

Insect Physiology - Syllabus for ENY 6401– 3 credit hours **Instructor:** Dan Hahn

E-mail: Through the course E-learning site in Canvas – this is the best way to reach me! Please do not send e-mails directly to my personal account so I can keep track of all correspondence in the E-learning system.

IMPORTANT: PLEASE CHECK THE E-LEARNING SITE FREQUENTLY (HOPEFULLY DAILY) FOR COURSE UPDATES AND COMMUNICATION

Office hours: By appointment by Zoom or phone, just drop me an e-mail to schedule it. Don't be a stranger, I am here to help you with this course but it is difficult for me to know what you need if you don't reach out.

Technical Support: Please contact our departmental tech guru Angel Perez (aperez1@ufl.edu) for assistance with any computer issues from videoconferencing to why your browser may not load lectures properly (I'm not so good with these issues).

Delivery options: Please note that this course is delivered in two different ways each with several different section numbers based on delivery format and what degree track students are in.

1) Students in Gainesville will meet with me for a live lecture every Tuesday and Thursday in RM#3118 Ent/Nem – Steinmetz Hall. Gainesville-based students are expected to attend lectures and participate in interactive discourse both during the lecture period and in online forums. Gainesville students can also join by Zoom or asynchronously as needed, but in-person interactions are encouraged. Gainesville-based students will also take the associated 1-credit laboratory course. Off-campus students will not have a lab.

2) Students will meet with me for a live Zoom lecture every Tuesday and Thursday. I hope most of you can take this option because my lectures are interactive and often based on problem solving. In a graduate course, interactive discourse is often very useful to push learning. That said, I know not all of you can join me live every Tuesday and Thursday. Some of you may have full time jobs or be around the world such that the lecture times are in the middle of the night. Furthermore, some of you will have events that prevent you from attending live on a particular day (e.g., field research) or a week (e.g., you get sick). Feel free to move between the live lectures and the pre-recorded synchronous lectures as you need to, but the more live lecture participants we get the more interactive it will be.

3) Students taking this course by asynchronous distance delivery will interface with me and the rest of the class through the UF E-learning system, Canvas. Asynchronous distance students will have access to recorded video lectures taken in Zoom. Lectures will typically be posted the day they are recorded. Asynchronous delivery students are expected to keep pace with the real-time students and participate through interactive discussion forums. Please note that unlike other asynchronous courses, **this course is really semi-synchronous** so that the interests and participation of distance students should be incorporated in nearly real time.

Real-time videoconferencing will be provided by the Zoom app. Please go to this website to learn how to use Zoom (<http://microcell.ufl.edu/mcs-apps/mcs-zoom/>) or this one (<http://fred.ifas.ufl.edu/destudio/html/zoom.html>). Our course conference id is <https://ufl.zoom.us/j/98969911719> or just use the last numbers if you go to the Zoom website and need a conference ID. You should be able to watch and participate though any computer, tablet, or even your phone. Please contact our departmental tech guru Angel

Perez (aperez1@ufl.edu) for assistance with any Zoom issues. Each lecture will also be recorded through Zoom and the file posted in Canvas.

Meeting times: On campus and by videoconferencing we will meet Tuesdays and Thursdays from 1:00pm until 2:45 pm (periods 6 & 7). Why do we have 4 hours a week blocked off for a 3-credit course? Sometimes we will use the whole 2 periods and sometimes we will not. Overall, we will average 3h of contact per week because we will also have scheduled breaks within the double period block. Distance video delivery will be asynchronous on the web. For “live” students, note that I will sometimes assign video lectures that will complement in class lectures or replace in-class lectures so we will have more time for discussion or to facilitate material from special guest speakers.

Meeting location: RM#3118 Ent/Nem – Steinmetz Hall, or your videoconferencing unit.

Course Description: Physiology and biochemistry of insect life.

Course Learning Objectives: (I know this is a lot, but I have high aspirations for you!) Students will learn to recognize and clearly define important terms in the vocabulary of physiology, biochemistry, anatomy, and cell biology of insect systems, so that they will have the knowledge to become conversant in the field. This objective will be assessed through in class discussions, web forum discussions, paper discussions, and on exams.

Students will be able to describe the structure and functions of insect organs and underlying structures like regulatory molecules and cell types. Students will be able to explain how these substructures within and across organs may interact as a physiological system to regulate whole-organism functions like growth, molting, and reproduction. Objectives will be assessed by in class discussions, web forum discussions, and exams.

Students will learn the fundamentals of designing and interpreting physiological experiments. Specifically, students are expected to be able to clearly articulate the hypothesis being tested, the underlying assumptions being made, the experimental steps needed to test the hypothesis, and make clear predictions about the expected outcomes from each element of the hypothesis test. Two important outcomes of these goals follow.

Students will read and understand journal articles from the primary literature in insect physiology. After reading a paper, students are expected to be able to define the central hypothesis/goal and sub-goals of the paper. Students will be able to describe the design and methods used to test the central hypothesis/reach the stated goals. Based upon the methods and data collected, students will be able to assess the strength of the inferences that the authors have made based upon the information they collected. Did they actually show what they claim to show? Furthermore, students will be expected to suggest important future extensions of the work at hand that would further justify or invalidate the authors’ inferences. These objectives will be assessed through our paper discussions.

Beyond assessing others work, students are expected to apply knowledge of physiology and experimental design to propose tests of physiological hypotheses in hypothetical “real world” problems. Synthetic essay questions will be an important component of student learning evaluation (i.e., exams and designing your own exam question) and students are expected to illustrate their knowledge of physiology and to demonstrate that they can both critically analyze hypothetical situations and apply their physiology knowledge to solve problems presented in these hypothetical situations. Emphasis will be placed on the ability to clearly and concisely communicate.

I hope that students will achieve a level of knowledge and enough understanding of selected physiological systems to recognize opportunities to extend this learning to improve their own current or future work. This course is not designed to be a brief survey of insect physiological systems; we will not cover everything in the textbook. Instead, my goal is for you to learn enough about select physiological systems so that you are comfortable in your ability to learn about any physiological system or problem on your own in the future.

To achieve these goals, the first half of the semester will be structured around in-depth investigation of insect growth and post-embryonic development, molting, and reproduction. In this context we will cover many important aspects of physiology including cell cycle regulation and cell signaling, endocrinology, neurobiology, and nutrition. After students become more familiar with and proficient in the base principles of insect physiology in the first half of the course, we will continue our coverage of additional physiological systems to increase student exposure but with less depth in each.

Expected knowledge and Prerequisites:

You should have had at least one introductory course in entomology/insect biology such as ENY 3005 or ENY 5006. In addition, a course in biochemistry or molecular genetics would be very, very helpful. If you lack these courses, I highly suggest that you do some independent reading to acquire additional background that will make this course easier. I would be happy to supply you with some of these readings as excerpts from textbooks that I really like. I also expect you to know some basic concepts of genetics, cell biology, and whole-organism physiology at the level of an introductory biology course. I do realize that many of you probably took introductory biology a long time ago and may have forgotten some of these concepts. I certainly tend to forget information that I do not regularly use, so I do not expect you to remember everything you have ever learned in prior courses. I am glad to provide some supplementary readings, just ask. If you have questions about something you have read contact me and we can talk about it.

Suggested Textbook:

Klowden, M.J. 2013. *Physiological Systems in Insects*, Third Edition. Academic Press, San Diego, CA. – please note that you do not have to buy this, you can get it online through the UF library for free through their Ebook Central service.

All **required** reading for the course will be distributed by PDF through our course Canvas shell. You do not absolutely have to obtain the suggested text book, but many find it useful. At least half of my previous students have said the book was a helpful additional resource to the course, but some also said it was not necessary because I do not always follow along with the book. I like a particular flow of information that is different from the author of this text in the first month of the course – even though I do cover the same material that is in the book I do it in a slightly different order.

In addition to the suggested text, I will provide supplementary reading materials from several sources including book chapters, review articles, primary literature, and the Internet. Some of these readings will be required and some will be optional. When assigned a required reading, you will be expected to read these articles and make the effort necessary to understand the material. Sometimes that means going to the internet for more information or discussing with your fellow students – just like you would for any kind of research topic. I will choose the first papers, but you will help me to choose additional papers based on our shared interests as the course progresses. Note that the last paper in this list was chosen by students to discuss in a previous course.

Examples of these types of readings are:

Nijhout, H.F. 1981. Physiological control of molting in insects. *American Zoologist*. 21:631-640.

Truman, J.W., and L.M. Riddiford. 1999. The origins of insect metamorphosis. *Nature*. 401:447-452.

Avila, F.W., M.C. Bloch Qazi, C.D. Rubinstein, and M.F. Wolfner. 2011. A requirement for the neuromodulators octopamine and tyramine in *Drosophila melanogaster* female sperm storage. *Proceedings of the National Academy of Sciences*. 109: 4562-4567.

Two other books that are very useful, but certainly not required:

Chapman, R.F., Simpson, S.J., and Douglas A.E. 2013. *The Insects, Structure and Function*. Fifth Edition. Cambridge University Press, UK. 770 pp.

Nation, James L. 2015. *Insect Physiology and Biochemistry*. Third Edition. CRC Press, Boca Raton.

Grades will be based on a total of 400 points spread across the assignments below:

Exams (3 hour exams & final – drop lowest score, 100 pts each)	300
Paper Discussions (3 x 25 pts each)	75
Experimental Design Exercise (2 x 20 pts each)	40
Quiz Question Design	25
Participation	20
<hr/> Total	<hr/> 460

Detailed rubrics for each assignment will follow as we approach due dates, but short summaries follow.

Exams: This course includes four exams. All four exams are worth 100 points and students are given the option of dropping their lowest exam score. Missed exams may be made up with the approval of an excused absence from the instructor. Excused absences can be arranged with the instructor ahead of time or with appropriate documentation after the fact (e.g., medical or police report). Students taking the course by asynchronous delivery over the Internet must have a back-up computer plan for tests.

Paper discussions: Students will be assigned 3 papers from the literature to discuss and evaluate during the course. All students will provide comments on each paper in an online forum before the class period for discussion and will also provide additional comments on others ideas. Students in Gainesville and on synchronous videoconferencing will discuss the paper live during class time. Asynchronous distance students will have access to recorded discussions and will provide their analyses of the papers using specialized forum threads within the E-learning system. A detailed rubric for paper discussions will follow.

Experimental Design Exercise: Students will be assigned a problem and they will use knowledge derived from this course to design a series of observational and experimental studies to test a hypothesis about physiological function and make clear predictions while identifying any assumptions. A detailed rubric for experimental design will follow.

Quiz Question Design: The 20 points for quiz question design will be based on you designing a synthetic test question. I ask that you use the “design an experiment” question format that you will become familiar with during our first three exams. Your goal will be to design a question and accompanying answer key that tests for knowledge and analysis of an important concept in insect physiology. A detailed rubric for questions will follow.

Participation grade: The 20 points of the participation grade will be distributed across a series of exercises that will be introduced during lectures (live or recorded) and discussed in forums within the E-learning platform. Students will be expected to log into the E-learning platform and participate in these activities to earn points. Rubrics for grading each activity will be provided at the time of the activity.

Letter Grades will be assigned as follows:

- A = 90% or more total points
- B+ = 87% to 89% total points
- B = 80% to 86% total points
- C+ = 77% to 79% total points
- C = 70% to 76% total points
- D+ = 67% to 69% total points
- D = 60% to 66% total points
- E = Less than 60% total points

Grades and Grade Points:

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

Schedule and list of topics: Note this may change during the semester, so think flexible!

Date	Lecture Topic
Jan 6 Tr	Cell & Tissue Growth
Jan 10 Mo	Introduction Discussion Post due 11:59pm
Jan 11 Tu	Post-embryonic Development
Jan 13 Tr	Post-embryonic Development
Jan 18 Tu	Endocrinology
Jan 20 Tr	Endocrinology
Jan 24 Mo	Nijhout Paper First Discussion Post due 11:59pm
Jan 25 Tu	Nijhout Paper Discussion Live & on Zoom
Jan 27 Tr	Endocrinology
Jan 30 Su	Nijhout Paper Second Discussion Post due 11:59pm
Feb 1 Tu	Experimental Design & Integument - Cuticle & Epidermis
Feb 2-6	Experimental Design Exercise #1 due no later than 11:59pm Feb 6th
Feb 3 Tr	Integument - Cuticle & Epidermis
Feb 8 Tu	Test 1 review & discussion
Feb 9-13	Test 1 due no later than 11:59pm on February 13th
Feb 10 Tr	Female Reproduction
Feb 15 Tu	Female Reproduction
Feb 17 Tr	Male Reproduction
Feb 17 Tr	Neurobiology
Feb 21 Mo	Truman & Riddiford First Paper Discussion Post due 11:59pm
Feb 22 Tu	Truman and Riddiford Paper Discussion Live on Zoom
Feb 24 Tr	Neurobiology
Feb 27 Su	Truman & Riddiford First Paper Discussion Post due 11:59pm

Mar 1 Tu	Experimental Design & Neurobiology
Mar 3 Tr	Feeding and digestion
Mar 2-6	Experimental Design Exercise #2 due no later than 11:59pm Mar 6th
Mar 8 Tu	Spring Break
Mar 10 Tr	Spring Break
Mar 15 Tu	Test 2 Review & discussion
Mar 16-20	Test 2 due no later than 11:59pm on March 20th
Mar 22 Tu	Feeding and digestion
Mar 24 Tr	Feeding and digestion
Mar 28 Mo	Simpson Paper First Discussion Post due 11:59pm
Mar 29 Tu	Simpson Paper Discussion Live on Zoom
Mar 31 Tr	Muscles & Movement
Apr 3 Su	Simpson Paper Second Discussion Post due 11:59pm
Apr 5 Tu	Quiz question design & Flight
Apr 6-10	Design your own quiz question - due no later than 11:59pm Apr 10th
Apr 7 Tr	Respiration
Apr 12 Tu	Test 3 Review & discussion
Apr 13-16	Test 3 due no later than 11:59pm on April 16th
Apr 14 Tr	Blood
Apr 19 Tu	Immunity
April 24-28	Final Exam due no later than 11:59pm on April 28th

Additional General Information: The following information applies to courses at the University of Florida.

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 complete course evaluations online via GatorEvals. Guidance on how to give feedback 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). 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

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/>

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 Counseling Services Groups and Workshops Outreach and Consultation Self-Help Library Wellness Coaching
- U Matter We Care, 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://sccr.dso.ufl.edu/policies/student-honor-code-studentconduct-code/>
- Online Course: <http://www.distance.ufl.edu/student-complaint-process>

Remember: your student fees have already paid for these services. Using them when needed is getting the best value for your money.

COVID Response

We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. Students are expected to wear masks, refrain from physical contact with other students (touching) and wash hands frequently. *This as well as other components of this syllabus are subject to change as the COVID19 pandemic develops.*

All positive COVID-19 cases, including positive at home tests, should call 352-273-9790 University Health, for further guidance.