A. Course Meeting Times & Instructors

Lecture:  TuTh, 12:45-2:05am (0060 Jennings Hall)

Labs: two sections: W, 11:30-1:20 or 3:00-4:50 (115 Howlett Hall)

Instructor:  Dr. David Shetlar, Professor, Department of Entomology
            shetlar.1@osu.edu, 292-3762 (Cell: 614-288-6396, text or voice)
            Office Hours: Tu & Th, 11:00-12:00, 2 Rothenbuhler Lab, or by appointment

Lab TA:  Devon Rogers, 14 Rothenbuhler Lab, by appointment; rogers.786@osu.edu

Prerequisite:  none, freshman standing or higher

Textbook:  All reading materials, lectures and laboratory materials available on Carmen

Lab Manual:  All assignments and reading materials are posted. (please print out and bring to labs or request them before class).

B. Course Purpose and Learning Objectives:

The purpose of this course is to acquaint engineers, who plan to build future buildings, with the incredible biological diversity found on Planet Earth using the largest group of living animals, the insects, as examples and biological models.  Insects have been used to investigate all kinds of biological processes - genetics, neural and sensory physiology, population growth and development, evolutionary processes, hormonal action, behavior and more!  Insects are also important to human life because they can destroy our crops, clothing and houses; they may attack humans and domesticated animals, as well as serve as transmitters of major human and animal diseases.  Human buildings are susceptible to attack by insects and fungi and their modified environments provide habitat for insects, birds, mammals, molds and mildews.  A significant portion of this course will cover the biology of these organisms, how to detect them and present techniques that can reduce their invasion, establishment and damage.

This is a course in the Natural Sciences that fosters an understanding of the principles, theories and methods of modern science, the relationship between science and technology, the interactions of living organisms (using insect and human perspectives) and their effects on the environment.

Learning Objectives:

- Students will be able to recognize the major groups of the arthropods and insects and understand how these relate to the other groups of animals.
- Students will learn and be able to express how insects perform regular bodily functions (digestion, respiration, neural transmission, reproduction, growth and development, etc.) and how this compares to human systems.
- Students will achieve an understanding of how insects perceive their environment and
how this compares to human perception.

- Students will experience and be able to state the basic scientific processes of making observations, developing a hypothesis and testing this hypothesis.
- Students will learn to identify the major groups of insects, animals and fungi that attack and utilize urban habitats and structures.
- Students will achieve an understanding of how insects, animals and fungi are managed using the integrated pest management approach with an emphasis on prevention techniques.

**How students meet the GEC objectives through this course:** In Entomology 1111, students will meet that GEC Natural Science Learning Objectives in multiple ways. Insects are the largest and most diverse group of living organisms and their evolution and ability to adapt to all of Earth's extremes serve as examples of all the major principles and theories used in the biological sciences. Insects have been used to develop many of the major theories supporting genetics, evolution, physiological processes, population dynamics, behavior, and ecosystem analysis. The laboratories will include some rudimentary experiments (with fruit flies) whereby students will test genetic theories and methods. Other laboratories will investigate sensory perceptions, measurement of behavioral activities, usefulness of insects in the environment and the products they provide. Students will be engaged in discussions about how insects, other animals, fungi and humans have interacted through history and how current technology is used to minimize the adverse affects that insects and other pests have on human habitats and human health.

**Entomology 1111 Learning Outcomes**

Successful students will be able to:

1. Collect, maintain and preserve biological specimens for biological studies, taxonomic studies and for aesthetic appreciation.
2. Recognize cellular to organismal characteristics that are used to group and separate the major biological groups, from microbes to higher plants and animals.
3. Explain how the major groups of insects differ in their life cycles, evolved characteristics, and adaptations to the environment.
4. Explain how insects and other animal groups (especially humans) perform basic processes of digestion, excretion, respiration, growth, neural transmission, sensing the environment, and locomotion.
5. Explain the transfer and modification of heritable traits from parents to offspring.
6. Describe the nature and expression of heritable information at the molecular level, including DNA replication, DNA repair, transcription, protein synthesis.
7. Apply Mendelian genetics to solve monohybrid and dihybrid crosses.
8. Describe the differences between innate behavioral responses, learned behavior and social behavior as demonstrated by insects and other animals (especially humans).
9. Explain how sex is determined in insects and other animals and the importance of sex in creating biodiversity.
10. Describe general population growth processes and the factors that limit this growth.
11. Describe how insect, vertebrate animals and fungi are able to inhabit and survive in and around human-constructed habitats.
12. Decide on appropriate pest control actions when encountering insect, vertebrate animal
and fungal pests.

13. Describe and use preventive techniques to manage insect, vertebrate animal and fungal pests of homes, buildings and facilities.

### Course Outline

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Topics</th>
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<tbody>
<tr>
<td>Th 27 Aug</td>
<td>1</td>
<td>Introduction, Class Expectations, What is Entomology? &amp;</td>
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<tr>
<td>Tu 2 Sept</td>
<td>2</td>
<td>Major Biological Domains and of Living Organisms &amp;</td>
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<td></td>
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<td>Phyla of Animals – Acoelomate Body Types &amp; Forms</td>
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<tr>
<td>W 3 Sept</td>
<td>Lab 1</td>
<td>Introduction, Collecting, Sampling, Rearing &amp; Displaying Insects</td>
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<td>Th 4 Sept</td>
<td>3</td>
<td>Phyla of Animals – Coelomate Body Types &amp; Evolution &amp;</td>
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<td>Tu 9 Sept</td>
<td>4</td>
<td>The Arthropod Body Types &amp;</td>
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<td>The Arachnids</td>
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<td>W 10 Sept</td>
<td>Lab 2</td>
<td>The Animal Kingdom (Porifera to Chordata) (Quiz 1)</td>
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<td>Th 11 Sept</td>
<td>5</td>
<td>The Crustaceans</td>
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<td>Tu 16 Sept</td>
<td>6</td>
<td>The Myriapods &amp; Early Hexapoda</td>
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<td>W 17 Sept</td>
<td>Lab 3</td>
<td>Classes of Arthropods &amp; Early Hexapods (establish fruit fly cultures) (Quiz 2)</td>
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<td>Th 18 Sept</td>
<td>7</td>
<td>The Mayflies (Ephemeroptera) to Grasshoppers (Orthoptera)</td>
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<td>Tu 23 Sept</td>
<td>8</td>
<td>Earwigs (Dermoptera) to Cockroaches (Blattodea) &amp; Bugs I (Hemiptera)</td>
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<td>W 24 Sept</td>
<td>Lab 4</td>
<td>Hexapods with Incomplete Life Cycles (Quiz 3)</td>
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<td>Th 25 Sept</td>
<td>9</td>
<td>Lice &amp; Beetles</td>
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<td>Tu 30 Sept</td>
<td>10</td>
<td><strong>Exam I</strong> (Introduction through Lice)</td>
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<td>W 1 Oct</td>
<td>Lab 5</td>
<td>Hexapods with Complete Life Cycles (count fruit fly cultures) (Quiz 4)</td>
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<td>Th 2 Oct</td>
<td>11</td>
<td>Neuroptera &amp; Bees &amp; Wasps (Hymenoptera) &amp;</td>
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<td>Tu 7 Oct</td>
<td>12</td>
<td>Butterflies &amp; Moths (Lepidoptera) to Flies (Diptera) &amp; Fleas</td>
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<td>W 8 Oct</td>
<td>Lab 6</td>
<td>General Genetics Lab - nature of genes, gene function,</td>
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<td>mitosis, meiosis. (fruit fly reports due) (Quiz 5)</td>
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<td>Th 9 Oct</td>
<td>12</td>
<td>Hexapod General External Anatomy &amp;</td>
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<td>Tu 14 Oct</td>
<td>13</td>
<td>Hexapod General Internal Anatomy &amp;</td>
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<td>Organ Systems: Digestion &amp; Excretion</td>
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<tr>
<td>W 15 Oct</td>
<td>Lab 7</td>
<td>External &amp; Internal Anatomy (grasshopper drawing &amp; roach dissections) (Quiz 6)</td>
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<td>Th 16 Oct</td>
<td>14</td>
<td>Organ Systems: Respiration &amp; Circulation</td>
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<td>Tu 21 Oct</td>
<td>15</td>
<td>Organ Systems: Sensory Organs (sight, taste, hearing, etc.)</td>
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<td>Organ Systems: Muscular, Locomotion &amp; Flight</td>
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W 22 Oct  Lab 8  Physiology Lab - Chemoreception, Walking, Flight (Quiz 7)
Th 23 Oct  16  Organ Systems: Reproduction
Tu 28 Oct  17  Integument (Cuticle) – Anatomy & Molting
            Insect (Animal) Behavior – the terms biologists use
W 29 Oct  Lab 9  Insect Societies (social insects, colony recognition) (Quiz 8)
Th 30 Oct  18  SEX! Hook'in Up!.....or not!! & Populations
Tu 4 Nov   19  EXAM II (Beetles through Sex) (VOTE!!)
W 5 Nov    Lab 10 Products Derived from Insects (shellac, silk, wax, honey)  
            (Quiz 9)
Th 6 Nov   20  The Starch Eaters: Silverfish and Booklice &
Tu 11 Nov  21  No Class – Veterans Day Observed
W 12 Nov   Lab 11 Selecting and Safe Usage of Pesticides (Quiz 10)
Th 13 Nov  22  Cockroaches & Stored Products Pests (Pantry Pests) &
            Integrated Pest Management (IPM)
Tu 18 Nov  23  Flies & Mosquitoes – habitat management &
W 19 Nov   Lab 12 Managing Filth & Stored Products Pests using IPM (Quiz 11)
Th 20 Nov  24  Bed Bugs, Lice & Fleas & Spiders & Bees, Wasps and Ants
Tu 25 Nov  25  Wood-Destroying Insects – Termites
W 26 Nov   NO LAB Thanksgiving Holiday Observed
Th 27 Nov  NO LECT Thanksgiving Holiday Observed
Tu 2 Dec   26  Managing Wood-Destroying Pests in and around structures  
            (Quiz 12)
W 3 Dec    Lab 13  Nuisance Mammals & Pestiferous Birds
Th 4 Dec   27  Review for Final!
Tu 9 Dec   28

FINAL EXAM: (On designated date and time) – looks like Tuesday, Dec 16 @ 2:00-3:45 in
0060 Jennings.

Evaluation

There will be two lecture exams (worth 100 points each) and a lecture final exam (worth 100
points). The questions will be in a multiple choice format, short answer and matching. You will
be responsible for material presented in lecture, laboratories and in the reading assignments.
The final will be comprehensive but with emphasis on the material after the second exam.

The laboratory quizzes will start with second lab and quizzes will covering the topic(s) of the
previous laboratory. There will be 12 quizzes, each worth 10 points. YOU will tell your
instructor which 8 quizzes you want to count (80 points total). There will be two lab reports,
each worth 10 points (one group fruit fly report and one individual report on pesticides). Any
student missing three laboratories without excuse will automatically receive a failing grade! (see below) The course point breakdown is as follows:

Three Exams of 100 points each  300 pts
8 Lab Quizzes of 10 points each   80 pts
2 Lab Reports of 10 points each   20 pts

TOTAL             400 pts

Grade Scale: Your final grade will be based upon the University Standard Grade Scale.

Grades are not rounded up. A curve should not be expected.

Course Policies

Late Assignments: Reports turned in after the due date will receive a 10% deduction per day. After five days, no late assignments will be accepted.

Absences: If you are too ill to take the final exam or complete a quiz or assignment, please contact the instructor within 24 hours of the class period during which the exam was to have been taken. You must be seen by and receive written documentation from a professional health care practitioner on the day (or period) of the exam in order for a make up to be given. Other serious personal problems will be considered on an individual basis. In all instances, documentation supporting the excused absence will be required. Lack of transportation, loss of electricity, travel plans, etc., are not be considered as valid excuses and you will receive a zero. Make ups for missed exams and quizzes may be in a different format than the scheduled exam or quiz.

The laboratory portion of this course is an integral part of the learning experience; missing three or more labs will result in the student being automatically assigned a failing grade for the course. Students must contact their laboratory TA within two days of the original missed lab date. There is no opportunity for a make-up assignment if a student contacts his/her TA on the third day or later. In order to establish that the student was prevented from attending lab for a valid reason, some form of written verification acceptable to the Center for Life Sciences Education is required.

Exam and Quiz Conduct: Cell phones, pagers, and all other electronic devices must be turned off and stored out of sight. Students are encouraged to ask questions during exams and quizzes, but these should not be asked in a disruptive manner. Students who have handicaps that affect exam performance are encouraged to tell the instructor and laboratory instructors prior to the first quiz of such handicaps. Every effort will be made to accommodate documented handicaps.

Late Arrival at Exams: Any student arriving for an exam, AFTER the first student has completed the exam and left the lecture hall, will be permitted to take the exam during the time remaining and will be assessed a 25% penalty. CALL or text if you are going to be late!
University Policies

**Students with Disabilities:** Any student who feels she/he may need an accommodation based on the impact of a disability should contact the Course Instructor privately to discuss your specific needs within the first two weeks of class.

**Academic Misconduct:** Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct (Section 3335-23-04) is never considered an "excuse" for academic misconduct. Faculty, staff, and TAs are obligated by University Rules to report suspicions of Academic Misconduct to the Committee on Academic Misconduct.

**Sexual Harassment:** While all members of the staff involved in this course have been trained in the OSU sexual harassment policies and procedures, this is not true for all OSU students. Please report any concerns about questionable or unwanted behavior that has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive environment for working, learning, or living on campus, to your course instructor.

**University Escort Service:** To promote safety on campus, transportation across campus is offered by the OSU Department of Public Safety. Service is available between 7:30pm and 2:40am. Call 292-3322 to schedule a pick-up. You must provide at least one hour notice (http://www.ps.ohio-state.edu/sss/escort_info/).

**Errors & Omissions:** While every effort has been made to insure the validity and correctness of the information presented in this syllabus, any mistakes or clerical errors that are discovered will be corrected and communicated through subsequent editions as necessary.

If you have any questions about any of the above policies please contact the Course Instructor.