Syllabus

Biology 499A    Tropical Field Ecology    3 credits

Professors:
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Dr. Jose Manuel Mora, Prof. of Wildlife Biology Univ. Nacional de Costa Rica
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This is an upper level course for students with a strong background in biology or related sciences. It is taught as a field-intensive, research-oriented course in Costa Rica during the mid-semester break (Dec. 27 through Jan. 11), with visits to a number of ecologically divergent sites. Our major sites are a premontane forest on the Atlantic slope, an active volcano and high mountains along the continental divide, a lowland rain forest on the Pacific coast, and a coral reef that borders an offshore island in the Pacific. At two of these sites the faculty lead group research projects (4-6 students per group) which the students help to design, carry out, analyze the data (we carry laptop computers and spend lots of time on statistics and graphical presentation) then present orally to the class (with lots of questions and critique) and hand in as formal write-ups. At our final site (the lowland rainforest), students carry out independent research projects with faculty input. These projects conclude with data analysis, oral presentation,
and a written abstract. Evenings not devoted to student research presentations feature lectures by the faculty and other scientists who visit with us along the way. These research projects, lectures, journal articles, and a large library of reference texts that we carry comprise the formal academic component of the course.

The topics of research projects are highly variable. You might find yourself in a group studying pollination of flowers by hummingbirds, censusing nocturnal mammals by the footprints they leave along trails, using tropical stream macroinvertebrates as indicators of stream water quality, or the possibilities are virtually endless. The unifying feature of the projects is that they form and test hypotheses regarding the ecology, evolution, and population biology of local plants and animals, and they involve collection and analyses of quantitative data.

Course goals:
- Gain confidence traveling, working, and socializing outside of the U.S., in a variety of unfamiliar settings
- Develop teamwork skills in designing, carrying out, and presenting research
- Learn that research skill involves your mind more than instrumentation or other forms of technical methodology
- Have a deeply immersive experience in a variety of tropical habitats
- Broaden your world view

Course objectives:
- Recognize and learn aspects of the biology of a number of common plant and animal species of the new world tropics
- Learn to make observations and pose a testable (rejectable) hypothesis involving a biological question; understand the difference between mutually exclusive and non-exclusive hypotheses
- Learn to perform and interpret results of basic statistical analyses used in ecological research. These analyses are common to many other fields and comprise a valuable and broadly transferable skill set
- Make coherent presentations of research projects to a group of peers and professors; think on your feet to respond to difficult questions; take constructive criticism and improve
- Contribute in positive ways to research project reports (in journal format) written by small student groups

Grading: This course depends heavily on work done within groups, which makes it necessary to be somewhat subjective in assigning grades to individuals. Success of the course also depends on everyone being a good team player and a good fellow traveler. Whiners and complainers, for whom the accommodations, food, etc. are rarely
satisfactory, can drag down the positive spirit and energy that this class thrives on. The professors are aware of the identity of group members who are napping, or who are absent when their group is busy preparing a presentation or a report. We know which individuals are a hindrance and which are a help to the progress of their groups. Hard working and effective team players receive grades of “A”; others receive grades that are somewhat lower. It’s kind of like real life. Lack of rigor, quality, or intellectual engagement in the scientific aspects of the work are also grounds for grade reduction.

Things that will help you earn an “A”:
- Paying attention during hikes and lectures
- Participating in discussions
- Working and thinking hard and making meaningful contributions during research projects
- Making effective and coherent presentations of your research projects
- Turning in well-written and complete research reports
- Making a strong effort to learn about the plants and animals that we encounter. Any mixture of broad efforts (many taxonomic groups) or focused efforts (particular taxonomic groups) is encouraged.
- Asking probing questions about ecological processes and tropical biology
- Having fun

Things that will reduce your grade:
- Being a hindrance to research projects. Examples of such behavior include: lack of effort or quality in data collection and/or analysis; napping or being absent when your group is busy preparing a presentation or a report; being present but useless; being so argumentative that your group cannot get anything accomplished
- Low effort and/or engagement in the scientific and natural history content of the course
- Failure to heed warnings and precautions about safety issues
- Abuse of alcohol. The legal drinking age in Costa Rica is 18, and we have no objection to moderate consumption of alcohol during social occasions. However, we have no interest in baby-sitting drunks, cleaning up vomit, or nursing hangovers. Being loud and obnoxious in settings where the professors tell you that you cannot be loud and obnoxious will hurt your grade.
- Disrespect for our Costa Rican hosts (this never happens because they’re awesome but I keep it on the list just in case)

Please keep in mind that we will not be constantly looking over your shoulder for reasons to reduce your grade. In fact, grades are about the last thing the professors will have on their minds during this course. Our hope and expectation is that you’ll all work hard, learn a lot, have fun, and in the end we’ll reflect back on things and decide that most or all of the class deserves an “A”.
Suggested clothing and equipment list

The basics
- Passport (make sure it hasn’t expired and is not within 6 months of expiring)
- $70 – $100 spending money
- Rubber boots (calf height, non-insulated, pull on over socks; often called “barn boots”)
- Light hiking boots or sturdy sneakers
- Teva-type sandals or water shoes (an old pair of sneakers will suffice)
- Mask and snorkel, fins (Campanario has a fair amount of equipment we can borrow)
- Sweatshirt, fleece, or jacket (it’s chilly at San Ramon and Cerro de la Muerte)
- rain jacket or poncho (cheap poncho from Walmart or Army/Navy works fine; so does a sturdy garbage bag with arm and neck holes)
- hat
- sturdy flashlight or headlamp & extra batteries (light needs to survive being dropped on a concrete floor)
- sunscreen (35-45 rating)
- insect repellent (the bugs generally aren’t too bad, but some night activities can be buggy; I recommend NEVER more than 30% DEET)
- notebook, pens, USB memory device
- 5 short sleeved shirts
- 3-4 long sleeved shirts
- 3 pair shorts
- 3 pair long light-weight field pants (avoid blue jeans – they don’t dry in this climate)
- 1-2 decent sets of clothes for restaurants & New Year’s Eve (nothing fancy; skirts or sundresses work well; wear whatever makes you feel great after many days in the jungle)
- bathing suit (you may prefer two bathing suits; we’re in and out of the water a lot)
- plenty of socks to wear in the field (at least 3 pair should be sturdy hiking socks; cotton “tube socks” quickly turn to mush inside rubber boots and lead to nasty blisters)
- underwear (“like duh ...“)
- something warm to sleep in at San Ramon and Cerro (long underwear top and bottom work well)
- a large bag to store the stuff that we don’t carry to Campanario (a garbage bag or laundry bag will do just fine; we leave it in a locked place)
- water bottle (should hold at least 1 quart)
- personal toiletry items
- personal medications (consult your physician if you’re allergic to bee & wasp stings)
- 1-2 small bath towels (backpacking towel works well but they are expensive)
- some small to mid-sized plastic bags to organize and protect your stuff
- day pack
- pocket umbrella (optional; not many students bring these)
Optional
- camera
- binoculars
- sun glasses
- moleskin (blister prevention)

Please don’t bring an excessive amount of stuff. We spend a lot of time hauling packs and bags in and out of lodging, buses, etc. Ideally, your luggage will consist of one large bag (< 50 lbs) and one daypack (which most students now call their backpack) that is your carry-on. Soft luggage works much better than hard suitcases.

Don’t assume that we can stop at a pharmacy or an ATM machine. Except for emergencies (which do not include you running out of cash), we won’t. Most of the time we’re in places where there is no place to spend money and your meals are provided.

Some of the places we stay have wi-fi but some don’t (notably Campanario, where we stay for a week). Learning to live without your phone is a good thing.

Required academic integrity statement:
All Penn State Policies (www.psu.edu/ufs/policies/) regarding ethics and honorable behavior apply to this course. There are no exams, so cheating is not an issue. You have very limited opportunity for plagiarism, as the papers are based on original data. The greatest potential for dishonest behavior is falsification or alteration of data (including selective omission of data); in this regard your ethical responsibilities are more similar to those of researchers than students. Be sure to consult with a professor if you have questions about ethical issues in data analyses. These are very important issues.

This course involves sharing of living quarters, transportation, meals, and many other things by a large group of students and faculty. You will become very familiar with each other, and we hope that in the vast majority of cases it will be a mature, comfortable, and welcome familiarity. Typical college-age social interactions are abundant, but we must all be aware that the borderline of sexual harassment (https://policy.psu.edu/policies/ad85) must not be crossed. Treat each other with respect and request assistance from the professor or TA if you encounter a problem that is uncomfortable or you would like help or advice in handling. Most situations can be resolved quickly with a bit of gentle and discrete consultation. We have now taught this course for >25 years and have experience handling many kinds of situations, so please let us know if you’re having difficulties of any kind. We cannot solve problems that we don’t know about.