Upper Division
130A. Special Themes in Medieval Cultures (4)
Lecture—3 hours; discussion—1 hour. Each offering concentrates on an interdisciplinary aspect of medieval culture in the Middle East and Europe; the idea of the hero, mysticism, urban development. Extensive readings focused on medieval source material. May be repeated for credit. GE credit: ArtHum, Wrt|AH, WC, WE.

130B. Special Themes in Renaissance Culture (4)
Lecture—3 hours; discussion—1 hour. Each theme illuminates an interdisciplinary aspect of Renaissance culture in the eastern and western hemispheres: exploration, medical pathology, daily life, baroque culture. Immersion in source material from 1500-1650. May be repeated for credit. GE credit: ArtHum, Wrt|AH, WC, WE.

131. Cross-Cultural Relations in the Medieval and/or Early Modern World (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 20A or 20B or consent of instructor. Medieval and/or Renaissance aspects of cross-cultural relations. Relations between Christians, Jews, and Muslims: Europeans, Africans, and Asians; Old World and New World. Offered irregularly. GE credit: WC, WE.

189. Seminar in Medieval and Early Modern Culture (4)
Seminar—3 hours; term paper. Prerequisite: course 20A or 20B or consent of instructor. Focus on a particular problem or issue in the Medieval or Early Modern periods. Seminar topics might include but not limited to: monasticism, origins of the university, chivalry, exploration, the role of women in the Medieval and Early Modern world. Offered in alternate years. GE credit: WE.

190. Senior Thesis (4)
Seminar—4 hours. Prerequisite: senior standing and major in Medieval Studies. Preparation of a research paper dealing with a selected aspect of medieval culture, under supervision of three members of the Committee in Charge. —F, W, S. (F, W, S.)

197T. Tutoring in Medieval Studies (1-4)
Seminar—2 hours. Prerequisite: courses 20A and 20B; upper division standing; consent of instructor and chairman of curriculum committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit for a total of 6 units. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Microbiology and Molecular Genetics
Formerly Microbiology
[College of Biological Sciences]
Wolf-Dietrich Heyer, Ph.D., Chairperson of the Department
Department Office, 237 Briggs Hall 530-752-2626; http://microbiology.ucdavis.edu

Faculty
Primary Department Members
Jacqueline Baslow, Ph.D., Assistant Professor
Sean Collins, Ph.D., Assistant Professor
Scott C. Dawson, Ph.D., Associate Professor
Wolf-Dietrich Heyer, Ph.D., Professor
Neil Hunter, Ph.D., Professor
Michele M. Igo, Ph.D., Professor
Stephen C. Kowalczykowski, Ph.D., Distinguished Professor
Sui-Ju Lin, Ph.D., Professor
Miriam Martin, Ph.D., Lecturer
John C. Meeks, Ph.D., Research Professor
Douglas C. Nielsen, Ph.D., Research Professor
Rebecca Parales, Ph.D., Professor
Martin L. Privalsky, Ph.D., Distinguished Professor
Katherine Ralston, Ph.D., Assistant Professor
John R. Roth, Ph.D., Distinguished Professor
Michael A. Savageau, Ph.D., Distinguished Professor
Kazuhiro Shizaki, Ph.D., Visiting Professor
Mitchell H. Singer, Ph.D., Professor
Valley J. Stewart, Ph.D., Professor
Lifeng Xu, Ph.D., Assistant Professor
Secondary Department Members
Sean Burgess, Ph.D., Professor
Jodi Nunnari, Ph.D., Professor
Ted Powers, Ph.D., Professor
Emeriti Faculty
Stanley W. Artz, Ph.D., Professor Emeritus
Paul Baumann, Ph.D., Professor Emeritus
John L. Ingraham, Ph.D., Professor Emeritus
John L. Ingraham, Ph.D., Professor Emeritus
Jaquie S. Manning, Ph.D., Professor Emeritus
David Pratt, Ph.D., Professor Emeritus
Chester W. Price, Ph.D., Professor Emeritus
Merna R. Villarreal, Ph.D., Professor Emerita
Mark L. Wheelis, Ph.D., Senior Lecturer Emeritus
Affiliated Faculty
Eric D. Mann, Ph.D., Lecturer

The Major Program
Microbiology is the branch of biology that deals with bacteria, yeasts and other fungi, algae, protozoa, and viruses. These microorganisms are ubiquitous in nature and play a crucial role in areas such as agriculture, biotechnology, ecology, medicine, and veterinary medicine. The field of microbiology contributes to areas of fundamental inquiry such as biochemistry, cell biology, evolution, genetics, molecular biology, pathogenesis, and physiology. The ease and power of simultaneous genetic and biochemical analysis of microbes led to the emergence of the new disciplines of molecular biology and molecular genetics, and spawned the new industry of biotechnology.

The Program. The Microbiology Undergraduate Program offers Bachelor of Science and Bachelor of Arts degrees in the College of Biological Sciences. Both degrees are designed to provide students with quantitative skills and knowledge across the breadth of Biological Sciences, while maintaining a focus on the biology of microorganisms. The B.S. degree offers more training in mathematics, biochemistry and laboratory methodology; the B.A. degree incorporates more exposure to the liberal arts. The choice of a major program and its suitability for particular career options should be discussed with a major adviser.

Career Alternatives. A bachelor’s degree in microbiology serves as the foundation for advanced study in microbiology, entry into the professional schools of all health sciences, or immediate employment in biotechnology, health care and food science industries.

A.B. Major Requirements:

Preparatory Subject Matter .............. 45-57
Biological Sciences 2A-2B-2C ........... 15
Chemistry 2A-2B-2C ..................... 10
Chemistry 8A-8B or 118A-118B ......... 118C ......................... 6-12
Mathematics 17A-17B or 21A-21B ........ 8
Physics 1A-1B or 7A-7B-7C ............. 6-12

Depth Subject Matter ................. 36
Biological Sciences 101, 105
(or 102+103) .............................. 7-10
Microbiology 102, 104L, 105, 105L, 111 .......................................... 15
Select at least one course from each of the areas of study below.

Areas of Study:

1. Microbial Genetics: Microbiology 115, 150, 170, 171, 172 ................. 3
2. Virology or Immunology: Microbiology 162, Medical Microbiology and Immunology 128, Pathology, Microbiology, and Immunology 126, 128 ................................................. 34
Additional course work, chosen from the list below, to achieve a total of 36 or more units. Upper division Microbiology courses not used in satisfaction of any other requirement; or Biological Sciences 104, 181, 183, Food Science and Technology 104; Molecular and Cellular Biology 121, 182; Plant Pathology 130; Soil Science 111; or upper division courses in related fields, relevant to the student’s interest and chosen in consultation with the adviser. No more than three units of variable-unit courses (numbered 192, 198 or 199) may be used for credit in this category. Note: Although a course might be listed in more than one category, that course may satisfy only one requirement in the entire major.

Total Units for the Major ................ 81-93

B.S. Major Requirements:

Preparatory Subject Matter .............. 57-67
Biological Sciences 2A-2B-2C ........... 15
Chemistry 2A-2B-2C ..................... 15
Chemistry 8A-8B or 118A-118B ......... 118C ......................... 6-12
Mathematics 17A-17B-17C or 21A-21B (21C recommended) ........... 8-12
Physics 7A-7B-7C ......................... 12
Microbiology 91 or 191 .................. 12

Depth Subject Matter ................. 45
Biological Sciences 101, 105 (or 102+103), 104 .................................. 10-13
Statistics 100 or 102 ........................ 4
Microbiology 102, 104L, 105, 105L, 111 .......................................... 15
Select at least one course from each of the areas of study below.

Meteorology

See Atmospheric Science, on page 184.

Mexican-American (Chicano) Studies

See Chicana/Chicano Studies, on page 203.

Microbiology

See Microbiology and Molecular Genetics, on page 453; Medical Microbiology (MMI), on page 442;
Areas of Study: 1. Microbial Genetics: Microbiology 1A, 1B, 1C, 1D, 1F, 1G, 1H, 1J, 1K, 1L, 1M, 1N, 1O, 1P, 1Q, 1R, 1S, 1T, 1U, 1V, 1W, 1X, 1Y, 1Z; 2. Virology: Microbiology 162; Pathology, Microbiology, and Immunology 128; 3. Microbial Microbiology and Immunology 188; Pathology, Microbiology, and Immunology 126; 4. Additional course work, chosen from the list below, to achieve a total of 45 or more units. Upper division Microbiology courses not used in satisfaction of any other requirement; or Biological Sciences, 181, 183, Food Science and Technology 104; Molecular and Cellular Biology 121, 182; Plant Pathology 130; Soil Science 111; or upper division courses in related fields, relevant to the student’s interest and chosen in consultation with the adviser. No more than three units of variable-unit courses (numbered 192, 198, or 199) may be used for credit in this category. Note: Although a course might be listed in more than one category, that course may satisfy only one requirement in the entire major.

Total Units for the Major.............. 102-112

Master Adviser, Su Jin, Ph.D.

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

Honors and Honors Program. Su Jin, Ph.D.

Teaching Credential Subject Representative. Su Lin, Ph.D., see the Teaching Credential/M.A. Program on page 124.

Graduate Study. The Graduate Group in Microbiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Strong preference is given to doctoral applicants. The graduate group offers microorganisms, microbial physiology, microbial genetics, molecular mechanisms of microbial regulation, molecular mechanisms of microbial pathogenesis, immunology, virology, and recombinant DNA technology. For information on the graduate study and undergraduate preparation for the program contact a graduate adviser or the Chairperson of the Group.

Related Courses. The offerings of the Department of Molecular Genetics are augmented by courses in Food Science and Technology; Medical Microbiology; Molecular and Cellular Biology; Pathology, Microbiology, and Immunology; Plant Pathology and Soil Science.

Faculty of the Department of Microbiology and Molecular Genetics also teach or participate in the following courses: Biological Sciences 2A, 101 104 and 181.

Courses in Microbiology (MIC)

Lower Division

10. Natural History of Infectious Diseases (3)

Lecture—3 hours. Topics in the natural history of infectious diseases principally affecting humans. Introduction to bacterial, viral, mycobacterial, fungal, and parasitic agents, ecology, epidemiology, and induction of disease. Focus on diseases of a contemporary nature. Not open for credit to students who have completed course 101, course 102, or course 104. GE credit: SciEng | SE. — F. (F.)

91. Introduction to Research (1)

Seminar—1 hour. Prerequisite: Biological Sciences 2A or equivalent. Restricted to lower division standing. Discussion of research methods in the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members. May be repeated for credit. (P/NP grading only) GE credit: SE—S. (S.) Hunter

98. Directed Group Study (1-5)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only).

99. Special Study for Undergraduates (1-5) (P/NP grading only)

Upper Division

101. Introductory Microbiology (5)

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1A, or 2A; Chemistry 28 (may be taken concurrently). Survey of microorganisms emphasizing their interactions with humans and diseases. Topics include microbial survey of various microbes, the immune system, food microbiology, microbial pathogens, and mechanisms of disease transmission. Designed for students requiring microbiology for professional schools. Not open for credit to students who have completed courses 102, 102L, 104L, or 104L. GE credit: SciEng | SE, SL.

102. Introductory Microbiology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 1A or 2A; Chemistry 28 (may be taken concurrently). Essentials of microbial biology, emphasizing physiology, genetics, ecology, and pathogenesis. Bacteria, Archaea, and microorganisms, humans, and the biosphere. Uses of microbes in agriculture and biotechnology. Not open for credit to students who have completed courses 101 or 104. GE credit: SciEng | SE, SL. —F. (F.) Shiozaki, W. (W.) Xu

103L. Introductory Microbiology Laboratory (2)

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 102 C or better; Chemistry 28. Introduction to principles and techniques employed in working with microorganisms. Designed for students requiring microbiology for professional school admission. Not open to students who have completed courses 102L or 104L—F. (W.) S., S. (W.) Mann

104L. General Microbiology Laboratory (3)

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 102 C or better. (Chemistry 88 or 118B or 129A) consent of instructor. Students must complete a petition for consideration of enrollment; petition available on department of Microbiology and Molecular Genetics website. Principles and laboratory methods employed in working with microorganisms. Designed for students continuing in microbiology, genetics, or biochemistry. Only two units of credit can be applied toward courses 101 before Spring 2016, or who have completed course 103L. Not open to students who have completed course 102L. GE credit: SciEng | SE, WE. —F. (F.) Martin

105. Microbial Diversity (3)

Lecture—3 hours. Prerequisite: course 102 or 104, Biological Sciences 101; 103 or 105 strongly recommended. Survey of microbial diversity in the three domains of life: Eukarya, Prokarya, and microbial eukaryotes. Emphasizes microbial evolution and phylogeny, physiology and metabolism, global biogeochemical cycles, environmental adaptations, and genomic methods for analyzing culture-independent microbial diversity and microbial communities. GE credit: SciEng | SE. —W. (W.) Dawson, Parales

105L. Microbial Diversity Laboratory (3)

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 102 or 104. (184) 104L (may be taken concurrently). Students must complete a petition for consideration of enrollment; petition available on department of Microbiology website. Classical enrichment for the isolation of metabolically diverse microorganisms; modern molecular methods for the identification of isolates; cultivation independent analysis of microbial communities from local environment sources. GE credit: SciEng | SE, WE. —W. (W.) Dawson, Parales, Ralston

111. Human Microbiology (3)

Lecture—3 hours. Prerequisite: course 102; Biological Sciences 101. Biology of microorganisms that form commensal, mutualistic, and pathogenic relationships with human beings, emphasizing their phylogeny, physiology, genetics, and ecology. Effects on human nutrition, development and physiology. Mechanisms of pathogenesis, immune response, antibiotic action, and antibiotic resistance. GE credit. SciEng | SE. —F. (F.) Stewart

115. Recombinant DNA Cloning and Analysis (3)

Lecture—3 hours. Prerequisite: Biological Sciences 101 or equivalent. Cloning and analysis of recombinant DNA, with emphasis on Escherichia coli host-vector systems. DNA-modifying enzymes and their use; manipulation and expression of insert DNA; polymerase chain reaction; and sequence annotation. Graduate students see course 215. GE credit. SciEng | SE. —F. (F.) Privalsky

120. Microbial Ecology (3)

Lecture—3 hours. Prerequisite: course 105; Biological Sciences 101, 102, 103 (103 may be taken concurrently), or Biological Sciences 101, 105; Microbiology 102 recommended. Fundamentals of bacterial growth and bacterial responses to environmental stresses. Topics will include carbon and nitrogen regulation, growth rate control, post-exponential growth, and motility and chemotaxis. Not open for credit to students who have completed course 104L. Offered irregularly. GE credit. SciEng | SE.—J. Nelson

140. Bacterial Physiology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 101, 102; Molecular genetics and comparative genomics of representative pathogenic bacteria. Roles of mobile genetic elements, lateral gene transfer, and genome rearrangements in pathogen evolution. Mutation, recombination, and complementation as tools for genetic analysis. Content includes close examination of primary research articles. GE credit. SciEng | SE.—S. (S.) Stewart

155L. Bacterial Physiology Lab (4)

Lecture/discussion—1 hour; laboratory—8 hours. Prerequisite: course 140 or 150, 1201, consent of instructor. Physiology and genetics of bacteria. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction studies of the genetics of enzyme synthesis, induction, repression, and catabolite repression. Offered irregularly.

162. General Virology (4)

Lecture—4 hours. Prerequisite: Biological Sciences 101; 102 or 105 recommended. Integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication and genetics. Only three units to students who have completed Pathology, Microbiology, and Immunology 120. GE credit. SciEng | SE. —S. (S.) Shiozaki

170. Yeast Molecular Genetics (3)

Lecture—3 hours. Prerequisite: Biological Sciences 101; 102 or 105 strongly recommended. Survey of the genetics, cell biology and technologies in yeasts and related lower eukaryotes. Topics include diversity of yeasts; cell structure; metabolism; cell cycle; genetic approaches and genomics; gene expression; yeasts as models to study higher eukaryotes; and contemporary techniques. GE credit. SciEng | SE.—S. (S.) Privalsky

190C. Undergraduate Research Conference (1)

Discussion—1 hour. Prerequisite: upper division standing and consent of instructor, course 199 concurrently. Presentation and critical discussion of staff
research activities: designed for advanced undergraduate students. May be repeated for credit. (P/NP grading only.)—F, W, S, (F, W, S.)

191. Introduction to Research for Advanced Undergraduates (1)
Seminar—1 hour. Prerequisite: biological sciences 2A or equivalent. Restricted to upper division standing. Discussion of faculty research focusing on the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members. May be repeated three times for credit. (P/NP grading only.) GE credit: SE—S. (S.) Hunter

192. Internship (1-12)
Internship—3.36 hours. Technical and/or professional experience on or off campus. Supervised by a member of the Microbiology Section faculty. (P/NP grading only.)

194H. Microbiology Honors Research (2)
Independent study—6 hours. Prerequisite: senior standing; eligibility for college honors; completion of six units of 199 in microbiology with consent of section. Continuation of an individual microbiological research project culminating in writing of a senior thesis under a faculty director. (P/NP grading only.)—F, W, S, (F, W, S.)

197T. Tutoring in Microbiology (1-12)
Prerequisite: upper division standing and consent of instructor. Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students individually or in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.)—F, W, S, (F, W, S.)

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

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)—F, W, S, (F, W, S.)

Graduate

200B. Advanced Bacteriology (3)
Lecture—3 hours. Prerequisite: course 200A. Intended for first year graduate students in microbiology and closely related fields. Advanced topics in phylology, physiology, and diversity of bacteria. Offered irregularly.—Dawson, Parales

215. Recombinant DNA (3)
Lecture—3 hours. Prerequisite: biological sciences 101, 102, 103 or the equivalent. Application of recombinant DNA technology to modern problems in biology, biochemistry, and genetics, emphasizing molecular cloning strategies, choice of vectors, preparation of insert DNA, and selection procedures. (F) (Privalsky

262. Advanced General and Molecular Virology (3)
Lecture—3 hours. Prerequisite: graduate standing. Advanced integrated presentation of animal, bacterial, and plant viruses, including their structure, modes of regulation, expression and replication, and effects on host cells and organisms. Offered in alternate years.—W. Luciw

263. Principles of Protein–Nucleic Acid Interactions (4)
Lecture—3 hours. Prerequisite: advanced graduate standing and completion of one year of basic graduate course work in biochemistry, biophysics, chemistry, genetics, microbiology, or molecular biology. Physical basis of protein–nucleic acid interaction. Topics include nucleic acid recognition by proteins, thermodynamics of protein–nucleic acid stability, and kinetics of binding process for both non-specific and sequence-specific nucleic acid binding proteins. Emphasis on understanding and representing paradigms in protein–nucleic acid interactions. Offered irregularly.—Kowalczykowski

274. Seminar in Genetic Recombination (1)
Seminar—1 hour. Prerequisite: graduate standing; consent of instructor. Biochemical and genetic aspects of genetic recombination in prokaryotes and eukaryotes. Mechanisms of recombination and biochemical and genetic characteristics of recombination proteins. Proteins include DNA strand exchange, DNA helicases, and Holliday junction resolving proteins. May be repeated for credit. (S/U grading only.) Offered irregularly.—Kowalczykowski

275. Seminar in DNA Repair and Recombination (1)
Seminar—1 hour. Prerequisite: consent of instructor; graduate standing in microbiology or closely related field. Review and discussion of current research and literature in DNA repair and recombination with presentations by individual students and invited speakers. May be repeated for credit. (S/U grading only.)—W, S, (F, S.) Heyer

276. Advanced Concepts in DNA Metabolism (1)
Lecture—3 hours. Prerequisite: molecular and cellular biology 221C or genetics 201C or equivalent. DNA damage checkpoints, homologous recombination, and meiotic recombination. Advanced topics in the structure and current literature to discuss emerging principles and current models in these research areas. Offered in alternate years.—W. Hunter

290C. Advanced Research Conference (1)
Discussion/conference—1 hour. Prerequisite: graduate standing and consent of instructor. Current progress in microbiology and cellular and molecular biology. May be repeated for credit. (S/U grading only.)—F, W, S, (F, W, S.)

291. Selected Topics in Microbiology (1)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Current progress in microbiology and cellular and molecular biology. May be repeated for credit. (S/U grading only.)—F, W, S, (F, W, S.)

292. Seminar in Bacterial Physiology and Genetics (1)
Seminar—1 hour. Prerequisite: consent of instructor, graduate standing in microbiology or closely related field. Review and discussion of current research and literature in bacterial physiology and genetics, with presentations by individual students. (S/U grading only.)—W, S, (F, W, S.)

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)—F, W, S, (F, W, S.)

Professional

366. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—F, W, S, (F, W, S.)

Microbiology (A Graduate Group)

Renée M. Tsolis, Ph.D., Chairperson of the Group
Group Office. 3143 Tupper Hall (Medical: Microbiology and Immunology) 530-752-0262

Fall 2011 and On Revised General Education (GE) AH=Arcs and Humanities; SE=Science and Engineering; SS=Social Sciences;
AGCH=American Cultures; DD=Dominant Diversity; OT=Oral Skills; DL=Quantitative; SL=Scientific; VL=Visual; WC=World Cultures; WE=Writing Experience
Pre-Fall 2011 General Education (GE): AritHum=Arts and Humanities; ScIeng=Science and Engineering; SocSci=Social Sciences; Div=Dominant Diversity; Wrt=Writing Experience
Quarter Offered: F=Fall, W=Winter, S=Spring, Su=Summer; 2017-2018 offering in parentheses