of human genetics, epigenetic gene regulation, personal genetics and genomic medicine. GE credit: SciEng | QL, SE—F. (F.) Chedin
163. Developmental Genetics (3) Lecture—3 hours. Prerequisite: course 121. Current aspects of developmental genetics. Historical background and current genetic approaches to the study of development of higher animals. GE credit: SciEng|SE. — W. (W.) Natzle, Rose

164. Advanced Eukaryotic Genetics (3) Lecture—3 hours. Prerequisite: course 121. Five basic organizational genetic analysis: mutation, segregation, recombination, complementation, and regulation. Emphasis on the theory and practice of isolating and analyzing mutations, as well as understanding mechanisms underlying both Mendelian and epigenetic inheritance. GE credit: SciEng|SE, SL—S. (S.) Burgess, Engbrecht

178. Undergraduate Seminar in Molecular Genetics (1) Seminar—1 hour. Prerequisite: upper division standing, completion of Biological Sciences 101, and completion or concurrent enrollment in course 121. Discussion of current topics in molecular genetics to show advanced applications of basic principles and to highlight professional career opportunities. May be repeated one time for credit when topic differs. (P/NP grading only.) GE credit: SciEng|OL, SE. — F, W, S. (F, W, S.)

197. Tutoring in Molecular and Cellular Biology (1-6) Tutorial—2-6 hours. Prerequisite: upper division standing, completion of course to be tutored, and consent of instructor. Assisting the instructor in one of the section’s remaining individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.) Offered irregularly. GE credit: SE. — F, W, S. (F, W, S.)

198. Directed Group Study (1-5) Variable—1-5 hours. Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE. — F, W, S. (F, W, S.)

199. Special Study for Advanced Undergraduates (1-5) Independent study—3-15 hours. Prerequisite: consent of instructor. (P/NP grading only.) GE credit: SE. — F, W, S. (F, W, S.)

Graduate

248. Seminar in Cell Biology (2) Seminar—2 hours. Prerequisite: consent of instructor. Discussion of special current literature on the physical and chemical aspects of organization and function of living systems, topics of current interest in ultrastructure and function of cells. Organizational and functional properties of the molecular and cellular levels of biological systems. May be repeated for credit.

256. Cell and Molecular Biology of Cancer (2) Lecture—1 hour; term paper. Prerequisite: course in cell or developmental biology (e.g., course 150, 141, 163, or Biological Sciences 104). Analysis of the cellular and molecular levels of the regulation of normal and neoplastic tissue growth; tumor dissemination; identification and characterization of oncogenic agents; characterization of oncoproteins and tumor-suppressor genes. — F. (F.)

258. Seminar in Development (2) Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit. — W. (W)

259. Literature in Developmental Biology (1) Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in developmental biology. May be repeated for credit. (S/U grading only.)— F, S. (F, S.) Draper

263. Biotechnology Fundamentals and Application (2) Lecture—2 hours. Prerequisite: Biological Sciences 101, 102 and Microbiology 102 or consent of instructor. Must be a graduate student in good standing. Fundamentals of molecular biology and chemical engineering involved in recombinant DNA technology. Topics: principles of rate processes of biological systems, optimization of bioreactors, and issues related to overexpression and production of recombinant molecules. Participation in student-directed team projects. — W. (W) McDonald, Privalsky, Rodriguez

282. Biotechnology Internship (7-12) Internship—21-36 hours. Prerequisite: consent of instructor. Seminars presented by guest instructors. May include presentation of a seminar to a research group. Internship carried out under the supervision of a faculty sponsor. Discussion and analysis of results and proposed experiments on a weekly basis with faculty sponsor. May include participation in a seminar to a research group. May be repeated for credit. (P/NP grading only.) GE credit: SE. — F, W, S. (F, W, S.)

190C. Undergraduate Research Conference (1) Discussion—1 hour. Prerequisite: upper division standing and consent of instructor; concurrent enrollment in course 193 or 199. Presentation and discussion of current research and laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: OL, SE, WE. — F, W, S. (F, W, S.)

190. Introduction to Research (1) Seminar—1 hour. Prerequisite: Biological Sciences 101. Fundamentals of genomics, including structural genomics, functional genomics, proteomics, and bioinformatics, focusing on the impact of these disciplines on research in the biological sciences. Social impacts of genomic research. GE credit: SciEng|SE. — W. (W.) Burtis, Korf

190D. Tutorial in Undergraduate Research (1-2) Tutorial—1-2 hours. Prerequisite: completion of course 190. Technical and/or practical experience on and off campus, supervised by a member of the Section of Molecular and Cellular Biology faculty. (P/NP grading only.) GE credit: SE. — F, W, S. (F, W, S.)

193. Advanced Research (3) Laboratory—6 hours; discussion—1 hour. Prerequisite: upper division standing, completion of an upper division Molecular and Cellular Biology laboratory course and consent of instructor. Research project carried out under the supervision of a faculty sponsor. Discussion and analysis of results and proposed experiments on a weekly basis with faculty sponsor. May include participation in a seminar to a research group. May be repeated for credit. (P/NP grading only.) GE credit: SE. — F, W, S. (F, W, S.) Wheeler

194. Thesis Research (3) Independent study—9 hours. Prerequisite: & units of course 193 and/or 199 with faculty director; senior standing. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: SciEng|OL, SE, WE. — F, W, S. (F, W, S.)

194H. Honors Research (3) Independent study—9 hours. Prerequisite: & units of course 193 and/or 199 with faculty director; senior standing, GPA of at least 3.25; consent of Section.

Honors project. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.) GE credit: OL, SE, WE. — F, W, S. (F, W, S.)

290C. Research Conference (1) Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Presentations and critical discussions of faculty and graduate student research in molecular and cellular biology including biochemistry, genetics, and cell biology. May be repeated for credit. (S/U grading only.)— F, W, S. (F, W, S.)

291. Current Progress in Molecular and Cellular Biology (1) Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (S/U grading only.)— F, W, S. (F, W, S.)

294. Current Progress in Biotechnology (1) Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (Same course as Chemical Engineering 294.) (S/U grading only.)— F, W, S. (F, W, S.) Kjelstrom, McDonald, Rodriguez

295. Literature in Molecular and Cellular Biology (1) Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Critical reading and evaluation of current literature in molecular and cellular biology disciplines. Papers will be presented and discussed in detail. May be repeated for credit. (S/U grading only.)— F, W, S. (F, W, S.) Baldwin, Fisher, Privalsky, Wilson

298. Group Study (1-5) Variable—1-5 hours. Prerequisite: consent of instructor. (S/U grading only.)— F, W, S. (F, W, S.)

299. Research (1-12) Independent study—3-36 hours. (S/U grading only.)— F, W, S. (F, W, S.)

Professional

390. Methods of Teaching (1) Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching biochemistry/genetics/cell biology. Includes analysis of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion and laboratory sections, formulating examinations under supervision of instructor. Participating in the teaching program required for Ph.D. May be repeated for credit. (S/U grading only.)— F, W, S. (F, W, S.)

Molecular, Cellular, and Integrative Physiology (A Graduate Group)

Catherine VandeVoort, Ph.D., Chairperson of the Group

Group Office. 227 Life Sciences Building 530-752-9092, http://mcip.ucsd.edu

Faculty
Paul Allen, Ph.D., Professor [Molecular Bicociences] Keith Baar, Ph.D., Associate Professor [Neurobiology, Physiology, and Behavior] Linda Barter, Ph.D., Associate Professor [VM: Surgical and Radiological Sciences] Donald M. Bers, Ph.D., Professor [Medical Pharmacology] Sue Bodine, Ph.D., Professor [Neurobiology, Physiology, and Behavior] Laura Borodinsky, Ph.D., Assistant Professor [Physiology & Membrane Biology] Julianne Boyd, Ph.D., Associate Professor [Medical Pharmacology] Robert Bransan, Ph.D., Professor [Medical Pharmacology] Catherine VandeVoort, Ph.D., Chairperson of the Group

Pre-Fall 2011 General Education (GE) Area — Arts and Humanities: SciEng—Science and Engineering; SocSci—Social Sciences; Div—Diverse; Wrt—Writing Experience Quarter Offered: F-W, W-Spring, Su-Summer; 2011/2012 offering in parentheses