

EE graduate group upcoming courses and reading groups

Note that course numbers sometimes change without warning (or at least any warning that I can discern) so take the numbers below with a grain of salt.

Ongoing reading groups and seminars

These are offered every semester. Register when you can, but you do not need to register to attend any of these. Some of these are lab group meetings that are open to attenders from other labs.

- Seminar in Ecology and Evolutionary Biology (PCB 6938-0001, 2 credits, S/U, Instructor for 2019/2020 – McCoy). Friday 4:00-5:00. This is the weekly EE seminar series.
- Colloquium (BSC 6921 0001, 1 credit, S/U, Instructor – Underwood). Thursday 4:00-5:00. This is the weekly departmental seminar series, which includes talks on work from across all biological disciplines.
- Ecology Reading Group (BSC 5932 – 53, 1 credit, S/U, Instructor for fall 2019 TBA). Friday 9:30-10:30.
- Marine Ecology and Evolution Reading Group (BSC 5932-0004, 1 credit, S/U, Instructor - Burgess) – Not offered spring 2020.
- Applied Ecology Reading Group (BSC 5932-0001 (442), 1 credit, S/U, Instructor - Rassweiler). Not offered fall 2020.
- Macroevolution Reading Group (BSC 5932-39, 1 credit, S/U, Instructor – Steppan). Fridays, typically starting at 12:00 but time can be adjusted plus/minus 30 minutes depending on the schedules of the attendees.
- Plant-Insect Interactions Reading Group (BSC 5932-45, 1 credit, S/U, Instructor – Underwood. This is the Underwood and Inouye lab group; all are welcome).
- Ecological Genetics Reading Group (BSC 5932-43, 1 credit, S/U, Instructor – Travis, this is the Travis lab group; all are welcome. Meets Thursdays 1:30-3:00. ON HIATUS fall 2019-spring 2020)
- Behavior Lunch (BSC5932-0053 #10958, 1 credit, S/U, Instructor – Emily DuVal, folks from labs across EE, Neuro and Psychology attend)
- Speciation Discussion (1 credit, S/U, Instructor – E. Lemmon, this is the Lemmon lab group).
- Evolution Discussion Group (BSC 5932-20, 1 credit, S/U, organized by David Houle, possibly on hiatus?).

- Evolutionary Morphology (BSC 5932-13, 1 credit, S/U, Instructor – Erickson)
- Units of Selection Reading/Discussion Group (i.e., all aspects of multi-level evolution, ranging from evolution of eukaryotic cells; evolution of multi-cellular life at the base of the animal, plant, and fungi trees of life; social insects and other social groups; symbiotic associations, including mutualisms of all types). This is the Wulff lab group, but we enthusiastically welcome anyone who would like to explore aspects of evolution that involve questions about units of selection. If interested, contact Dr. Wulff.
- Writing in Biology (also known as “Writing Club”, BSC 5932-52, 1 credit, S/U, Instructor – Underwood). Wednesday 9:00-11:00. We meet, we write, sometimes we talk about strategies for getting writing done.
- Ecological, Evolutionary, and Behavior Genetics Reading Group (BSC 5932-22, 1 credit, S/U, Instructor - Hughes, this is the Hughes lab meeting, but all interested students are welcome). Time: TBA
- Green Group botany discussion group (BOT 6936-01, participating faculty: Bass, Bates, Cui, Jones, McCoy, McGinnis).

Courses and one-off seminars

Some courses are on a regular rotation (e.g. every other fall), others are irregular. A projection of the next two-year cycle is shown below:

Spring 2020

- Macroevolution (PCB 5682, Instructor – Steppan). Evolutionary biology and ecology are increasingly being integrated across process scales. In particular macroevolutionary approaches like phylogenetics are applied to questions about organisms, adaptations, and microevolutionary phenomena whereas microevolutionary approaches are providing greater insight into macroevolutionary patterns. Therefore, this class will provide a foundation in macroevolution (evolution at the species-level and above) applicable to the research and conversability of graduate students in E&E. The focus will be two-fold: 1) survey the primary concepts of modern macroevolution with a focus on phylogenetic inference and historical perspectives on extant variation, 2) facilitate competency in many of the common tools and applications of macroevolution, including phylogenetics (using morphological and molecular data), the comparative method, biogeography, testing adaptation, quantifying trends in diversification, and molecular clock dating. Together, students should leave the class being able to look at their own work in new ways, ask

sophisticated questions that use — at least in part — macroevolutionary or phylogenetic approaches, the ability to understand and evaluate macroevolutionary approaches in the literature, and the ability to apply such tools to any project of their interest. Students should also be conversant in macroevolutionary concepts as would be expected of a faculty member in ecology and evolution.

- College Science Teaching (ISC 5933, 3 credits, graded, Instructor – Granger). If you are interested, contact Ellen Granger. This course is generally taught every other spring. This course is a study of best instructional practice for college science teaching and learning as grounded in the accumulating findings of discipline based education research on post-secondary science teaching. The goal is for students to learn to bring to teaching the “critical thinking, rigor, creativity, and spirit of experimentation that defines research” (Handelsman et al., 2007).
- Quantitative Methods 2 (BSC 5936-0004 Instructor - Okamoto). A follow-up course to QM1 in which we will cover advanced statistical methods useful for ecologists and evolutionary biologists. These methods include advanced linear/generalized linear mixed effects and hierarchical models, nonlinear models, multivariate analysis, time series analysis, and Bayesian approaches, among others. Students will also bring a dataset (or lab/open source dataset similar to expected dissertation data) to analyze for a final project, and will build skills in statistical programming, data manipulation, version control and visualization throughout the course. Software used includes R, Stan, and github. The goal of this course is to provide students a primer in advanced statistical methods in preparation for designing sound data collection, robust analysis of complex data, and estimation of ecological/evolutionary models from data. Offered Tu/Th 9:30-10:45.
- Bioinformatics (BSC4933/5936, 3 credits, graded, Instructor - Rokyta). Bioinformatics is a huge field of study, the mastery of which requires expertise in biology, mathematics, statistics, and computer science. The goal of researchers in the field is to develop and apply methods for extracting biological information from (usually) DNA/RNA/protein sequence data. These data can be used to, for example, study genome structure and function, characterize sequence or expression differences among samples, and establish links between genotypes and phenotypes. The goal of this course is to provide students with a practical introduction to bioinformatics, including hands-on experience with some of the major current data types and software, while addressing enough of the theoretical underpinnings of common approaches in the field to ensure that students can critically evaluate existing and future bioinformatic tools.
- Ecology and Evolution of Plant-Insect Interactions (BSC 5936-0005 3 credits graded or BSC 5936-0006 1 credit ungraded, or feel free to sit in (talk to me about options), Instructor – Underwood). Plants and the insects that feed on them constitute a huge proportion of the diversity on the planet. Interactions

between plants and insects are fundamental to natural systems and agricultural systems, and many classic studies in ecology and evolutionary biology focus on these interactions. This course will explore areas of active research on plant-insect interactions from both ecological and evolutionary perspectives. The emphasis is on learning the history of research in each area, identifying current open questions and figuring out how they might be answered. We will use reading and discussion of primary literature and writing to explore topics such as herbivorous insect population dynamics and community ecology, coevolution, evolution of plant defenses and insect host range, mutualisms, etc. There are many parallels between terrestrial plant-insect interactions and marine systems; marine papers will be included as appropriate if there is interest in the class.

Fall 2020

- Quantitative Methods (BSC 5936-01, 4 credits, graded, Instructor - Burgess). Taught each fall. See above for description.
- Field Quantitative Methods (BSC 5936023, 1 credit, graded, Instructor – Miller). Taught each fall. See above for description.
- Ecological Genetics (PCB 5615, 3 credits, graded, Instructor – Hughes) This course covers the fundamentals of modern ecological genetics. The course begins with an overview of genetic variation, its measurement, and the forces responsible for the origin and maintenance of variation within and among populations. The remainder of the course describes the ecological context of evolution, and the ecological and evolutionary forces that shape variation within and between populations. Emphasis will be placed on experimental studies of natural populations, and the relationship between theory and experiments. Several advanced topics will be covered in the second part of the course: life-history evolution, sexual selection, applied ecological genetics, and molecular evolution. Students in the course will choose some of the advanced topics. Readings from the textbooks will be supplemented with considerable reading and discussion of the primary literature.
- Biogeography (BSC 5936-05, 4 credits, graded, Instructor – Stepan, taught even numbered fall semesters). This course is an undergraduate course that can also be taken for graduate credit. Biogeography is the study of the distributions of animals and plants (all organisms) in space and time and the processes that determine those distributions. As the name implies, this field combines elements of biology (especially ecology and evolution) and geography. The distributions are determined by the physical characteristics of organisms, how these characteristics interact with the physical and biotic environment, and by history. The field can be explored by looking at entire ecosystems, physiology of individual species, or evolutionary history of groups of species, among other approaches. This course will cover the full range of biogeography with an

emphasis on ecological and evolutionary biogeography, the processes that help determine distributions, and the analytical methods used to describe distributions and test processes. Topics include the physical environment (geology, meteorology), the distribution of ecosystems and biomes across the globe, speciation, common geographic patterns, diversity gradients, island biogeography, and historical (evolutionary) biogeography. There is a laboratory section as part of this course in which student working in groups will analyze geographic data sets to search for patterns and test hypotheses with the scientific method. This class qualifies for the departmental lab requirement.

- **TENTATIVE Ecophysiology** (3 credits, graded, advanced undergraduate and graduate course, instructor – McCoy). Usually taught every fall. Linking physiological responses to ecology enables us to understand environmental drivers of ecology at every scale: from population ecology, community dynamics, and conservation, to stress responses in plants, animals, and humans. This course will provide context for various applications of ecophysiology, including environmental, agricultural, and biomedical examples. Ecophysiological processes will be taught through lectures, active learning exercises during class, problem sets, and written assignments. Midterm and final exams will be given. Graduate students should speak to the instructor before signing up.

Spring 2021 (very tentative!)

- **Community Ecology (PCB 5447, 3 credits, graded, Instructor – Miller, generally every other spring).** This is a graduate-level course that includes lectures, exercises, and exposure to the primarily literature. The course begins with a short history, then moves on to discuss community patterns, species interactions (competition, predation, mutualisms), indirect effects, disturbance and succession, metacommunities, and landscape ecology. The course ends by looking at unanswered questions in community ecology, as well as current concepts such as invasive species and climate change, and possible future directions for the field. This course requires a strong background in general ecology and will utilize experiments, theory, and models.

Courses in other grad areas and departments that might be of interest

It is hard to keep up with all relevant courses so I won't attempt to list them all here, but bear in mind that there are courses that may be of interest in Cell/Molecular Bio, Neurobio, Scientific Computing, EOAS, Math, Statistics, Science Education and other departments. Talk with the EE faculty about how to find courses you want or need.

Ongoing courses in scientific communication and teaching (every fall and spring semester, last time I checked):

1. **Writing in the Sciences (ENC 5457, 3 credits, S/U, Instructor – Hellstrom, workshop style class for students with a writing project in progress. Not for first year students. Through the English department.)**

2. Scientific Presentations and Posters (COM 5115, 3 credits, S/U, Instructor – Hellstrom, through the College of Medicine).
3. Science Education Reading Group (College of Education, Instructor – Calusell Mathis, contact instructor if interested in joining)
4. Short (2-7 days) summer **teaching workshops** through Science Education. There is no charge and different ones carry different amounts of course credit (one to two credits). Contact Ellen Granger to find out more about these. Example workshops that are usually taught are:

Developing Scientific Explanations in the Classroom (2.5 days)

Scientific Argumentation in the Classroom (3 days)

Teaching the Nature and Practices of Science (10 days)

Communicating Science: The Pedagogy of Teaching Science (5 days)

Teaching Climate Science and Data Literacy (7 days)

Lesson Study in the Science Classroom (4 days)

Teaching about and with Scientific Models (Models Based Inquiry) (3 days)

From Scientific Computing:

- Computational Evolutionary Biology (Tu/Th 2-3:15 Instructor – Beerli, if interested contact instructor beerli@fsu.edu). This class discusses theoretical aspects of phylogenetics and population genetics/genomics; this year I will do this so that we will discuss theory and algorithms on Tuesday and then run tutorials on Thursdays: for example:
 - discussing mutation models then using modeltest or similar programs to evaluate and compare mutation models.
 - theory of likelihood; evaluating likelihood on trees (PAUP*, raxML)
 - enumerating phylogenetic trees; heuristic searches and maximum likelihood
 - theory of Bayesian inference; running BEAST
 - coalescence theory; run and discuss my own program MIGRATE

From Geography:

- GIS5101 Geographic Information Systems (3) is an introduction to the expanding field of geospatial technology, how digital maps represent the world, locational measurements by GPS, spatial data structures, scenario-building, modeling/analysis, and decision support. Corequisite GIS5101L.
- GIS5101L GIS Lab (1) lab is hands-on computer practice in using ArcGIS. Corequisite GIS5101.
- GEO5115 Environmental Field Methods (3) demonstrates the design, implementation and presentation of a field-based project employing sampling, GIS, GPS, and exploratory statistical methods.
- GEO5378 Landscape Ecology (3) offers a review of methods on analyzing geographic patterns of natural phenomena, including ecological conservation, natural resource management, landscape and urban planning, as well as human-

environmental interactions and implications. Familiarity with software packages such as ArcGIS is assumed. Prerequisite GIS5101.

- GEO5393 Marine Conservation (3, instructor - Lester)
- GEO5318 Climate Change and Ecosystems (3, instructor – Pau)
- GEO5165C Quantitative Geography (instructor – Elsner)

From EOAS:

- OCB5930 Estuarine and Coastal Ecology. This course addresses the ecology of estuaries and that part of the inshore waters with which estuaries directly interact. We will investigate the general ecological principles that govern the productivity and diversity of estuaries, including their hydrodynamics, sedimentology, chemistry and plant and animal community structure.
- OCB5639: Marine Benthic Ecology. This course studies the physical setting and ecological organization of the communities found in the rocky intertidal, in the fouling habitat, on sandy beaches, in subtidal soft bottoms, and in the deep sea. This is presented through lectures, substantial reading, and class discussions.
- OCB5636: Marine Microbial Ecology. This course studies the diversity, distribution and roles of marine microbes, whose members include viruses, bacteria, archaea and protists. These are presented through lectures, readings, class discussions, and field trips to regional marine habitats.

Possible courses, unscheduled at the moment, but if you want to see them taught feel free to ask!

- **Any course you need!** If you see a need for a course that we don't usually offer, particularly if multiple students are interested, find an appropriate faculty member and ask about creating that course. This could be reading through a particular book, reading current literature on a topic of your choice, etc. Take charge of your education and propose the course you need!
- Advanced Evolution (PCB 5675 01, 3 credits, graded, Instructor – Houle)