

## ENY 6821 – INSECT MICROBIOLOGY.

Spring 2022

Online

Graduate Level Credits: 3 (honor level undergraduate students will be accepted)

**Instructor:**

Dr. Kirsten Pelz-Stelinski  
700 Experiment Station Rd, Lake Alfred  
Citrus Research and Education Center  
863-956-8666  
[pelzstelinski@ufl.edu](mailto:pelzstelinski@ufl.edu)

**Course Description:** Insect Microbiology ENY 6821 will cover the diverse associations that exist between insects and microorganisms. These associations include mutualistic relationships, commensalism, vector biology, and insect-pathogen interactions. Insects from a wide range of orders as well as a diverse array of microbes will serve as theoretical models for the students to learn about developmental biology, physiology, behavior, and ecology involved in interactions between insects and microbes. In addition, various methods in scientific research will be presented and discussed. The course is composed of lectures, a writing assignment, discussions, and a podcast activity to build a comprehensive understanding of insect microbiology.

**Learning Objectives:** Students who will have completed this course will be able to:

- Define and classify the major groups of microorganisms associated with insects.
- Identify and differentiate between beneficial, neutral, and pathogenic interactions.
- Explain and discuss vector biology and implement the concept of vector control for disease prevention in various agricultural systems.
- Synthesize and integrate the concept of biological control into pest management strategies.
- Analyze and critique research publications.

**Prerequisites:** There are no formal prerequisites, however introductory coursework in entomology and microbiology are suggested.

**Textbooks and supplies fees:** No textbook or fees are required. Selected chapters from the following textbooks are recommended for additional reading:

Boucias, D.G. and Pendland, J.C. (1998) *Principles of Insect Pathology*, 537 pp. Kluwer Academic Publishers, Boston.

Bourtzis, K. and Miller, T.A. (2003) *Insect Symbiosis (Contemporary Topics in Entomology)*, Vol. I-III, CRC Press, Boca Raton.

Harris, K.F., Smith, O.P. and Duffus, J.E. (2001) *Virus-Insect-Plant Interactions*, 376 pp. Academic Press, San Diego.

Lacey, L.A. (1997) *Manual of Techniques in Insect Pathology*, 409 pp. Academic Press, San Diego.

Nation, J.L. (2002) *Insect Physiology and Biochemistry*, 485 pp. CRC Press, Boca Raton.

Tortora, G.J., Funke, B.R. and Case, C.L. (2004) *Microbiology: An Introduction*, 944 pp.  
Benjamin/Cummings, Redwood City, CA.

**Readings:** A series of assigned research and review articles covering lecture topics will be provided.

Examples of reading assignments include:

Baverstock, J., Roy, H.E. and Pell, J.K. (2010) Entomopathogenic fungi and insect behaviour: from unsuspecting hosts to targeted vectors. *Biocontrol* 55, 89-102.

Dillon, R.J. and Dillon, V.M. (2004) The gut bacteria of insects: nonpathogenic interactions. *Annual Review of Entomology* 49, 71-92.

Douglas, A.E. (1998) Nutritional interactions in insect-microbial symbioses: Aphids and their symbiotic bacteria *Buchnera*. *Annual Review of Entomology* 43, 17-37.

Fereres, A. and Moreno, A. (2009) Behavioural aspects influencing plant virus transmission by homopteran insects. *Virus Research* 141, 158-168.

Purcell, A.H. and Almeida, A.M. (2005) Insects as vectors of disease agents. *Encyclopedia of Plant and Crop Science* DOI: 10.1081/E-EPCS-120010496, 5 pp.

Roditakis, E., Couzin, I.D., Balrow, K., Franks, N.R. and Charnley, A.K. (2000) Improving secondary pick up of insect fungal pathogen conidia by manipulating host behaviour. *Annals of Applied Biology* 137, 329-335.

**Additional readings for the course will be posted online at:**

<https://elearning2.courses.ufl.edu/portal>

## Weekly Schedule

Week	Dare	Topic	Weekly Assignment
1	Jan 5	Introduction to insect microbiology	<b>Quiz, discussion</b>
		Diversity and significance of microbe interactions	
		Principles of microbiology	
2	Jan 10	Mutualistic associations between insects and microbes	<b>Quiz, discussion</b>
3	Jan 18	Insect nutrition and the importance of microbes	<b>Quiz, discussion</b>
4	Jan 24	Gut symbionts	<b>Quiz, discussion</b>
5	Jan 31	Fungal symbioses:	<b>Quiz, discussion</b>
		Ant fungal gardens	
		Termites	
		Ambrosia beetles	
6	Feb 7	Non-nutritional functions of intra- and extracellular symbionts	<b>Quiz, discussion</b>
7	Feb 14	Wolbachia	<b>Quiz, discussion</b>
8	Feb 21	<b>Writing assignment</b>	

9	Feb 28	Microorganisms and insect behavior	No
10	Mar 7	<b>Spring Break, no class</b>	<b>Quiz, discussion</b>
11	Mar 14	Entomopathogenic Nematodes	<b>Quiz, discussion</b>
12	Mar 21	Entomopathogens	<b>Quiz, discussion</b>
13	Mar 28	Insects as Vectors of Plant pathogens	<b>Quiz, discussion</b>
14	Apr 4	Insects as Vectors of Animal pathogens	<b>Quiz, discussion</b>
15	Apr 11	Integrated pest management for vector control	No
16	Apr 18	<b>Podcasts and Research Report due 4/20</b>	No
17	Apr 25	<b>Podcasts available for listening; Peer reviews due 4/27</b>	

### Weekly discussions and quizzes:

After viewing lectures and reading materials assigned for the week, there will be a weekly discussion and short quiz. Quizzes will be composed of multiple choice or short answer questions.

Weekly discussions are available each week. The discussion assignments for each week are due by the end of the next week. You will need to both post and respond to others' posts in the discussion. Ten points are awarded for the initial post, 10 points for a follow up post, and 5 points for the thoroughness of your response (e.g. more than just saying "I agree" with a previous post).

### Writing Assignment:

The mid-term writing assignment should be in the form of a short research proposal with a literature review. The paper should be more than four and up to 6 pages (single-spaced, 12 point Times New Roman font, not including references). Provide new references you have selected on a separate page from your essay underneath the section heading "References Cited." Please use the following format for your references and provide a web link to your articles, if available.

Dillon, R.J. and Dillon, V.M. 2004. The gut bacteria of insects: nonpathogenic interactions. Annual Review of Entomology 49: 71-92.

The final paper is due on February 25.

Writing assignments will be evaluated for grammar, content, style, and adherence to topic. Assignments should be completed independently and will be evaluated using Turnitin® to check for plagiarism. Grades will be available on the Gradebook section of Canvas.

A rubric for grading is provided on the Canvas website. Grades will be based on:

Criteria (% of grade)	Below Average	Average	Above Average
-----------------------	---------------	---------	---------------

Organization and clarity (5%)	Paper does not explicitly guide the reader through the topic clearly and methodically.	Paper without clear or methodical organization.	Paper clearly guides the reader through the topic clearly and methodically
Provide supporting background information for the topic and hypothesis (20%)	No background information. Only contains information from lectures/readings.	Limited or brief background information or only contains information from lectures/readings.	Background information builds on information from lectures/readings and is a meaningful addition to the course topics.
Hypothesis identified and clearly defined(5%)	Hypothesis not explicitly identified.	Hypothesis not explicit or does is not clearly supported by the background information given.	Hypothesis identified and logically derived from the provided background information.
Approach for evaluating hypothesis (10%)	Approach not discussed.	Approach not discussed clearly or overly simple.	Approach is clearly described and laid out logically, with sufficient steps/experiments to address the hypothesis.
Discussion of the value of the proposed research to the field (10%)	Discussion of the topic is shallow without critical evaluation of possible results and benefit of the research.	Discussion of the topic is limited to only one result and/or no discussion of strength or weakness associated with value of the results.	Discussion includes thoughtful assessment of the contribution of the results to the field and an evaluation of the strengths and weaknesses of the proposed approach.
Thoroughness (20%)	Writing assignment does not provide sufficient information for readers unfamiliar	Writing assignment does not provide sufficient information for readers unfamiliar	Writing assignment provides sufficient information for readers unfamiliar

	and is below the caliber expected for a thesis-level proposal topic. Presentation does not provide sufficient interpretation of the literature or discussion of the approach .	with topic or is below the caliber expected for a thesis-level proposal topic. Presentation provides sufficient interpretation of the literature or discussion of the approach.	with topic and is equivalent to the information expected for a thesis-level proposal topic. Presentation provides sufficient interpretation of the literature or discussion of the approach.
Discuss expected results (10%)	Expected results are unclear, illogical, or not clearly defined.	Expected results are listed but not clearly described, illogical, or not developed.	Expected results are clearly described, logical, and well-developed.
Writing style and grammar (10%)	Writing with many errors in grammar, spelling, or formatting. Does not include paragraph indentation.	Writing with some errors in grammar, spelling, or formatting.	Writing free from errors in grammar, spelling, and formatting. Paragraphs are appropriately indented.
References (10%)	References with typos, inconsistent format, incomplete.	References with typos, inconsistent format, or incomplete.	References without typos, consistent format, complete with in-text citations.

**Podcast:**

- Students will write a two-page research report (with appropriate citations) on a topic covered this semester, then create a 1-2 minute podcast about the concept discussed.
- You can listen to the podcasts at Science Update for examples. These do not need to be elaborate and can be recorded using a computer or phone. See the following for resources on how to effectively create, record, and edit (if desired) your podcast:  
<https://www.nytimes.com/2018/04/19/learning/lesson-plans/project-audio-teaching-students-how-to-produce-their-own-podcasts.html>

- All students must listen to all podcasts and complete **peer review sheets**, available under the assignments section of the Canvas website.
- Peer review sheets must be completed and returned by the end of the week reserved for the podcast activity.

A rubric for grading is provided on the Canvas website.

Podcase research report:

In no more than 500 words, address the following:

1. State the main hypothesis and discuss how the papers relate to the weekly lecture/reading topics
2. What are the main conclusions? Are they valid?
3. How convincing were their results and do they support the conclusions? (i.e., did they design the experiments and analyze the data correctly?)
4. What could the authors have done differently, if anything?
5. What is the next direction this research group should take based on these results?

Grading:

- Presentation (based on peer evaluations, content, format, and adherence to topic): 200 points
- Completion of peer review sheets for each presentation: 50 points
- Research report: 100 pts

**Grades for ENY 6821** will be based on a total of 820 points as outlined below:

Assignment	Point amount	% of Grade
Writing assignment	300	30
Peer evaluations of podcast	50	5
Podcast Activity	200	20
Research report for podcast	100	10
Discussion assignments- (12 x 25 pts each)	300	30
Weekly quiz (10 x 5-6 pts each)	50	5
<b>Total</b>	<b>1000</b>	<b>100</b>

**Grading policy:** To be fair to all students, there will be no extra credit opportunities. Podcasts will be graded according to the evaluation criteria of the Entomological Society of America for oral presentations at scientific meetings. These will be available in the assignment section of Canvas. The writing assignments are due by the dates posted in Canvas and must be submitted using the Canvas Assignments feature as an unlocked MS Word document (\*.doc or \*.docx). Late submissions will be reduced 10% of the total grade for each 24h past the scheduled deadline. All graded material remains the property of the instructors, and any unreturned test or assignment will result in a grade of zero. For

information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

**Grading Scale:**

A	93-100% of 1000 points	B-	80-82%	D+	67-69%
A-	90-92%	C+	77-79%	D	63-66%
B+	87-89%	C	73-76%	D-	60-62%
B	83-86%	C-	70-72%	E	<60%

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

**Attendance and Make-up Policy:**

The course is entirely online; however, because exams will consist of materials covered in lectures and paper assignments, students that do not participate will not do well on these assessments.

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

**Netiquette Guide for Online Courses**

Please review the UF guidelines for online courses here:

<http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf>

**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.ua.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://evaluations.ufl.edu/results>.

**Academic Integrity and Class Rules**

**UNIVERSITY OF FLORIDA COURSE POLICIES:**

Each student in the course is expected to abide by the UF Code of Academic Integrity. For information, please visit: <https://sccr.dso.ufl.edu/students/student-conduct-code/>

**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). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. 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>.

### **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.

For issues with technical difficulties for Canvas, please contact the UF Help Desk at:

- <http://helpdesk.ufl.edu>
- (352) 392-HELP (4357)
- Walk-in: HUB 132

### **Plagiarism**

The UF Science and Engineering policy about plagiarism is located [here](#). **Please read it.**

The following information applies to all courses taught at the UF Entomology and Nematology Department and can be found in all class syllabi.

Plagiarism is a serious problem in academia today, especially with the ease of obtaining information from the World Wide Web. Plagiarism is defined as representing the words or ideas of another person as one's own, without attribution to the source. All words and ideas must be attributed to a source unless they are considered common knowledge (i.e., widely known by many people and found in many different sources). There are many kinds of plagiarism, as you will read on the Guide to Plagiarism website referenced below.

Plagiarism is unethical, unacceptable in science, and prohibited by the UF Student Honor Code (<http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php>). The consequences for plagiarism while

at the University of Florida range from receiving a grade of zero for the plagiarized assignment or a failing grade for the course, or, for repeated offenses, expulsion from the university. Plagiarism after graduate training calls into question one's scientific integrity and can lead to banning of publication in journals and the loss of jobs/careers.

In some countries, it is an acceptable practice to write in a manner that faculty members at the University of Florida consider plagiarism. Students studying in our university and with plans to publish their research in the English language need to know what plagiarism is and how to avoid it.

**Plagiarism will not be tolerated in this course.** Students who plagiarize will be caught and consequences will be applied. I will check all written assignments using an anti-plagiarism software called Turnitin® (<http://www.at.ufl.edu/~turnitin/about.html>).

For further information and examples of plagiarism, I strongly suggest that you please read the George Smathers' Library Guide to Plagiarism at <http://web.uflib.ufl.edu/msl/subjects/Physics/StudentPlagiarism.html>

**Please understand that our purpose in bringing to your attention the matter of plagiarism is to help train you to be ethical scientists, not to impugn your character.**

#### **HARDWARE/INTERNET REQUIREMENTS**

1. All students should have dedicated access to a computer using a modern operating system such as Windows 7 or Mac OS X. Students should make sure to have access to a back-up computer (work, friend or relative's computer) in case of equipment failure.
2. A high-speed Internet connection is highly recommended for all courses. We cannot guarantee multimedia components will work on slower connections. Some wireless connections might also present a problem. Unfortunately, we cannot distribute hard copies (e.g., cd-rom, dvd-rom) of multimedia items.
3. This course requires audio-video presentations. Students will need speakers and/or headphones, and a microphone for the presentations.

#### **SOFTWARE REQUIREMENTS**

This software is available at no cost (the one exception is the MS Office suite, however there is a free alternative). It is recommended that you download the software even if you already have it on your computer. Many technical problems you might encounter can be resolved by installing the latest version of the following software. Click on the logo(s) to download.

1. [Firefox Web Browser](#) – In order to simplify compatibility issues, students should access their courses using Firefox (Chrome, Internet Explorer or Safari have limited functionality)
2. [Adobe Reader](#) – This course includes .pdf documents which require Adobe Reader.
3. MS Office or Open Office – Courses require updated business suite applications. Open Office is a free alternative to the MS Office suite. You can [get Open Office here](#).

Contact the UF Computing Help desk immediately with any technological issues:

Ph: 352-392-4357; helpdesk@ufl.edu

## Additional Resources

### Campus Helping Resources

Campus Helping Resources Students experiencing crises or personal problems that interfere with their general wellbeing 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](http://www.counseling.ufl.edu) 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>.

### Student Complaints

- Residential Course: [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf)
- Online Course: <http://www.distance.ufl.edu/student-complaint-process>.

### 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/>

### COVID Response

We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

- You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.
- Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
- Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.
- If you are experiencing COVID-19 symptoms (Click here for guidance from the CDC on symptoms of coronavirus), please use the UF Health screening system and follow the instructions on whether you are able to attend class. Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms.
- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. Find more information in the university attendance policies.