



University of Guelph, School of Environmental Sciences



**ENVS*4260 [0.50 credits]
Field Entomology**

**Spring 2020 – Costa Rica
Course Outline**

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Class Dates: April 24 – May 13, 2020

Locations:

- 1) Monteverde Cloud Forest Reserve (<http://www.cloudforestmonteverde.com/>) located at Tropical Science Centre (April 24-27) on the eastern slopes of Mount Arenal.
- 2) **Soltis Center for Research and Education** (<http://soltiscentercostarica.tamu.edu/>) - owned by Texas A&M University. The Center is located in San Juan de Peñas Blancas, San Ramón, Costa Rica and is approximately 3 h from Daniel Oduber Quirós International Airport in Liberia, Costa Rica and about 30 min from La Fortuna at the base of Volcan Arenal. The property backs onto the largest private nature reserve in Costa Rica. (April 27-May 12)
- 3) Hotel Velero – Guanacaste Coast near the airport at Liberia, CR which is our departure airport (May12-13)

Course Description:

This course is taught in late April or May. Students may enroll in the Spring semester, the preceding Winter semester or following Fall semester. The course provides an introduction to insect sampling, observation, identification, and experimentation in field settings. Student activities are divided equally between observing, collecting and identifying specimens and an experimental component involving one or more studies to test hypotheses about the ecology or behaviour of insects. There are occasional lectures and discussions to highlight particularly interesting observations of insects. Student evaluation is based on the student's insect collection and associated logbook, a written paper describing their experiment, oral presentations on projects, and peer evaluation. Course fees cover costs of room, board, supplies, and transportation to the field site(s). This course must be recorded as part of the student's Fall or Winter course selection and tuition and compulsory fees will be calculated accordingly. Detailed information is available from the Office of the Director - School of Environmental Sciences.

Course Weight: 0.5 credits

Prerequisites: ENVS 3090 or ENVS 4040, or instructor consent

Academic department: School of Environmental Sciences

Instructor Information:

Dr. Stephen Marshall (general entomology and systematics) - 519 824-4120 ext. 52720, samarshall@uoguelph.ca, Bovey Bldg., Rm 1211/1215

Dr. Cynthia Scott-Dupree (insect behaviour, ecology and integrated pest management - insects):
519-824-4120 ext. 52477, cscottdu@uoguelph.ca, EC Bovey Bldg., Rm 2110

Office Hours: By appointment. During actual course April 24-May 13, 2020 instructors will be available continuously for students.

Statement of Learning Outcomes:

1. **Global Understanding:** *Global Understanding, Sense of Historical Development, Biogeographical Context*
2. **Critical and Creative Thinking:** *Inquiry and Analysis, Problem Solving, Depth and Breadth of Understanding, Generation and testing of hypotheses in a field setting*
3. **Literacy:** *Information Literacy, Quantitative Literacy*
4. **Communicating:** *Oral Communication, Written Communication, Reading Comprehension*
5. **Professional and Ethical Behaviour:** *Teamwork, Leadership, Personal Organization and Time Management*

The Learning Outcomes for this course are:

1. Apply knowledge and concepts from lecture courses taken on campus to behaviour, ecology, and identification of insects in a field setting;
2. Demonstrate proficiency in observing, recording, and analyzing insect behaviour (in written and/or photographic formats);
3. Gain an introductory level of expertise in insect identification to orders and common families;
4. Discover relationships between insects and their environment (both biotic and abiotic);
5. Learn and apply effectively a variety of insect collecting techniques;
6. Formulate hypotheses related to insect biology and design experiments to test them in the field;
7. Select and execute appropriate graphic and tabular applications for presentation of data related to field experiments;
8. Effectively communicate results of insect observations and experiments in oral and written formats, while demonstrating familiarity with the relevant entomological terminology;
9. Demonstrate proficiency and gain experience with teamwork through group research, presentations, and papers;
10. Gain experience and an appreciation for entomological field work and research; and,
11. Experience and gain an understanding of the unique habitat of the La Fortuna region of Costa Rica and its associated flora and fauna.

Mark Allocations:

Assignment/Quiz	Value (%)	Due Date	Learning Outcomes
Individual			
30 Questions and hypotheses	10	TBA	1,2,4,10,11
Insect diversity logbook and collection	40	TBA	1,2,3,4,5, 8, 10, 11
Participation in Bug of the Day	10	Every day	1,2,3,4,5,6, 7,8,10, 11

Group – Research Project			
Group project - oral	15	TBA	8,9
Group project - written	15	TBA	2,4,5,6,7,8,9,10,11
Total	100		

Final examination: None

Course resources:

Required Texts: None

Recommended Texts:

Some reference books and identification guides will be available at Soltis. Other recommendations are: The Wildlife of Costa Rica: A Field Guide (Reid, Leenders, Zook and Dean), The New Neotropical Companion (Kricher), Insects and other Arthropods of Tropical America (Hanson and Nishida) and Insects: Their Natural History and Diversity (by Steve Marshall).

Lab Manual: None.

Policy on Late Assignments:

If you cannot meet a course requirement, let Cynthia Scott-Dupree and Steve Marshall know as soon as possible, preferably before the due date.

Course Policy on Group Work:

- Group work is required and all group members are expected to participate and contribute equally to setting up, conducting experiments and collecting data associated with the study. All group members are expected to behave professionally and ethically in all group activities.

Copies of out-of-class assignments

Keep paper and/or other reliable electronic back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Academic Misconduct Statement:

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Detailed information regarding the Academic Misconduct policy is available in [Section VIII \(Undergraduate Degree Regulations and Procedures\) of the Undergraduate Calendar](#).

Academic Consideration:

The University of Guelph is committed to supporting students in their learning experiences and responding to their individual needs and is aware that a variety of situations or events beyond the student's control may affect academic performance. Support is provided to accommodate academic needs in the face of personal difficulties or unforeseen events in the form of Academic Consideration.

Information on regulations and procedures for Academic Consideration, Appeals and Petitions, including categories, grounds, timelines and appeals can be found in [Section VIII \(Undergraduate Degree Regulations and Procedures\) of the Undergraduate Calendar](#).

Accessibility:

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS), formerly Centre for Students with Disabilities (CSD), as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email sas@uoguelph.ca or visit the [Student Accessibility Services website \(http://www.uoguelph.ca/csd/\)](http://www.uoguelph.ca/csd/).

Recording of Materials: N/A

Course Evaluations:

End of semester course and instructor evaluations provide students the opportunity to have their comments and opinions used as an important component in the Faculty Tenure and Promotion process, and as valuable feedback to help instructors enhance the quality of their teaching effectiveness and course delivery.

While many course evaluations are conducted in class others are now conducted online. Please refer to the [Course and Instructor Evaluation Website](#) for more information.

COURSE REQUIREMENTS: FIELD ENTOMOLOGY (2020- Costa Rica)

Field Entomology is divided into two components — diversity and research— with the diversity component advised and graded by Dr. Marshall, and the research component advised and graded by Dr. Scott-Dupree. These two components are highly interdependent, as the choice of taxa and hypotheses for the “ecology” component depends on discoveries about the taxonomy and basic biology made as part of the “diversity” component, and the natural history notes compiled as part of the “diversity” component will blend into the larger projects that make up the “ecology” component. Despite the artificiality of the division into “diversity” and “ecology”, these two components are graded separately according to the following assignments:

“Diversity” and “Bug of the Day” component: coordinated by Steve Marshall (value 50%)

Diversity Component – value 40%

The "diversity" component of your grade in Field Entomology will be assigned on the basis of an annotated field notebook and associated specimens or photographs. The notebook should be submitted as a PDF with 20 entries each on a separate page of text and images. A grade out of 100 will be given according to the following criteria **for 20 insect families (5X20 =100)**.

1. **Correctly identified specimens/images of a family.** These would normally be appropriately prepared and mounted insects but current regulations restricting insect collecting in Costa Rica mean that your "specimens" will be photographs of multiple species in each of the twenty chosen families. Make every effort to share your photographs with the group during our "bug of the day" sessions; when you submit your field notes indicate if the image identifications have been checked by one of the instructors or shown to the class (maximum of 1 mark per taxon).
2. **Basic label data** (where, when, who) associated with two or more photographs for each family. Label data accompanying your photographs should be to the same standard normally used for pinned insect specimens (maximum of 1 mark per taxon).
3. **Basic field notes** (microhabitat, how collected, basic observations) associated with two or more specimens (or images or sketches) (maximum of 1 mark per taxon).
4. **Insight and observations** (behaviour, life history, ecology) associated with two or more different species in the family (maximum of 2 marks per taxon).

By way of example, if you carefully photograph a couple of flower flies, put proper data label on the photographs, and identify them as ‘Syrphidae’, then you will get 2/5. The addition of some field notes such as “flying along forest edge, 10 am” will bring you up to 3/5. The next two marks will require quite a bit more effort, and will represent a mixture of careful opportunistic observation and a series of mini-experiments. For example, the addition of useful information like “ovipositing in dead wood” or “feeding on dead snail” will earn a mark, but to get the whole 2/2 you will need to make more extensive observations. For example, you might include a series of different flower fly species with notes on their

preference for honeydew, flowers, or other sugar sources (each of your 20 families should be represented by more than one specimen). Alternatively, you could ask specific questions about taxa of interest with regard to baits, ephemeral habitats, flower types, trap-types, time of day, mimicry complexes, predator-prey associations, mating behavior or other variables.

Remember that your mark will be based on your logbook entries and associated images for **TWENTY** taxa. If you include more than 20 entries, only the first 20 will be graded. Note that photographic quality is not a criterion for grading; as long as we can figure out what it is you have photographed then it is acceptable. That said, it is much easier for you to identify your "digital specimens" if you have taken some care with lighting, focus, exposure etc. We are glad to help you with that as the course progresses. Macrophotography has become central to Field Entomology and it is worth taking the time to do it well. Some students will use smartphones, some will use compact digital cameras, and some will use digital SLR cameras; as long as you can photograph things as small as lady beetles then you are adequately equipped. Practice photographing something small and stationary, like the tip of a pen, if possible.

Voucher specimens:

Field Entomology students sometimes do original work that requires voucher specimens for identification of, or future confirmation of, the species studied. Collecting permits for Costa Rica are difficult to obtain and very restrictive. We expect to have permits for some focused activities only. If voucher specimens are needed they will have to be collected and exported under the terms of those permits; discuss that with us as necessary. We will guide you through the steps to properly prepare those legally collected specimens.

Equipment available:

Since you will not be making a traditional collection of dead specimens, you will not need pinning boxes, pins, nets, killing bottles and preservatives of your own. Nonetheless, we will be fully equipped and will be making "demonstration" collections using a variety of insect sampling devices. You should familiarize yourself with the techniques and equipment in use.

A "collecting kit" consisting of a large number of plastic vials/pill bottles, a hand lens, pre-printed labels, field forceps and a net will be provided to each student before departure for Costa Rica. Our experience suggests that your most useful equipment will be a large number of plastic vials. These vials can be used to show insects to your peers, to instructors for identification, and potentially to rear out immature stages so you can make an identification. If necessary, the specimens in pill bottles can be frozen and later mounted under the terms of our permit, but this activity needs to be approved by the instructors.

PLEASE RETURN YOUR KIT AT THE END OF THE COURSE.

EXAMPLE LABEL:

Costa Rica, Alajuela Prov.,
San Ramón, Texas A&M
Soltis Center, 10°22'59.84"
N 84°37'3.21" W **DATE**
HABITAT, TRAIL, OTHER

Lectures:

Although most instruction will take place in small groups in the field, there may also be evening or rainy-day lectures on various topics, including an introduction to insect diversity, insect collecting techniques, mimicry systems, or biology and identification of various group of insects. Whenever possible we will encourage students and instructors to share selected daily digital insect photographs of insects with the group during evening sessions. Student photographs will serve as starting points for discussions and short lectures about the taxa represented in the photographs.

Bug of the Day Component - value 10%

We usually gather in the late afternoon to share experiences and photographs taken during that day. Every student will have at least one opportunity to present their “bug of the day”. When you encounter an insect (or arthropod) that really piques your interest, make extensive observations of it, learn what it is, and do some background reading and research. You will then present a short (5 min) exposé on that insect and its family to the class. These mini-lectures are not marked, but they should be informative, accurate and interesting. You are also welcome to show images of taxa you do not recognize, as a challenge to the rest of the group and as talking points for discussions and lectures.

“Research” component: coordinated by Cynthia Scott-Dupree (value 50%)

30 Questions Exercise (10% value): Field studies are miniature experiments to be designed by groups of students (typically 4 students). They provide experience in formulating and testing hypotheses about insect ecology, behaviour and integrated pest management. The topics of these field studies will emerge from the “30 Questions” exercise (originally developed by Dr. Gard Otis) undertaken soon after your arrival at the Soltis Centre. From this set of questions, you and the other students in your group will define a hypothesis for a 4-5 day study. The instructors will help to guide you and members of your group with the research questions and implementation of studies, but the final group field study hypothesis should be approved by Cynthia Scott-Dupree before the study is started

Group Project – Written (20% value): A written report will be completed by your group for the 4-5 day study. This report is restricted to 5 pages (number pages, text double spaced, 12 font, 1-inch margins; maximum of 6 references), 1st page is the title page which should also include all group member names and student numbers. The remaining 4 pages of the report must include an introduction and justification for the research, clearly stated hypothesis, materials and methods, results, discussion, conclusion and any photos, diagrams, graphs, tables/figures of results and references.

Group Project – Oral (20 % value): The oral presentations for your group project will be given at the Soltis Centre on the afternoon of May??. All members of the group must participate in the Power Point

presentation. Oral presentations should be 20 minutes in length – 15 min presentation time and 5 min for questions.

Equipment for field studies: The space and weight limitations intrinsic to international field courses and air travel mean that we will have very little equipment other than what you bring in your field kit. If you are thinking of a project that requires additional materials or supplies (malaise traps, pan traps, sprayers, sorting containers, rearing containers, emergence traps, Berlese funnel, etc.) discuss it with the instructors before we leave Canada. At minimum, you should bring a pencil, logbook, and camera; additional items can include: ziploc bags (several sizes), extra collecting vials, flagging tape, masking and duct tape, waterproof marker pens, **scissors and a penknife (checked baggage only!)**.

NOTE: *I will also be asking for a peer evaluation from the members of your group so I can determine whether you were involved with all aspects of the group project (planning, execution, analysis, writing and presentatio*

