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: 1 hour after each scheduled lecture and by appointment in my office, Rm # 3112 of Steinmetz Hall. I am happy to talk on the phone or by Skype with distance students, just drop me an e-mail to schedule it. Don't be a stranger, especially if you are a distance student that I do not get to regularly converse with.

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 tech issues).

Delivery options: Please note that this course is delivered in three different ways each with a separate section number based on delivery format.

1) Students in Gainesville will meet with me for a live lecture every Tuesday and Thursday. Gainesville-based students are expected to attend lectures and participate in interactive discourse both during the lecture period and in online forums. Gainesville-based students will also take the associated 1-credit laboratory course. Off-campus students will not have a lab.

2) Students at UF REC sites may choose one of two options. They may tune in for the live lectures using our videoconferencing system every Tuesday and Thursday, or they may watch the lectures solely from video like asynchronous students. Videoconferencing-based students can either attend lectures and participate in interactive discourse during the lecture period and in online forums, or just in online forums as asynchronous students will. It may be possible for distance students away from UF campuses to also participate in videoconferncing into the course in real time, but that will depend on the equipment you have available to you.

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 via the web. Lectures will typically be posted with in 12 hours of completion (or as soon as UF Video Services can make it happen). Asynchronous delivery students are expected to keep pace with Gainesville and videoconferencing students and participate through interactive discussion forums weekly. 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.

Meeting times: On campus and by videoconferencing we will meet Tuesdays and Thursdays from 11:45 am until 1:40 pm (periods 5 & 6). 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 "in-person" 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: Steinmetz Hall (ENT/NEM) RM1031 or your videoconferencing unit.

Course Description: Physiology and biochemistry of insect life.

Course Learning Objectives: (I know this is a lot, but I've 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 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 a 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 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 and proficient with 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 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.

All **required** reading for the course will be distributed by PDF through our course Canvas shell. You do not absolutely have to buy 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. We will certainly read the first two papers, but you will help me to choose two 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 (4 x 20 pts each)	80
Quiz Question Design	10
Participation	10
Total	400

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 4 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.

Quiz Question Design: The 10 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.

Participation grade: The 10 points of the participation grade will be distributed across a series of additional 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 = 83% to 86% total points
B- = 80% to 82% total points
C+ = 77% to 79% total points
C = 73% to 76% total points
C- = 70% to 72% total points
D+ = 67% to 69% total points
D = 63% to 66% total points

D- = 60% to 62% 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

Associated Lab course, ENY6401L: Some of you on the Gainesville campus will take the associated hands-on lab course to this lecture. This lab is not required for students outside Gainesville. The lab will meet each week in RM # 3118 ENT/NEM periods 6-8 on Wednesdays (12:50-3:50pm). A separate syllabus will be distributed for the lab on our first meeting (Wednesday January 17th).

Optional Lab Experience for Distance students: I regret that distance students may not get the same hands-on opportunities in insect physiology as our students on the Gainesville campus. To facilitate hands-on opportunities for distance students, there will be an optional insect physiology lab "boot camp" held for 1-2 days during spring break (March 5-9). All distance students from the state of Florida and beyond are most welcome to attend this optional hands-on experience. Please let me know if you are interested so we can choose some dates that will work out for most participants. Some past students have found this experience very useful because it is a great opportunity to not only learn in an intensive and focused environment, but to bond with fellow students.

Attendance, Class Demeanor, and Make-Up Work:
Please note that concepts in this course will be conveyed numerous ways including lectures, readings, discussions, individual projects and group-learning activities. I expect that you will attend classes (in person or virtually), be punctual, prepared, and participate. I think that active participation is the best way to involve most people in learning, so I will expect you to be interactive online in asynchronous discussions for distance students and both in person and online discussions for local students in Gainesville. My goal is to make this an open learning atmosphere where you will think about physiological systems in a synthetic and analytical way. I expect you to go beyond simply knowing the information to pass the test and be able to apply the information in your own work down the road. Because of time constraints, I will rely on you to learn some material on your own from assigned readings or supplementary video lectures. If I ask you to have something read before class or for a test, please do it. If there is a valid reason for missing an assignment, discussion, or exam, I will be happy to work with you to generate a make-up assignment in agreement with the official UF policies. 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.

Computer Requirements:
Students taking the course through asynchronous distance delivery are expected to keep pace with students taking the course live and to complete in exercises in the E-learning system regularly. Because distance delivery requires both a computer and access to the Internet you must have a back-up plan for contingencies such as your computer getting stolen or breaking down. Contact me right away if you are having problems.

E-mail Requirements/Gatorlink Accounts:

You are required to have a Gatorlink computer account through the university (a free service to the University of Florida students). Using this account you will be able to send and receive e-mail and access the World Wide Web from home or school and thus access the UF E-learning system (WEBCT) component of this course at http://lss.at.ufl.edu/. Instructions for getting a Gatorlink account can be found at **http://www.gatorlink.ufl.edu/.** While many of you already have independent email accounts, course notifications will be sent to your gatorlink account and all course correspondence must be carried out through this account as stated in the official UF e-mail policy pasted below.

Policy on E-mail:
Official University business email will be communicated to students using the University GatorLink email account. That is, official email will be sent exclusively to GatorLinkUserName@ufl.edu. The preferred email address recorded for all students will be the GatorLink address. This is the email address displayed in the online phonebook. Students may continue to use the forwarding mechanism to deliver their email to other mail services, if they wish. However, it is the student's responsibility to insure that the forwarding address is current so that they receive official communications from the University.

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. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

Distance-Learning Conflict Resolution:
Each online distance learning program has a process for, and will make every attempt to resolve, student complaints within its academic and administrative departments at the program level. See http://distance.ufl.edu/student-complaintsfor more details.

Academic Honesty:
UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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." The Honor Code (http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor of this class.

Plagiarism:
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 below.

Plagiarism is unethical, unacceptable in science, and prohibited by the UF Student Honor Code (http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/). 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, to, 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.

Students who plagiarize will be caught and consequences will be applied. I check all written assignments using an anti-plagiarism software called Turnitin® (https://lss.at.ufl.edu/help/Turnitin). Students who plagiarize will receive a grade of zero on the assignment. The second instance of plagiarism in the course will result in an automatic failing grade in the course.

For further information and examples of plagiarism, please take a look at this Online Guide to Plagiarism from Purdue University's Online Writing Lab (http://www.uflib.ufl.edu/msl/07b/students.html). This Writing Lab is a great resource in general so please take advantage of it for even more general information on writing.

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.

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:
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, http://www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester

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.

U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc/Default.aspx, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS) Student Health Care Center, 392-1161.

University Police Department, 392-1111 (or 9-1-1 for emergencies). http://www.police.ufl.edu/

In addition, if you would like to improve your academic performance there are many resources on campus that can help you do so, from writing assistance to career development.Examples of UF Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. http://www.crc.ufl.edu/

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. http://teachingcenter.ufl.edu/

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. http://writing.ufl.edu/writing-studio/

Student Complaints Campus:
https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf
On-Line Students Complaints: http://www.distance.ufl.edu/student-complaint-process

Schedule and list of topics – please scroll down to the next page.

Schedule and list of topics: Note that this may change during the course of the semester, so think flexible! Exams will be delivered during laboratory periods (ENY 6401L – Wednesday periods 6-8) for students located in Gainesville. Exams will be delivered through E-learning/Canvas for asynchronous distance students and those on videoconferencing. More details on distance exam policies will follow.

Date	Lecture Topic
Jan 9 Tu	Organization & Homeostasis
Jan 11 Tr	Cell & Tissue Growth
Jan 16 Tu	Post-embryonic Development
Jan 18 Tr	Post-embryonic Development
Jan 23 Tu	Endocrinology
Jan 25 Tr	Nijhout Paper Discussion
Jan 30 Tu	Endocrinology
Feb 1 Tr	Endocrinology
Feb 6 Tu	Integument - Cuticle & Epidermis
Feb 7 We	Test 1
Feb 8 Tr	Integument - Cuticle & Epidermis
Feb 13 Tu	Neurobiology
Feb 15 Tr	Neurobiology
Feb 20 Tu	Neurobiology
Feb 22 Tr	Truman and Riddiford Paper Discuss.
Feb 27 Tu	Neurobiology & Feeding
Mar 1 Tr	No Class - Spring Break
Mar 6 Tu	No Class - Spring Break
Mar 8 Tr	Nutrition
Mar 13 Tu	Nutrition
Mar 14 We	Test 2
Mar 15 Tr	Gut Physiology – Guest Lecture
Mar 20 Tu	Female Reproduction
Mar 22 Tr	Female Reproduction
Mar 27 Tu	Male Reproduction
Mar 29 Tr	Reproduction Related Paper Discuss.
Apr 3 Tu	Muscles & Movement
Apr 5 Tr	Flight & Blood
Apr 10 Tu	Water Balance & Excretion
Apr 12 Tr	Quiz Question Assignment Due Today!
Apr 17 Tu	Blood & Immunity– Guest Lecture
Apr 18 We	Test 3
Apr 19 Tr	Olfaction – Guest Lecture
Apr 24 Tu	Paper Discussion – open topic
May 1 Tu	Final Exam 1-4 pm