Department of Ecology and Evolutionary Biology

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949-824-6006
http://ecoevo.bio.uci.edu/

Overview
Ecology and evolutionary biology deals with the establishment of adaptations over evolutionary time and with the organismal function in ecological time. Faculty in the Department of Ecology and Evolutionary Biology study questions pertinent at a variety of 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 phages and bacteria, to higher 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.

Undergraduate Major in Ecology and Evolutionary Biology
In the 21st century, biologists in fields ranging from medicine to global change biology increasingly incorporate ecological and evolutionary ideas in their research. The major in Ecology and Evolutionary Biology encourages students to understand and appreciate important linkages between biological disciplines. The major is very broad, including components of evolutionary biology, ecology, and physiology. Faculty interests are also broad and include the evolution of aging, conservation biology, restoration ecology, biogeography, plant and animal population and community ecology, the evolution of infectious disease, evolutionary physiology, behavioral ecology, host-disease interactions, evolutionary genetics, genetics of invasive species, and plant population biology. Following graduation, students will be especially well prepared to enter graduate programs in either ecology or evolution for advanced study. The major also provides the foundation to pursue careers in governmental and non-governmental environmental organizations, as well as professional schools. The Department considers undergraduate experience in research an integral component of a scientific education, and majors are encouraged to participate in BIO SCI 199, in which they will be mentored by an individual faculty member within the Department.

Requirements for the B.S. in Ecology and Evolutionary Biology
All students must meet the University Requirements.
All students must meet the School Requirements.

Major Requirements
A. Required Major Courses:
   BIO SCI E106 Processes in Ecology and Evolution
   BIO SCI E107 Seminar in Ecology and Evolutionary Biology
   STATS 8 Introduction to Biological Statistics

B. Upper-Division Laboratories:
   BIO SCI E115L Evolution Laboratory
   BIO SCI E166L Field Biology
   and select one of the following:
   BIO SCI D111L Developmental and Cell Biology Laboratory
   BIO SCI E106L Habitats and Organisms
   BIO SCI E112L Physiology Laboratory
   BIO SCI E131L Image Analysis in Biological Research
   BIO SCI E140L Evolution and the Environment Laboratory
   BIO SCI E161L Biology of Birds Lab
   BIO SCI E179L Field Freshwater Ecology
   BIO SCI M114L Biochemistry Laboratory
   BIO SCI M116L Molecular Biology Laboratory
   BIO SCI M118L Experimental Microbiology Laboratory
   BIO SCI M121L Advanced Immunology Laboratory
   BIO SCI M127L Virology and Immunology Laboratory
   BIO SCI M130L Advanced Molecular Lab Techniques
   BIO SCI N113L Neurobiology Laboratory
One laboratory can be satisfied with completion of Excellence in Research in the Biological Sciences.

C. Upper-Division Biology Electives:

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIO SCI D103</td>
<td>Cell Biology</td>
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<tr>
<td>BIO SCI D104</td>
<td>Developmental Biology</td>
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<tr>
<td>BIO SCI D105</td>
<td>Cell, Developmental, and Molecular Biology of Plants</td>
</tr>
<tr>
<td>BIO SCI E109</td>
<td>Human Physiology</td>
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<tr>
<td>BIO SCI N110</td>
<td>Neurobiology and Behavior</td>
</tr>
</tbody>
</table>

and select three four-unit courses from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIO SCI E118–E190</td>
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</table>

BIO SCI 199 Research is strongly encouraged.

Double majors within the Francisco J. Ayala School of Biological Sciences or with Public Health Sciences, Biomedical Engineering: Premedical, Nursing Science, or Pharmaceutical Sciences are not permitted.

Sample Program — Ecology and Evolutionary Biology

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<thead>
<tr>
<th>Freshman</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>BIO SCI 93</td>
<td>BIO SCI 94</td>
<td>BIO SCI 106</td>
</tr>
<tr>
<td>CHEM 1A</td>
<td>CHEM 1B</td>
<td>CHEM 1C: 1LC</td>
</tr>
<tr>
<td>Lower-Division Writing</td>
<td>Lower-Division Writing</td>
<td>Lower-Division Writing</td>
</tr>
<tr>
<td>BIO SCI 2A</td>
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<thead>
<tr>
<th>Sophomore</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>BIO SCI 97</td>
<td>BIO SCI 98</td>
<td>BIO SCI 99</td>
</tr>
<tr>
<td>CHEM 51A</td>
<td>CHEM 51B: 51LB</td>
<td>CHEM 51C: 51LC</td>
</tr>
<tr>
<td>MATH 2A or 5A</td>
<td>MATH 2B or 5B</td>
<td>STATS 8</td>
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<tr>
<td>CHEM 1LD</td>
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<tr>
<td>BIO SCI 194S</td>
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<tr>
<th>Junior</th>
<th>Winter</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>BIO SCI E107</td>
<td>U-D Bio. Sci. elective</td>
<td>BIO SCI E115L</td>
</tr>
<tr>
<td>PHYSICS 3A</td>
<td>PHYSICS 3B- 3LB</td>
<td>PHYSICS 3C- 3LC</td>
</tr>
<tr>
<td>BIO SCI 100</td>
<td>General Education</td>
<td>Bio. Sci. research</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Senior</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>U-D Lab</td>
<td>Bio. Sci. research</td>
<td>General Education</td>
</tr>
<tr>
<td>Bio. Sci. research</td>
<td>General Education</td>
<td>Bio. Sci. research</td>
</tr>
<tr>
<td>Elective</td>
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1. Students have the option of taking HUMAN 1AS, HUMAN 1BS, HUMAN 1CS or WRITING 39A, WRITING 39B, WRITING 39C in order to fulfill the lower-division writing requirement.

2. BIO SCI E106 is offered in all three quarters, is a prerequisite for many upper-division courses and may be taken at any time after completion of BIO SCI 94.

Graduate Program in Ecology and Evolutionary Biology

The graduate program offers both the Plan I M.S. and the Ph.D. in Biological Sciences.

Requirements

Students are required to complete a minimum of five core courses during their first six academic quarters. Two of those courses are required graduate-level courses that all students must take:

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ECO EVO 204</td>
<td>Writing Grant Proposals (typically in the second year)</td>
</tr>
<tr>
<td>ECO EVO 207</td>
<td>Quantitative Methods in Ecology and Evolutionary Biology (typically in the first year)</td>
</tr>
</tbody>
</table>

In addition students must take one course each in the areas of Physiology (P), Ecology (EC), and Evolution (EV). Although all three courses can be taken at the graduate level (G), one of the three courses may be taken as an upper-division undergraduate course (U). The list of acceptable courses is currently limited to:

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ECO EVO 208</td>
<td>Ecological and Evolutionary Physiology (GP)</td>
</tr>
</tbody>
</table>

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If a student wishes to request an exception (an exemption or a substitution), the student must submit a written request justifying the reason to the Graduate Advisor. The Graduate Advisor and the student’s Advisory Committee (or prior to the formation of the Advisory Committee, the Prescription Committee) will decide whether to grant the request.

Students who enter the program through the Gateway Program are required to take ECO EVO 204 and one additional course at either the undergraduate or graduate level in the dissertation topic area. The student and his/her thesis advisor should decide which particular course would be most appropriate.

Students are required to maintain a grade point average of B or greater in the five core courses required for that student. The grade of B- is not considered a passing grade for a graduate student. Students must pass the five core courses by the end of their second academic year. Students failing to meet this requirement may be asked to leave the program. In the event a student receives an Incomplete in any of the core courses, the deficiency must be cleared by the deadline specified by the Graduate Advisor. Any extensions of this deadline require approval by the Graduate Advisor.

Teaching Requirement
To ensure that all students gain teaching experience, all students are required to serve as Teaching Assistants for a minimum of one quarter for M.S. students and three quarters for Ph.D. students. These are minima, and students may teach additional quarters during their program.

Research
Each entering graduate student chooses a faculty advisor and a three-person advisory committee for guidance, with whom the student meets at least twice each year. All students are encouraged to submit a research proposal to their advisory committee during their first year of residency. A comprehensive proposal is required before the end of the first year for M.S. students and before advancement to candidacy for Ph.D. students. The progress of each student is reviewed by the student’s advisory committee, together with the Graduate Advisor, twice each academic year.

Advancement to Candidacy and Normative Time for Completion
Doctoral students who Advance to Candidacy meet the M.S. degree requirements, and can receive the M.S. degree by submitting the M.S. degree advancement to candidacy paperwork, and then submitting the M.S. degree completion paperwork in a subsequent quarter.

The normative time for completion of the Ph.D. is five years, and the maximum time permitted is seven years. All requirements for the M.S. degree should be completed within two years, with a maximum of three years allowed for completion of the program. Advancement to doctoral candidacy by an oral examination is expected during the third year for students entering with a B.A. or B.S. or during the second year for those entering with an M.A. or M.S.
Admissions

Applicants for this program should have a solid undergraduate program in biology and ecology, emphasizing both research and fieldwork. In addition, course work in statistics, mathematics, and physical and chemical sciences is expected. All applicants are required to submit GRE scores. The deadline for application is December 1.

Master of Conservation and Restoration Science (MCRS)

The Master of Conservation and Restoration Science (MCRS) is designed for professionals or recent graduates who wish to further their education and gain skills that will help them obtain or advance in careers related to environmental management. The MCRS program integrates academic scholarship in ecology and evolutionary biology, training in natural resource management and stewardship, professional development (leadership training in agency, non-profit and for-profit conservation), and community engagement (translational partnerships in research and education).

Program Objectives

Upon completion of the program, graduates are able to lead and collaborate in the planning, design, implementation, and management of complex, large-scale environmental conservation and restoration activities, in agency, non-profit, and for-profit settings. MCRS graduates have the broad knowledge in applied ecosystem and community ecology, in addition to training in the use of Geographical Information Systems (GIS), remote sensing, and informatics (data analysis and management). Professional development training (e.g., project and personnel management) will position our graduates for leadership positions in environmental non-profits, agencies, and private consulting firms where managing teams of employees, volunteers, and stewards to conduct long-term and large-scale projects is often required.

Admissions

A B.A. or B.S., preferably in Biology, Conservation Biology, Ecology, or Environmental Science (or comparable degree title) from a fully accredited academic institution, is required for admission. Applicants with undergraduate degrees in areas such as Social Ecology, Public Health, Environmental Policy, or other similar degree titles are considered, but must demonstrate proficiency in the natural sciences and/or practical experience working in the professional field as documented below:

- Undergraduate preparation should include a minimum of:
  - One full year of biological sciences
  - One full year of chemistry
  - One semester or quarter of calculus or statistics

Experience from professional activities will be evaluated by faculty and staff in the program, but extended practical experience in ecology, conservation, restoration, or environmental engineering may be an acceptable substitute for one or more of the requirements above, depending on the nature of the experience. The GRE is not required.

Applicants must demonstrate that they possess academic potential for graduate study and meet the general requirements of the UCI Graduate Division. In addition to the requirements above, selection for admission is based on the following criteria:

1. A minimum overall grade point average of 3.0 in undergraduate academic course work
2. Two confidential letters of recommendation
3. A statement of purpose (describing the applicant’s goals in seeking the Master’s degree)
4. A resume (noting relevant work/academic experience)

Applicants apply directly to the Graduate Division for the MCRS program beginning each fall. The program uses rolling admission deadlines. The priority deadline is December 1; applications received by this date are read first, and next fall’s class begins to fill from this group. March 1 is the normal deadline; the remainder of the class is filled from these applicants. If the class is not full after each review of the March 1 applicants, additional applications will be accepted until June 1.

Curriculum

This two-year program of study consists of a four-part curriculum: a first-year sequence of core topic and professional development courses, a summer research/policy internship, a second-year of elective courses, and a team-based capstone experience (that serves as the thesis project). The summer internship and capstone experience are focused on stakeholder-engaged scholarship with community partners, where students are embedded in real-world conservation and restoration settings.

The MCRS program provides curriculum that includes:

1. Experience in core ecological and evolutionary principles underlying conservation and restoration;
2. interdisciplinary training in the earth and environmental sciences vital for a modern perspective on system-based conservation and restoration;
3. training in professional skills required for effective practice and success in leadership positions in non-profit, institute, for-profit and agency settings;
4. research experiences in community-engaged research projects to build bridges between communities of research capacity (universities, institutes, agencies) and need (non-profits, land management agencies, private land-holders, and governments); and
5. exposure to social, political, and economic principles that guide the application of science to conservation and restoration.

**Required and Elective Course Work**

*NOTE: This degree's requirements have not been finalized. Please check back prior to the start of the fall 2018 quarter for the finalized requirements.*

This program consists of 11 required classes, four required workshops, four electives (selected across three categories), a recommended summer internship, and a group capstone project. There is no teaching requirement for the MCRS.

A. Complete the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ECO EVO 203B</td>
<td>Graduate Tutorial in Ecology and Evolutionary Biology ((Intro to Conservation and Restoration Science - 2 units))</td>
</tr>
<tr>
<td>ECO EVO 205</td>
<td>Special Topics in Ecology</td>
</tr>
<tr>
<td>ECO EVO 264</td>
<td>Conservation Biology</td>
</tr>
<tr>
<td>ECO EVO 265</td>
<td>Restoration Ecology</td>
</tr>
<tr>
<td>EARTHSS 264</td>
<td>Ecosystem Ecology</td>
</tr>
<tr>
<td>ECO EVO 207</td>
<td>Quantitative Methods in Ecology and Evolutionary Biology</td>
</tr>
<tr>
<td>EARTHSS 134</td>
<td>Fundamentals of GIS for Environmental Science</td>
</tr>
<tr>
<td>ECO EVO 268</td>
<td>Technical Writing</td>
</tr>
<tr>
<td>ECO EVO 267</td>
<td>Science Communication</td>
</tr>
<tr>
<td>ECO EVO 269</td>
<td>Project Management</td>
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</tbody>
</table>

B. Select four courses from the following categories:¹

- Environmental Regulation and Policy
- Organismal Biology and Diversity
- Earth and Environmental Science

¹ View courses eligible for the elective requirements here (http://mcrs.bio.uci.edu/elective-courses). Courses offered in each category may change each year. Two electives may be taken at the undergraduate level.

**Capstone Project for Degree Completion**

In lieu of qualifying exams or a thesis requirement, students are required to complete 12 units of capstone course during their second year in the program. In the MCRS capstone course, groups of three to six students complete a project involving community-engaged scholarship in collaboration with a local partner/stakeholder to address a current management need and/or solve a real environmental problem.

Students demonstrate how the knowledge and skills learned in this program can be applied in a practical professional setting while gaining skills necessary to succeed in the professional arena upon degree completion.

Capstone projects require a written product. The format of this product is not specified, but it must demonstrate that the student can effectively integrate the skills that they have learned in the MCRS program. Programs may include habitat conservation, restoration, or species management plans; detailed reports to partners or stakeholders; or scholarly research papers. All written products must show originality and thoroughness in the conception and implementation of the project and effective integration of their project with the broader field of conservation and restoration science.

**Faculty**

Nancy M. Aguilar-Roca, Ph.D. University of California, San Diego, Lecturer with Potential Security of Employment of Ecology and Evolutionary Biology

Steven D. Allison, Ph.D. Stanford University, Associate 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, UCI Distinguished Professor of Ecology and Evolutionary Biology

Francisco J. Ayala, Ph.D. Columbia University, Donald Bren Professor and University Professor of Ecology and Evolutionary Biology; Logic and Philosophy of Science; Religious Studies

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

Alan G. Barbour, M.D. Tufts University, 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, Senior Lecturer Emerita of Ecology and Evolutionary Biology
Peter A. Bowler, Ph.D. University of California, Irvine, Senior Lecturer of Ecology and Evolutionary Biology
Matthew E. Bracken, Ph.D. Oregon State University, Associate Professor of Ecology and Evolutionary Biology
Timothy J. Bradley, Ph.D. University of British Columbia, Professor 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, Associate Professor of Ecology and Evolutionary Biology
Diane R. Campbell, Ph.D. Duke University, 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
James J. Emerson, Ph.D. University of Chicago, Assistant Professor of Ecology and Evolutionary Biology
Celia Faiola, Ph.D. Washington State University, Assistant Professor of Ecology and Evolutionary Biology
Steven A. Frank, Ph.D. University of Michigan, Donald Bren Professor of Ecology and Evolutionary Biology; Logic and Philosophy of Science
Brandon S. Gaut, Ph.D. University of California, Riverside, Professor of Ecology and Evolutionary Biology
Donovan German, Ph.D. University of Florida, Assistant Professor of Ecology and Evolutionary Biology
Michael L. Goulden, Ph.D. Stanford University, Professor of Earth System Science; Ecology and Evolutionary Biology
Bradford A. Hawkins, Ph.D. University of California, Riverside, Professor 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, Lecturer with Security of Employment 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, Professor of Ecology and Evolutionary Biology
Mahtab F. Jafari, Ph.D. University of California, San Francisco, Vice Chair and Professor of Pharmaceutical Sciences; Ecology and Evolutionary Biology; Pharmacology
Natalia Komarova, Ph.D. University of Arizona, Professor of Mathematics; Ecology and Evolutionary Biology (applied and computational mathematics, mathematical and computational biology, mathematics of complex and social phenomena)
Harold Koopowitz, Ph.D. University of California, Los Angeles, Professor Emeritus of Ecology and Evolutionary Biology
Anthony D. Long, Ph.D. McMaster University, Professor of Ecology and Evolutionary Biology; Pharmaceutical Sciences
Catherine Loudon, Ph.D. Duke University, Senior Lecturer of Ecology and Evolutionary Biology
Richard E. MacMillen, Ph.D. University of California, Los Angeles, Professor Emeritus of Ecology and Evolutionary Biology
Adam Martiny, Ph.D. Technical University of Denmark, Associate 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, Associate Professor of Ecology and Evolutionary Biology
Kailen Mooney, Ph.D. University of Colorado Boulder, Associate 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, Biological Sciences Associate Dean of Graduate Studies and 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, Lecturer with Potential Security of Employment of Ecology and Evolutionary Biology
James T. Randerson, Ph.D. Stanford University, UCI Chancellor's Professor of Earth System Science; Ecology and Evolutionary Biology
Jose Mari Ranz Navalpotro, Ph.D. Universidad Autónoma de Madrid, Associate Professor of Ecology and Evolutionary Biology

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

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

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

Richard Symanski, Ph.D. Syracuse University, Senior Lecturer of Ecology and Evolutionary Biology

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

Kathleen K. Treseder, Ph.D. Stanford University, Francisco J. Ayala Chair and 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 of Ecology and Evolutionary Biology

Dominik Franz X. Wodarz, Ph.D. Oxford University, Professor of Ecology and Evolutionary Biology; Mathematics

Guiyun Yan, Ph.D. University of Vermont, Professor of Program in Public Health; Ecology and Evolutionary Biology; Program in Public Health