Department of Ecology and Evolutionary Biology

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Ecology and evolutionary biology deals with the adaption of organisms over evolutionary time and with organismal function in ecological time. Faculty in the Department of Ecology and Evolutionary Biology study questions at levels of biological organization, from molecular aspects of evolution, to organismal structure and performance, to the ecology of ocean ecosystems. Research is conducted in both the laboratory and field and includes work on a variety of organisms from bacteria and fungi to plants and animals. Primary attention is given to evolutionary, ecological, and functional questions rather than to particular habitats or taxa. Faculty and graduate student research is often collaborative and interdisciplinary in approach. Departmental research activities include physiological ecology energetics, plant-herbivore and plant-pollinator interactions, microbial ecology and coevolution, quantitative genetics, life history evolution, population and reproductive ecology, community ecology and biogeography. These research endeavors provide a balance between empirical and theoretical approaches to evolutionary, organismal, and ecological problems.

- Ecology and Evolutionary Biology, B.S.
- Ecology and Evolutionary Biology, Graduate Program
- Master of Conservation and Restoration Science

Faculty

Nancy M. Aguilar-Roca, Ph.D. University of California, San Diego, *Associate Professor of Teaching of Ecology and Evolutionary Biology*

Steven D. Allison, Ph.D. Stanford University, *Professor of Ecology and Evolutionary Biology; Earth System Science*

Peter R. Atsatt, Ph.D. University of California, Los Angeles, *Professor Emeritus of Ecology and Evolutionary Biology*

John C. Avise, Ph.D. University of California, Davis, *Professor Emeritus of Ecology and Evolutionary Biology*

Manny Azizi, Ph.D. University of Massachusetts, *Associate Professor of Ecology and Evolutionary Biology*

Alan G. Barbour, M.D. Tufts University, *Distinguished Professor of Microbiology and Molecular Genetics; Ecology and Evolutionary Biology; Medicine*

Albert F. Bennett, Ph.D. University of Michigan, *Professor Emeritus of Ecology and Evolutionary Biology*

Rudi C. Berkelhamer, Ph.D. University of California, Berkeley, *Professor of Teaching Emerita of Ecology and Evolutionary Biology*

Peter A. Bowler, Ph.D. University of California, Irvine, *Professor of Teaching Emeritus of Ecology and Evolutionary Biology*

Matthew E. Bracken, Ph.D. Oregon State University, *Professor of Ecology and Evolutionary Biology*

Timothy J. Bradley, Ph.D. University of British Columbia, *Professor Emeritus of Ecology and Evolutionary Biology*

Adriana D. Briscoe, Ph.D. Harvard University, *Professor of Ecology and Evolutionary Biology*

Nancy T. Burley, Ph.D. University of Texas at Austin, *Professor of Ecology and Evolutionary Biology*

Robin M. Bush, Ph.D. University of Michigan, *Professor Emeritus of Ecology and Evolutionary Biology*

Diane R. Campbell, Ph.D. Duke University, *Distinguished Professor of Ecology and Evolutionary Biology*

F. Lynn Carpenter, Ph.D. University of California, Berkeley, *Professor Emerita of Ecology and Evolutionary Biology*

Michael T. Clegg, Ph.D. University of California, Davis, *Donald Bren Professor and Professor Emeritus of Ecology and Evolutionary Biology*

Kwasi M. Connor, Ph.D. University of Southern California, *Assistant Professor of Ecology and Evolutionary Biology*

Monica A. Daley, Ph.D. Harvard University, *Professor of Ecology and Evolutionary Biology*

James J. Emerson, Ph.D. University of Chicago, *Associate Professor of Ecology and Evolutionary Biology*

Celia Faiola, Ph.D. Washington State University, *Associate Professor of Ecology and Evolutionary Biology; Chemistry*

Steven A. Frank, Ph.D. University of Michigan, *Distinguished Professor and Donald Bren Professor of Ecology and Evolutionary Biology; Logic and Philosophy of Science*

Ana E. Garcia Vedrenne, Ph.D. University of California, Santa Barbara, *Assistant Professor of Teaching of Ecology and Evolutionary Biology*

Brandon S. Gaut, Ph.D. University of California, Riverside, *Distinguished Professor of Ecology and Evolutionary Biology*

Donovan German, Ph.D. University of Florida, *Associate Professor of Ecology and Evolutionary Biology*

Michael L. Goulden, Ph.D. Stanford University, *Professor of Earth System Science; Ecology and Evolutionary Biology*

Tobin J. Hammer, Ph.D. University of Colorado Boulder, *Assistant Professor of Ecology and Evolutionary Biology*

Bradford A. Hawkins, Ph.D. University of California, Riverside, *Professor Emeritus of Ecology and Evolutionary Biology*

James W. Hicks, Ph.D. University of New Mexico, *Professor of Ecology and Evolutionary Biology*

Bradley S. Hughes, Ph.D. University of California, Irvine, *Associate Professor of Teaching of Ecology and Evolutionary Biology; Education*

George L. Hunt, Jr., Ph.D. Harvard University, *Professor Emeritus of Ecology and Evolutionary Biology*

Travis E. Huxman, Ph.D. University of Nevada, *Department Chair and Professor of Ecology and Evolutionary Biology*

Mahtab F. Jafari, Pharm.D. University of California, San Francisco, *Director of the Center for Healthspan Pharmacology and Professor of Pharmaceutical Sciences; Clinical Pharmacy Practice; Ecology and Evolutionary Biology* (anti-aging pharmacology and preventive medicine)

C. Sunny Jiang, Ph.D. University of South Florida, *Professor of Civil and Environmental Engineering; Ecology and Evolutionary Biology; Environmental and Occupational Health* (water pollution microbiology, environmental technology, aquatic microbial ecology)

Sarah Kimball, Ph.D. University of California, Irvine, *Associate Professor in Residence of Ecology and Evolutionary Biology*

Natalia Komarova, Ph.D. University of Arizona, *UCI Chancellor's Professor of Mathematics; Ecology and Evolutionary Biology* (applied and computational mathematics, mathematical and computational biology, mathematics of complex social phenomena)

Harold Koopowitz, Ph.D. University of California, Los Angeles, *Professor Emeritus of Ecology and Evolutionary Biology*

Joleah B. Lamb, Ph.D. James Cook University, *Assistant Professor of Ecology and Evolutionary Biology*

Grace Yuh Chwen Lee, Ph.D. University of California, Davis, *Assistant Professor of Ecology and Evolutionary Biology*

Anthony D. Long, Ph.D. McMaster University, *Professor of Ecology and Evolutionary Biology*

Catherine Loudon, Ph.D. Duke University, *Professor of Teaching of Ecology and Evolutionary Biology*

Deborah I. Lutterschmidt, Ph.D. Oregon State University, *Associate Professor of Ecology and Evolutionary Biology*

Richard E. MacMillen, Ph.D. University of California, Los Angeles, *Professor Emeritus of Ecology and Evolutionary Biology*

Katherine Mackey, Ph.D. Stanford University, *Associate Professor of Earth System Science; Ecology and Evolutionary Biology*

Christopher M. Martinez, Ph.D. Stony Brook University, *Assistant Professor of Ecology and Evolutionary Biology*

Adam Martiny, Ph.D. Technical University of Denmark, *Professor of Earth System Science; Ecology and Evolutionary Biology*

Jennifer Martiny, Ph.D. Stanford University, *UCI Chancellors' Fellow and Professor of Ecology and Evolutionary Biology*

Matthew J. McHenry, Ph.D. University of California, Berkeley, *Professor of Ecology and Evolutionary Biology*

Kailen Mooney, Ph.D. University of Colorado Boulder, *Professor of Ecology and Evolutionary Biology*

Laurence D. Mueller, Ph.D. University of California, Davis, *Professor of Ecology and Evolutionary Biology*

R. Michael Mulligan, Ph.D. Michigan State University, *Professor of Developmental and Cell Biology; Ecology and Evolutionary Biology* (RNA editing in plant mitochondria and chloroplasts)

Jessica Pratt, Ph.D. University of California, Irvine, *Associate Professor of Teaching of Ecology and Evolutionary Biology*

James T. Randerson, Ph.D. Stanford University, *UCI Chancellor's Professor of Earth System Science; Civil and Environmental Engineering; Ecology and Evolutionary Biology*

Jose Maria Ranz Navalpotro, Ph.D. Universidad Autónoma de Barcelona, *Associate Professor of Ecology and Evolutionary Biology*

Maria Rebolleda-Gomez, Ph.D. University of Minnesota, *Assistant Professor of Ecology and Evolutionary Biology*

Alejandra Rodriguez-Verdugo, Ph.D. University of California, Irvine, *Assistant Professor of Ecology and Evolutionary Biology*

Michael R. Rose, Ph.D. University of Sussex, *Distinguished Professor of Ecology and Evolutionary Biology*

Ann K. Sakai, Ph.D. University of Michigan, *Professor Emerita of Ecology and Evolutionary Biology*

Cascade J. Sorte, Ph.D. University of California, Davis, *Associate Professor of Ecology and Evolutionary Biology*

Richard Symanski, Ph.D. Syracuse University, *Professor Emeritus of Teaching of Ecology and Evolutionary Biology*

Celia Symons, Ph.D. University of California, San Diego, *Assistant Professor of Ecology and Evolutionary Biology*

Kevin Thornton, Ph.D. University of Chicago, *Professor of Ecology and Evolutionary Biology*

Kathleen K. Treseder, Ph.D. Stanford University, *UCI Chancellor's Fellow and Professor of Ecology and Evolutionary Biology*

Arthur Weis, Ph.D. University of Illinois at Urbana-Champaign, *Professor Emeritus of Ecology and Evolutionary Biology*

Stephen G. Weller, Ph.D. University of California, Berkeley, *Professor Emeritus of Ecology and Evolutionary Biology*

Guiyun Yan, Ph.D. University of Vermont, *Professor of Population Health and Disease Prevention; Ecology and Evolutionary Biology; Epidemiology and Biostatistics*

Courses

ECO EVO 200A. Research in Ecology and Evolutionary Biology. 2-12 Units.
Individual research with Ecology and Evolutionary Biological faculty.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

ECO EVO 200B. Research in Ecology and Evolutionary Biology. 2-12 Units.
Individual research with Ecology and Evolutionary Biological faculty.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

ECO EVO 200C. Research in Ecology and Evolutionary Biology. 2-12 Units.
Individual research with Ecology and Evolutionary Biological faculty.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

ECO EVO 201. Seminar in Ecology and Evolutionary Biology. 2 Units.
Invited speakers, graduate students, and faculty present current research in ecology and evolutionary biology.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

Concurrent with BIO SCI E107.

ECO EVO 203A. Graduate Tutorial in Ecology and Evolutionary Biology. 2-12 Units.
Advanced study in areas not represented by formal courses. May involve individual or small group study through reading, discussion, and composition.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

ECO EVO 203B. Graduate Tutorial in Ecology and Evolutionary Biology. 2-12 Units.
Advanced study in areas not represented by formal courses. May involve individual or small group study through reading, discussion, and composition.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

ECO EVO 203C. Graduate Tutorial in Ecology and Evolutionary Biology. 2-12 Units.
Advanced study in areas not represented by formal courses. May involve individual or small group study through reading, discussion, and composition.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

ECO EVO 204. Writing Grant Proposals. 4 Units.
Provides students with hands-on experience writing proposals in the research areas of ecology, evolution, or physiology.

Restriction: Graduate students only.

ECO EVO 205. Special Topics in Ecology. 4 Units.
Survey of special topics in Ecology.

Restriction: Graduate students only.

ECO EVO 206. Special Topics in Evolution. 4 Units.
Extensive introduction to the primary literature of evolutionary biology. Topics include population genetics, quantitative genetics, neutralism, molecular evolution, evolution of genetic systems, genetic architecture of fitness, speciation, and macroevolution.

Restriction: Graduate students only.

ECO EVO 207. Quantitative Methods in Ecology and Evolutionary Biology. 4 Units.
Statistics for ecologists and evolutionary biologists. Emphasis on specific applications and underlying assumptions rather than on methods of calculation. Topics include experimental design, parametric and nonparametric methods, analysis of variance and covariance, and multiple regression.

Prerequisite: Completion of at least one quarter of statistics including regression and analysis of variance.

Restriction: Graduate students only.

ECO EVO 208. Ecological and Evolutionary Physiology. 4 Units.
A summary of information in organismal biology, comparative and ecological physiology, and the biophysical basis of organismal function. Course offered every other fall.

Restriction: Graduate students only.

ECO EVO 210. Foundations of Physiology. 4 Units.
Physical and functional principles common to many living forms. Course forms a basis for subsequent specialization in any of the subdisciplines of physiology. Course offered in even years.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

ECO EVO 221. Advanced Topics in Ecology. 2-4 Units.
Weekly discussion of current topics in ecology at the graduate level.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: Unlimited as topics vary.

ECO EVO 222. Statistical Learning in Ecology and Evolution. 4 Units.
Reviews basic principals of variance/bias trade-offs. Topics include models for prediction and classification, variable selection methods, cross-validation, tree based methods, unsupervised learning. Applications in ecology and evolution using R.

Prerequisite: ECO EVO 207. ECO EVO 207 with a grade of B or better

Restriction: Graduate students only.

ECO EVO 227. Plant Physiological Ecology. 4 Units.
Provides a summary of information on plant organismal biology, comparative and ecological physiology, and functional ecology. Offered every other fall.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

ECO EVO 230. Topics in Microbial Ecology. 2-4 Units.
Weekly discussion of current topics in ecology, biogeochemistry, evolution, and physiology of microbial organisms.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

ECO EVO 231. Communication Skills for Environmental Scholars. 4 Units.
Students learn to communicate with non-specialist audiences about climate and environmental issues. Hands-on activities build technical, presentation, and contextual skills required for effective communication across a range of media types and careers.

ECO EVO 235. Experimental Evolution. 2 Units.
Explores experimental evolution, which is now a well-established part of evolutionary biology. With the advent of genomics, it is now one of the most powerful tools for studying the genetic foundations of biology.

Prerequisite: BIO SCI E106

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only. School of Biological Sciences students only.

ECO EVO 236. Human Dimensions in Conservation and Restoration. 4 Units.
The non-human “environment” we know today is the result of past social, political, scientific, and economic forces. Examines the forces that drove environmental conservation efforts, which often sought progress at the expense of local cultures.

Restriction: Graduate students only.

ECO EVO 237. Marine Conservation Ecology. 4 Units.
Theory-based seminar tackles pressing issues in marine ecology, conservation, and restoration. Focuses on the science of marine ecosystems, resources and tools for their conservation, and management and the socioeconomic and policy dimensions.

Restriction: Graduate students only.

ECO EVO 246. Seminar in Ecology and Evolution Education. 2 Units.
Weekly discussion of teaching techniques and challenges that are specific to courses in ecology and evolutionary biology. Emphasis will be on using evidence-based pedagogy techniques. There will be a combination of readings, group discussions and speakers.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

ECO EVO 247. Behavioral Endocrinology. 4 Units.
Comparative examination of the major hormone systems that regulate behavior across animals. Emphasizes the reciprocating nature of hormone-behavior interactions and seeks to understand how natural selection drives the evolution of hormone structure and function.

Restriction: Graduate students only.

Concurrent with BIO SCI E147.

ECO EVO 253. Functional and Structural Evolutionary Genomics. 4 Units.
Function and organization of genomes analyzed from an evolutionary perspective. Review of some of the most recent experimental approaches in genome analysis and comparative genomics. Relevant software to analyze DNA and expression data is used.

Concurrent with BIO SCI E153.

ECO EVO 261. Advanced Quantitative Methods. 4 Units.
Covers advanced analytical techniques used by conservation biologists. Methods include generalized linear models, community analysis using multivariate analyses, analysis of spatial/GIS data using R, time-series analysis, and meta-analysis.

Prerequisite: Recommended: ECO EVO 207.

Restriction: Graduate students only.

ECO EVO 262. Professional Workshop. 2 Units.
Identify and attend professional or technical skill workshops to gain professional knowledge and certifications related to conservation and restoration science.

Repeatability: May be taken for credit 4 times.

Restriction: Graduate students only.

ECO EVO 264. Conservation Biology. 4 Units.
Explores concepts in ecology with potential for conserving biological diversity. Identifies creative applications of ecological research that mitigate impacts of rapid human population growth and habitat destruction on biodiversity.

Restriction: Graduate students only.

ECO EVO 265. Restoration Ecology. 4 Units.
Study of principles and practices that help recover degraded ecosystems including restoration in different ecological systems, restoration motives and intensities, implementation and monitoring, and scope and success of case studies.

Restriction: Graduate students only.

ECO EVO 266L. Field Methods in Restoration. 4 Units.
Laboratory experience performing field methods that help recover degraded ecosystems in different ecological systems. Emphasis on the plant community composition, soil, irrigation, maintenance, and monitoring of a project.

ECO EVO 267. Science Communication. 2 Units.
Develops students' abilities to convey information related to conservation and restoration in a way that has broad appeal and/or effective messaging for non-scientific audiences by assessing the audience, developing effective storytelling, and deploying a persuasive information campaign.

Repeatability: May be taken for credit 2 times.

ECO EVO 268. Technical Writing. 2 Units.
Practice developing key documents for restoration projects including a response to a request for proposal (RFP), a restoration project plan, and a monitoring and maintenance plan.

ECO EVO 269. Project Management. 2 Units.
Discover the planning, design, implementation, and aftercare phases of managing a conservation or restoration project. Students will project cost, manage risk, analyze sites, evaluate and review projects, and become familiar with common permitting and consultation requirements.

ECO EVO 270. GIS for Environmental Science. 4 Units.
Introduction to the fundamental principles of GIS. Topics include cartography, creating/editing GIS data, georeferencing, map projections, geospatial analysis, spatial statistics, and development of GIS models. Focuses on theory and practice.

Restriction: Graduate students only.

ECO EVO 271. Marine Research and Conservation Methods. 4 Units.
Field-based introduction to marine ecology and conservation management through the study of the ecology, resource management, and conservation of marine habitats and species, and the use of a variety of marine field research methods.

Restriction: Graduate students only.

ECO EVO 275. Wildlife Ecology and Sampling. 4 Units.
Field-based introduction to wildlife management through the study of the ecology, physiology, population biology management, and conservation of vertebrate wildlife species, and the use of a variety of different wildlife sampling techniques.

Restriction: Graduate students only.

ECO EVO 276. Environmental Education and Outreach. 4 Units.
Prepares students to develop tailored education programs for conservation and restoration projects. Students engage in activities that foster innovative approaches and solutions to different education and outreach needs for conservation and restoration projects.

Overlaps with ECO EVO 200B.

Restriction: Graduate students only.

ECO EVO 278. Evolution and Conservation. 4 Units.
Examines evolution applications to conservation biology in three parts: processes of evolution within populations, conservation of species, and assessing evolutionary responses to environmental change.

Restriction: Graduate students only.

ECO EVO 279. Site Development. 4 Units.
Students learn about plan review and the permitting processes as they relate to site development. Explores how a site is developed from application to building permits, and all the steps in between.

Overlaps with UPPP 272.

Restriction: Graduate students only.

ECO EVO 282. Fundamentals of Informatics for Biologists. 4 Units.
Students learn the fundamentals of bioinformatics and the unix operating system (including the shell and Sun Grid Engine) in order to assemble a eukaryotic genome.

Restriction: Graduate students only.

ECO EVO 283. Advanced Informatics for Biologists. 4 Units.
Students learn advanced informatics including the analysis of: Poolseq, RNAseq, ATACseq, and ChiPseq datasets using programs such as bwa, tophat, cufflinks, DEseq, Trinity, Agustus, etc., in a unix high-performance computing environment. Statistical tests carried out and publication quality.

Prerequisite: ECO EVO 282. ECO EVO 282 with a grade of B- or better

Restriction: Graduate students only.

ECO EVO 285. Topics in Evolutionary Genetics. 2 Units.
Weekly discussion of recent research on evolutionary genetics.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

ECO EVO 286. MCRS Capstone. 2-12 Units.
Apply knowledge and skills in a practical professional setting, working with practitioners to identify a conservation or management problem and then to plan, implement, and evaluate a solution.

Repeatability: May be taken for credit for 12 units.

Restriction: Graduate students only.

ECO EVO 341. Teaching Science in Secondary School. 4 Units.
Prospective secondary science teachers learn how to teach science in grades 7-12. Covers State science requirements, a variety of teaching methods, criteria for selecting science curricular materials, and how to plan science lessons, units, experiments, projects, and demonstrations.

Same as EDUC 341.

Restriction: Master of Arts in Teaching Degree students only.

ECO EVO 399. University Teaching. 4 Units.
Mandatory course for Ecology and Evolutionary Biology Teaching Assistants, required in each quarter in which student has a Teaching Assistant position. Limited to Teaching Assistants.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.