**ENT 484 – Insect Behavior**

**Syllabus for spring 2023**

**Welcome to ENT 484! Please read this entire syllabus so you don’t miss important details about assignment deadlines, assignment instructions, and expectations for the course. This syllabus is subject to change; changes will be issued in writing and uploaded to the class website on Canvas.**

**Course description and goals**: Insects are one of the most successful and diverse taxonomic groups on the planet. Their success is attributed to the amazing range and complex behaviors they exhibit. They have mastered the abilities to find food and mate, defend themselves, invade new territories, communicate in various ways and cooperate to build highly organized societies. This course will provide a theoretical and empirical overview of insect behavior. We will cover topics related to insect physiology, genetic and evolution. We will learn how scientists study animal and insect behavior, why do insects behave the way they do, what functions these behaviors might serve, and how behavior is shaped by the evolutionary forces of natural and sexual selection. Among the topics we will discuss are learning, memory and decision making, foraging and defense, reproductive strategies and mating systems, communication, cooperative behavior, and social cognition.

**Course Objectives:**

1. Explain how insect behavior has evolved to make insects one of the most successful and diverse taxonomic groups
2. Explain observed behaviors based on their development, adaptive value, function, and evolution
3. Implement the process of scientific inquiry by making observations, generating questions, and proposing experiments to test hypotheses
4. Apply concepts in animal behavior to novel situations

**Credit**: This is a three-credit course

**Prerequisites**: Students should have basic knowledge of chemistry, cell biology, genetics, evolution, ecology, and diversity. This knowledge is typically taught in courses such as BIOL 110, 220 and 230. The level of this course is suitable for undergrads in advanced years or graduate students. If you are not sure whether you have the necessary background, please discuss this with me!

**Course meeting**: Tuesday and Thursday, 3:05-4:20, Ferguson Bldg 003

First day of classes: January 10, 2022

Last day of classes: April 27, 2022

**Instructor**:

Dr. Etya Amsalem, Associate Professor of Entomology

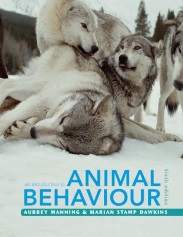
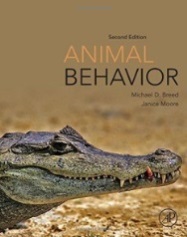
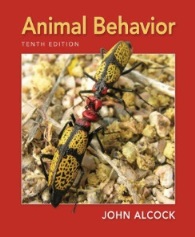
215 Huck Life Sciences building

Phone: 814-863-7675

Email: [eua6@psu.edu](mailto:eua6@psu.edu) or through Canvass

Office hours: Wednesdays 3:30-4:30 pm

*C:\Users\pashadag\AppData\Local\Temp\9789048123889.tif***Course resources**: While there is no required textbook in this course, students that wish to expand their knowledge, are encouraged to read selected chapters from the book “Insect Behavior by Robert Matthews & Janice Matthews, Springer, 2nd edition. Hard and electronic copies of this book are available at the library. There are several other great text books in the field, but most are not specific to insects. I listed few examples below for students who are interested to expand their knowledge. These books provide excellent coverage of many of the general topics we will discuss in this course.

**

1. *Animal Behavior by John Alcock, Sinauer, 10th edition*
2. *Animal Behavior by Michael Breed and Janice Moore, Elsevier, 2nd Edition*
3. *An introduction to Animal Behavior by Aubrey Manning & Marian Stamp Dawkins, Cambridge, 6th edition*

Additional material to read will be assigned from time to time and posted on Canvass. The syllabus, lecture notes, PDFs of scientific publications and additional information will be posted on Canvass to assist you with taking notes. Canvas will be also used for announcement, accessing your grades, and communicating with your instructor.

**Course communication**: If you need to communicate with me, please use your PSU email. Office hours are by appointment. Barring unusual circumstances, expect a reply within a day or two during the week, and 48 hours over the weekend. **Be aware that I do not check my inbox after 5 pm or before 8 am**. I will occasionally email members of the class. Please check your email regularly to be sure you get the info I send out. Each student is responsible for reading and following the instructions, guidelines, and schedule in this syllabus, the course’s webpage and in class. Not having read this information will not constitute an excuse for missing deadlines and assignments. Please set your preference in Canvas so that you receive timely notifications of course announcements and other information.

**Exams and Assignment of Grades**

You will be graded based upon:

Midterm exam (200 points)

Final exam (200 points)

Mid-course project (300 points)

Mid-course peer review (100 points)

Attendance and Participation (200 points)

**Exams:** There are 2 exams during this course, each worth 200 points. Both exams will consist of multiple choice, true/false, or short essay questions. The exams will be held during class time using Canvas on Feb 9 and Apr 27 (last class), so please bring your personal computers with you on these dates. I will have hard copies for students who are unable to bring a computer. Completing both exams is mandatory. Students are expected to arrive on time. No extra time will be given for students who arrive late. If you need extra time, please provide a formal document to support it and discuss this with me before the exam. Exams may include questions about materials that were discussed in class, were in the slides (including videos) or in reading materials. Take notes!

Make up requests for an exam will only be granted if a sound reason with written documentation is provided, (e.g. letter from the Deans Office). Formally accepted excuses are one of the followings: illness, injury, military service, family emergency, religious observance, athletic contests, employment, and graduate school interviews. Unless the reason is urgent (e.g., car accident in the morning of the exam, please stay safe!), students should ask for permission to miss an exam at least 24 hours before the exam for reasons associated with illness, and at least 7 days prior to the exam for pre-scheduled events (job interview or sporting event). Any make-up exam that is agreed to must be taken within three days of the original test date and it is the responsibility of the student to schedule it. Make up exams may be in an oral format in Zoom or in person.

**Mid-course project (300 points):** This is an individual assignment that includes an oral presentation and a discussion of a paper on a topic of interest to you from 7-9 topics of Insect behavior we will cover during the class. Students are required to choose a concrete example of insect behavior and analyze it according to Tinbergen's four questions (development, mechanism, evolution, adaptation) based on current research and to choose a representative research article to discuss in class. Suggestions for well-researched behaviors are provided below but you are welcome to choose any behavior you want. I can work with you to find a cool and interesting topic. Within this assignment, each student will be responsible for an entire class. The student will research the behavior they chose and explain aspects related to all Tinbergen's four questions based on previous research. Students should then identify a gap in our current understanding of the behavior and propose *a novel experiment* to study the question. The experiment should be presented in detail. The presentation will be followed by questions and discussion (apx 35 min in total). In addition, the student will choose and share a representative paper on the topic, will send it to the class at least 5 days before the class and run a discussion about it (apx 35 min). I encourage you to send leading questions together with the paper so that participants will think of the answers while they read. All participants are required to read the paper. Students are encouraged to integrate the paper discussion into their presentation.

The assignment will be graded based on the following:

1. A proper scientific coverage of the chosen behavior (discussion of all Tinbergen’s questions, sufficient content, use of references) (40%)
2. Intellectual merit, feasibility, and creativity of the proposed experiment. Intellectual merit is the importance of your question and its potential ability to advance science. Feasibility is the ability to perform your experiment, and creativity is the potential novelty of your proposed study and the potential to provide an elegant solution to the proposed problem (30%).
3. The quality of discussion in the paper you chose (preparation of questions, leading of discussion, meaningful outcomes) (30%).

Students will choose their class and behavior by Jan 26. **Note that this assignment requires time for research and preparation**. An average project will require reading and integrating information from 5-10 research articles. I recommend to start working on this project several weeks before the deadline. Students will have to upload their slides to Canvas following their talk.

Examples for behaviors divided by topic:

Foraging strategies - Puddling in butterflies, blood feeding in mosquitoes, digestion of cellulose in termites

Defense strategies – Escape behavior in cockroaches, the spread of formic acid in ants

Habitat selection – Construction of next in paper wasps/termites

Territorial behavior – Nestmate recognition in ants/wasps

Spatial adjustment – Migration in monarch butterflies, waggle dance in honeybees

Communication – Bioluminescence in fireflies, Acoustic communication in wasps, sing in crickets

Intelligence – Pain/play in bumblebees

Mating and reproduction – Lek behavior in drosophila, mating in dragon flies/silk moths

Parental and Social behavior – Reproductive inhibition in bees/ants/wasps/termites, egg carrying in water bugs

**Peer review of classmate talks (100 points).** Student talks will be evaluated by the instructor and by peers. Students will have to submit a review for each talk given by their classmates that includes a list of three strengths and three weaknesses. Each point should be explained in 1-2 sentences and followed by at least one example. Reviews should be submitted to Canvas no later than 24 h after the class. I will edit the feedback and will provide it to the speaker.

**Class participation (200 points):** Students are encouraged to participate, discuss, and ask questions during lectures. All questions, discussion, etc. by all participants should be valued and respected.

**Attendance:** It is generally expected that everyone will attend all classes, but I realize that occasionally professional activities or illness may prevent your attendance. Please let me know when you are unable to attend the class. I need to know the reason why you are unable to attend and may need verification of the excused absence. Penn State has a university-wide policy on student absence from courses (*The University Faculty Senate Policy is* [*42-27: Class Attendance*](http://senate.psu.edu/policies/42-00.html)). The policy recognizes that on occasion, students may opt to miss a class meeting in order to participate in a regularly scheduled university-approved curricular or extracurricular activity, or due to unavoidable or other legitimate circumstances such as illness, injury, family emergency, or religious observance.

**Assignment of Grades:**

A < 100% to 93%

A- < 93% to 90%

B+ < 90% to 87%

B < 87% to 83%

B- < 83% to 80%

C+ < 80% to 77%

C < 77% to 70%

D < 70% to 60%

F < 60% to 0%

**Electronics Use Policy:** Use of electronic devices in class to take notes is approved. Approved electronic devices are laptop computers and tablets. Other uses of these devices or the use of unapproved devices will be considered disruptive. Unapproved electronic devices are voice and video recording devices, cellphones, digital camera, and MP3 players.

**Be courteous.** Every student is expected to contribute to a positive, distraction-free learning environment. Laptops and other electronic devices may be used for taking notes during the lecture, but please refrain from activities not directly related to the course. Please do not talk while the instructor or another student is talking to the class. In general, please be respectful of other students and the educational process.

**Penn State policies and resources**

**Accessibility Information.** Accessibility statement for [Canvas](https://community.canvaslms.com/docs/DOC-2061).

**Netiquette.** The term "Netiquette" refers to the etiquette guidelines for electronic communications, such as e-mail and discussion postings. Netiquette covers not only rules to maintain civility in discussions, but also special guidelines unique to the electronic nature of messages. Please review Virginia Shea's "[The Core Rules of Netiquette](http://www.albion.com/netiquette/corerules.html)" for general guidelines that should be followed when communicating in this course. When you send an email to the professor or a TA, please refer to them in an appropriate way (Ms Jones, Mr Dean, Dr. Amsalem). If you are not sure how to approach someone, simply ask!

**Support Services.** As a Penn State student, you have access to a variety of services and resources, including advising, tutoring, library services, career services, and more. Please visit the [Student Support Resources](https://remotelearning.psu.edu/student-support/) page for more information.

If you experience technology problems of any kind in Canvas, please select the Help icon and select "Report a Canvas Problem," "Chat with Support," or "Call Support." It is in your own best interest to be as speciﬁc as you possibly can. Vague descriptions of a problem only delay assistance. Try to include information such as: the speciﬁc course page, quiz question, etc. you were on; what you attempted to do when that failed; the exact language of any error message displayed on your screen; the date and time when your problem occurred; and any other pertinent information (does the problem happen consistently and always in the same way, etc.).

**Online Students Use of the Library.** As Penn State students, you have access to many of the materials that the library offers to students. Please visit the [University Libraries](https://libraries.psu.edu/) website as it provides services including tutorials, peer reference consultants, an ask-a-librarian chat service, and data support to students from all campuses.

**Educational Equity Statement.** Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity at the [Report Bias](http://equity.psu.edu/reportbias/) webpage.

**Copyright Notice.** All course materials students receive or to which students have online access are protected by copyright laws. Students may use course materials and make copies for their own use as needed, but unauthorized distribution and/or uploading of materials without the instructor's express permission is strictly prohibited. University Policy AD 40, the University Policy Recording of Classroom Activities and Note Taking Services addresses this issue. Students who engage in the unauthorized distribution of copyrighted materials may be held in violation of the University's Code of Conduct, and/or liable under Federal and State laws.

**Counseling and Psychological Services (CAPS).** Many students at Penn State face personal challenges or have psychological needs that may interfere with interfere with their academic progress, social development, or emotional well-being. The university offers a variety of conﬁdential services to help you through difﬁcult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

Counseling and Psychological Services (CAPS) (814) 863-0395  
Penn State Crisis Line (24 hours/7 days/week) (877) 229-6400  
Crisis Text Line (24 hours/7 days/week) Text LIONS to 741741

[Mental Health Services](https://student.worldcampus.psu.edu/student-services/mental-health-services)

**Accommodations for Persons with Disabilities.** Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an ofﬁce for students with disabilities. The Student Disability Resources Web site provides [contact information for every Penn State campus](http://equity.psu.edu/student-disability-resources/campus-disability-coordinators). For further information, please visit the [Student Disability Resources Web site](http://equity.psu.edu/student-disability-resources).In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services ofﬁce at the campus where you are ofﬁcially enrolled, [participate in an intake interview, and provide documentation](http://equity.psu.edu/student-disability-resources/applying-for-services). If the documentation supports your request for reasonable accommodations, your [campus's disability services ofﬁce](http://equity.psu.edu/student-disability-resources/campus-disability-coordinators) will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations.**Privacy Policies.** For information about Penn State's privacy statement and what it encompasses, please read their policy concerning [web privacy](https://www.psu.edu/web-privacy-statement). Visit Penn State's [Family Educational Rights and Privacy Act](https://www.registrar.psu.edu/confidentiality/guidelines-faculty-staff/index.cfm) (FERPA) page for information regarding its rules on governing the privacy of student educational records.

**Accommodations for Military Personnel.** Veterans and currently serving military personnel and/or spouses with unique circumstances (e.g., upcoming deployments, drill/duty requirements, disabilities, VA appointments, etc.) are welcome and encouraged to communicate these, in advance, if possible, to the instructor in the case that special arrangements need to be made.

**Use of Trade Names.** Where trade names are used, no discrimination is intended and no endorsement by the World Campus, Outreach and Cooperative Extension, the College of Agricultural Sciences, or The Pennsylvania State University is implied.

**Subject to Change Statement.** Please note that this Course Syllabus is subject to change. Students are responsible for abiding by such changes.

**Academic Integrity Statement.** Academic integrity is a foundation for building integrity in all aspects of our adult lives. Academic integrity is about more than the words "don't cheat", though that is certainly part of it. Here are some reasons why academic integrity is so important

* Cheating in school leads to more cheating and lying later in life, in all contexts.
* Ethical decision-making takes a great deal of practice, and college is the best time to practice.
* Cheating is contagious.
* You’ll be happier and more committed if our class is cheat-free.
* You'll learn more.

Examples: Here are some specific examples (though not a complete list) to help clarify how to honestly approach this class.

Honest behavior: Talking about course concepts with others is a great way to help each other learn but be sure to write up your assignments on your own. Be sure you can explain everything in your own words. All work submitted by you should be an honest reflection of what you yourself personally know and understand without assistance.

Dishonest behavior: Any action whereby a student fails to do all the assigned work on their own, including, but not limited to: submitting the written work of anyone else, getting answers from any other source other than your own thinking or course content, using unauthorized sources of information for any assignments or tests, or misrepresenting any information to the instructor.

**Written assignments**: Written work that you submit for this class may be analyzed with plagiarism detection software, so be sure that any writing you do for this course, no matter how short or long, is completely in your own words and cite your sources of information. No quoted text (using someone else’s writing word for word) from a source may be used in your written assignments. Plagiarism is one of the most frequently committed violations of academic integrity in college classes.

**Warning:** Ignorance is not a valid defense for plagiarism. Educate yourself about what constitutes plagiarism, so you don't get burned. See <http://tlt.its.psu.edu/plagiarism>.

From Penn State’s website: “Academic integrity includes a commitment not to engage in or tolerate acts of falsification, plagiarism, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.” Code of student conduct <http://studentaffairs.psu.edu/conduct/codeofconduct> . Academic Integrity Guidelines for the College of Agricultural Sciences <http://agsci.psu.edu/students/resources/academic-integrity>.

**Review System -** Pennsylvania State University takes seriously the opinion of students in the evaluation of the effectiveness of instruction and has implemented the review process to gather student feedback. This course utilizes the “Student Rating of Teaching Effectiveness (SRTE)” system. You notified sometime during the last two weeks of class asking you to fill out a form at your convenience. We hope that you will be willing to give us your frank and constructive feedback so that we may instruct students even better in the future.

**ENT 484: Insect Behavior - Weekly schedule for spring 2023**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Week** | **Date** | **Lecture** | **Topic** | **Tasks** |
| **1** | Jan 10 | Lec1 | Introduction, The history of behavior |  |
| Jan 12 | Lec2 | Insect behavior |  |
| **2** | Jan 17 | Lec3 | Tinbergen's four questions |  |
| Jan 19 | Lec4 | Scientific ways of studying behavior |  |
| **3** | Jan 24 | Lec5 | Development |  |
| Jan 26 | Lec6 | Development | Choose your talk date and behavior |
| **4** | Jan 31 | Lec7 | Genes and behavior |  |
| Feb 2 | Lec8 | Genes and behavior |  |
| **5** | Feb 7 | Lec9 | Guest talk: Evolution and development. Dr Tanya Renner |  |
| Feb 9 | Lec10 | **Midterm (Canvas exam in class)** |  |
| **6** | Feb 14 | Lec11 | Foraging strategies |  |
| Feb 16 | Lec12 | **Student talk\*** | Submit peer review |
| **7** | Feb 21 | Lec13 | Anti-predator strategies |  |
| Feb 23 | Lec14 | **Student talk\*** | Submit peer review |
| **8** | Feb 28 | Lec15 | Habitat selection and territorial behavior |  |
| Mar 2 | Lec16 | **Student talk\*** | Submit peer review |
| **9** | Mar 7 |  | Spring break – no classes |  |
| Mar 9 |  | Spring break – no classes |  |
| **10** | Mar 14 |  | Spatial adjustment |  |
| Mar 16 | Lec17 | **Student talk\*** | Submit peer review |
| **11** | Mar 21 | Lec18 | Insect intelligence |  |
| Mar 23 | Lec19 | **Student talk\*** | Submit peer review |
| **12** | Mar 28 | Lec20 | Communication |  |
| Mar 30 | Lec21 | **Student talk\*** | Submit peer review |
| **13** | Apr 4 | Lec22 | Sexual selection |  |
| Apr 6 | Lec23 | Mating and reproductive systems |  |
| **14** | Apr 11 | Lec24 | **Student talk\*** | Submit peer review |
| Apr 13 | Lec25 | Parental care |  |
| **15** | Apr 18 | Lec26 | Social behavior |  |
| Apr 20 | Lec27 | Social behavior |  |
| **16** | Apr 25 | Lec28 | **Student talk\*** | Submit peer review |
| Apr 27 | Lec29 | **Final exam (Canvas exam in class)** |  |

**\*In preparation for this class you will have to read one paper. If you are the student running this class you will have to share a paper of your choice 5 days before the class and upload your slides after the class. All students expect the presenting one need to submit peer review within 24 hours after the class.**