

## **Invasive Ant Boot Camp**

ENY 6920L, 1 credit

**Class Periods:** W-F, 9am-5pm

**Location:** 2218 Steinmetz Hall

**Academic Term:** Summer A (3 days in May, TBD)



**Instructor:** Dr. Andrea Lucky, Entomology and Nematology Department

**Email:** [alucky@ufl.edu](mailto:alucky@ufl.edu); Phone: 352-273-3952, Office Location: 2108 Steinmetz Hall

**Office Hours:** Tuesdays 3-4pm OR by appointment via videoconference or phone.

### **Course Description**

Three-day hands-on, workshop-style course focused on learning to recognize the world's most invasive and problematic ant species in the laboratory and the field. Topics include threats posed by invasive ants to agriculture, the economy, and the environment; collection techniques; identification resources; regulation and policy; and monitoring, management, and control of invasive ants.

### **Course Pre-Requisites / Co-Requisites**

None

### **Course Objectives**

This workshop is intended to train participants in the recognition of the world's most invasive and problematic ants, as well as native pest species. While the focus is primarily on species that are established here in Florida, the course material introduces taxa that are problematic around the world.

#### **Upon successful completion of this course students should be able to:**

- 1) Identify 25 of the most common globally-invasive ant species using dichotomous keys**
- 2) Distinguish common ant genera in the field based on behavior and ecology**
- 3) Evaluate the threats that invasive ants pose to agriculture, the economy, and the environment**
- 4) Assess effectiveness of the principal monitoring and management techniques in different countries**
- 5) Analyze the likelihood of new invasive ant species introductions to Florida**

Students will master these skills over three intensive days through a combination of in-class lectures from international experts, local field trips, and guided laboratory identification sessions for keying out ants using stereomicroscopes and dichotomous keys. The course provides the most up to date resources and information available for identifying invasive ants in the lab and field. Get ready for a packed course that will teach you the skills you need in your work!

### **Required Textbooks and Software**

No textbooks or software are required – all student materials will be provided in class. Teaching materials provided to each student in the course include two inseparable components: a reference collection, and a unique booklet that is a compilation of information on invasive ant biology. There are over 13,000 species of ants in the world—this collection and booklet are not an exhaustive assemblage of globally invasive species, but rather are a unique compendium of resources targeting the most problematic and commonly encountered taxa. Together they offer a novel approach to the biosecurity and identification challenges posed by ant pests. No other course or museum collection offers each student the use of a carefully curated specimen collection representing the most problematic and economically important ant species. Even most major entomological museums do not hold all of these species. As a result, these materials should be a tool useful for anyone in academia, government or industry charged with determining the identity of these ant species.

### **Electronics:**

Laptops, tablets, and cell phones are welcome in class – we will discuss electronic access to identification resources and practicing with your own devices will be helpful. However, cell phones should be silenced during class to minimize disruptions and students will be expected to use electronic tools only for work related to this course.

### **Recommended resources:**

#### **Websites:**

- Ant Wiki: [www.Antwiki.org](http://www.Antwiki.org), Ant Web: [www.AntWeb.org](http://www.AntWeb.org), Ant photography: [www.alexanderwild.com](http://www.alexanderwild.com)

#### **Useful books (available in the classroom):**

- Agosti, D., Majer, J., Alonso, E. and Schultz, T.R. (Editors.). (2000). *Ants: Standard Methods for Measuring and Monitoring Biodiversity*. Smithsonian Institution Press. Washington D.C.
- Deyrup, M. (2016). *Ants of Florida: identification and natural history*. CRC Press. Boca Raton, FL.
- Fisher, B.L., & Cover, S.P. (2007). *Ants of North America: a guide to the genera*. Univ. of California Press. CA.
- Klotz JH, Hansen L, Pospischil R, Rust M. 2008. *Urban Ants of North America and Europe Identification, Biology and Management*. Ithaca, NY: Cornell Univ. Press. 196 pp.

#### **Scientific articles (provided electronically):**

- Angulo, E., Hoffmann, B. D., Ballesteros-Mejia, L., Taheri, A., Balzani, P., Bang, A., ... & Courchamp, F. (2022). Economic costs of invasive alien ants worldwide. *Biological Invasions*, 24(7), 2041-2060.
- Bertelsmeier, C. (2021). Globalization and the anthropogenic spread of invasive social insects. *Current opinion in insect science*, 46, 16-23.
- Fournier, A., Penone, C., Pennino, M. G., & Courchamp, F. (2019). Predicting future invaders and future invasions. *Proceedings of the National Academy of Sciences*, 116(16), 7905-7910.
- Gruber, M. A., Santoro, D., Cooling, M., Lester, P. J., Hoffmann, B. D., Boser, C., & Lach, L. (2022). A global review of socioeconomic and environmental impacts of ants reveals new insights for risk assessment. *Ecological Applications*, 32(4), e2577.
- Hoffmann, B. D., Luque, G. M., Bellard, C., Holmes, N. D., & Donlan, C. J. (2016). Improving invasive ant eradication as a conservation tool: A review. *Biological Conservation*, 198, 37-49.
- Holway, D. A., Lach, L., Suarez, A. V., Tsutsui, N. D., & Case, T. J. (2002). The causes and consequences of ant invasions. *Annual review of ecology and systematics*, 33(1), 181-233.
- Kronauer, D. J. (2023). The unusual genetics of invasive ants. *Science*, 380(6640), 33-34.
- Lach, L. (2021). Invasive ant establishment, spread, and management with changing climate. *Current Opinion in Insect Science*, 47, 119-124.
- Lester, P. J., & Gruber, M. A. (2016). Booms, busts and population collapses in invasive ants. *Biological Invasions*, 18, 3091-3101.
- Lee, C. Y., & Yang, C. C. S. (2022). Biology, ecology, and management of the invasive longlegged ant, *Anoplolepis gracilipes*. *Annual Review of Entomology*, 67(1), 43-63.
- Tsutsui, N. D., & Suarez, A. V. (2003). The colony structure and population biology of invasive ants. *Conservation biology*, 17(1), 48-58.
- Wong, M. K., Economo, E. P., & Guénard, B. (2023). The global spread and invasion capacities of alien ants. *Current Biology*.
- Xu, Y., Vargo, E. L., Tsuji, K., & Wylie, R. (2022). Exotic ants of the Asia-Pacific: invasion, national response, and ongoing needs. *Annual review of entomology*, 67(1), 27-42.

### Course Schedule

<b>Day 1.</b>	
9:00-10:00	Welcome and Introduction
10:00-10:30	Lecture: Ant morphology and Identification
10:45-12:00	Field Trip: Environmental Horticulture Greenhouse
12:00-1:00	Lunch discussion in the courtyard (Be sure to drop crumbs and watch for competition!)
1:00-2:00	Lecture: Common nuis-ants in Florida
2:00-3:15	Laboratory: Ant ID and curation – ant subfamilies and genera
3:30-5:00	Guided ID Workshop: Native vs. Non-Native Ants
	Graded assignments: 1 Discussion, 2 Lecture Questions, 1 Field Technique Question, 1 ID quiz
<b>Day 2.</b>	
9:00-10:15	Field Trip: NATL & Ants in native landscapes
10:15-10:45	Laboratory: Walk through the keys: Tramp ants of the world
11:00-12:00	Lecture: Impacts of invasive ants on native ecosystems
12:00-1:00	Lunch discussion under the pines (Be sure to drop crumbs and watch for competition!)
1:00-2:00	Lecture: Managing ants as structural pests
2:00-3:15	Show and Tell: Ants in captivity
3:30-5:00	Guided ID Workshop: Fire Ants around the world
	Graded assignments: 2 Discussions, 2 Lecture Questions, 1 Field Technique Question, 1 ID quiz
<b>Day 3.</b>	
9:00-10:30	Field Trip: UF Field and Fork Gardens
10:45-11:15	Guided ID Workshop: Ponerinae, Pseudomyrmecinae, Formicinae
11:15-12:00	Lecture: The challenge of taxonomic preparedness
12:00-1:00	Lunch discussion in the courtyard (Count the species – prize for the highest number!)
1:00-2:00	Lecture: Regulation of Invasive Insects – the policy perspective
2:00-2:30	Demo: Specimen handling and shipping
2:45-3:15	Guided ID Workshop: Hyperdiverse taxa – Myrmicinae and Dolichoderinae
3:15-4:15	Final test
4:15-5:00	Summary and farewell
	Graded assignments: 1 Discussions, 2 Lecture Questions, 1 Field Technique Question, 1 ID quiz, 1 final test.

### Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Lecture Questions (6)	5 each (30)	30%
Discussion (3)	5 each (15)	15%
Field Technique Questions (3)	5 each (15)	15%
ID Quizzes (3)	5 each (15)	15%
Final Test	20 (25)	25%
<b>TOTAL</b>	<b>100 points</b>	<b>100%</b>

### **Grading Policy**

<b>Points / Percentage</b>	<b>Letter Grade</b>
93.00-100	A
90.00-92.99	A-
87.00-89.99	B+
83.00-86.99	B
80.00-82.99	B-
77.00-79.99	C+
73.00-76.99	C
70.00-72.99	C-
60.00-69.99	D
<60	E

**Grades and Grade Points.** For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>.

### **Graded Assignments**

#### *Lecture Questions*

For two lectures each day, each student will submit two thoughtful questions (4 total), written (legibly) on an index card with their name. Questions should go beyond basic clarification and ask higher-level questions about next steps in the research, assumptions on which the hypotheses are based, potential outcomes of alternative actions, etc. It is recommended, but not necessary, to ask questions in the Q & A following the lecture.

#### *Discussions*

Participation in discussions is required each day of the course, and involves both asking and answering questions that arise on the day's topic. Questions should show attention to the day's speakers, the ants we have encountered, and may incorporate the optional reading materials provided.

#### *Field Technique Questions*

Following each day's field trip, which features a field technique demonstration, there will be a brief quiz to determine mastery of the technique. Students are expected to know how to deploy the technique and the conditions under which the technique is used. Be able to explain why this method is preferred over others in a particular situation.

#### *ID Quizzes*

At the end of each day, there will be an ant identification quiz to genus or subfamily level. The quiz will focus only on the material presented or reviewed that day. Students should be able to visually identify specimens under magnification.

#### *Final Test*

The final test will be conducted on the last afternoon, and will consist of identifications of 25 ant specimens. Use of magnification (stereoscopes), dichotomous keys (provided), and online reference materials is encouraged!

### **Attendance Policy, Class Expectations, and Make-Up Policy**

*Attendance* during all three days of the workshop is required to pass this class. Students are expected to attend all lectures and field trips, and to participate in each group discussion and laboratory sessions. Graded assignments correspond to each day's activities, so missing any session will result in a lowered grade. If you have a known scheduling conflict, please contact your instructor in advance so we can arrange for a solution, if possible. There are no make-up field trips, lab sessions, or guest lectures – these happen just once! However, life happens, and if you have an excused absence, we can provide additional assignments to offer you equivalent experience. Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Additional information can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

**Campus Helping Resources.** Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, [www.counseling.ufl.edu/cwc/](http://www.counseling.ufl.edu/cwc/) :* Counseling Services, Groups and Workshops, Outreach and Consultation, Self-Help Library, Wellness Coaching
- U Matter We Care, [www.umatter.ufl.edu/](http://www.umatter.ufl.edu/)
- Career Connections Center, First Floor JWRU, 392-1601, <https://career.ufl.edu/>
- Student Success Initiative, <http://studentsuccess.ufl.edu>.
- Academic Complaints: Office of the Ombuds; Visit the Complaint Portal webpage for more information: <https://www.ombuds.ufl.edu/complaint-portal/>
- Enrollment Management Complaints: (Registrar, Financial Aid, Admissions): View the Student Complaint Procedure webpage for more information: <https://www.ombuds.ufl.edu/complaint-portal/>

### **Online Course Evaluation Process**

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at: <https://gatorevals.aa.ufl.edu/public-results/>.

**Academic Honesty.** As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: **"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."** You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>. *Academic misconduct is taken very seriously at the University of Florida. Any violation of the Honor Pledge will be submitted to the Dean of Students office for review.*

**Software Use.** All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

### **Services for Students with Disabilities**

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation 0001 Reid Hall, 352-392-8565, <https://disability.ufl.edu/>.