

## SCI-928: Bugs in the Classroom: Entomology for Teachers

### Independent Study Online Course Syllabus

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**Number of Graduate Semester Units:** 3 units

**Target Audience:** 6<sup>th</sup> - 14<sup>th</sup> grade teachers

**Course Access:** <https://connect.fresno.edu>

#### Course Description

Entomology is the study of insects, the most abundant form of animal life on earth. Insects have incredibly diverse morphological, physiological, and behavioral adaptations to their surroundings which makes the study of insects a fascinating subject and an excellent resource for science education. Many insects are easily maintained in the classroom and can thrive despite being handled and kept in captivity. Insects can be used to model many scientific principles. Additionally, you'll find a variety of potential cross-curricular activities with insects that connect science with art, math, language arts, and social studies. The objectives of this course are to give educators basic information about insects and methods on how to use insects in the classroom. The pedagogy utilizes hands on, project-based learning full of facts, fun and DIY classroom activities aligned with the Next Generation Science and Common Core Standards.

**Note:** Required book must be acquired separately.

#### Required Texts and Course Materials

**Book:** Imes, Rick (1992). *The Practical Entomologist*. Simon & Schuster. ISBN 978-0-671-74695-7  
<https://www.amazon.com/Practical-Entomologist-Rick-Imes/dp/0671746952> or  
<http://www.directtextbook.com/isbn/9780671746957>

**Recommended Supplies:** Aerial insect net. Available at most toy stores or hobby stores and online. You may want to purchase a few living insect specimens at a pet store or bait shop.

**Canvas:** This course will be delivered totally online. Canvas is a web-based learning management system (LMS) that provides students access to online resources, documents, videos, assignments, quizzes, forums, etc. Canvas is easy to learn and has a user-friendly interface.

**Online Resources:** Relevant online resources that support the course content and encourage further investigation will be available throughout the course assignments. Active hyperlinks are utilized throughout the course and will link to the appropriate information when clicked. These include videos, podcasts, worksheets, online activities, journal articles and other resources.

## Course Dates

Self-paced; students may enroll at any time and take up to one year, from the date of registration, to complete assignments. Students may complete assignments in no less than three weeks for a 3-unit course (one week per unit).

## National Standards Addressed in This Course

### National Board for Professional Teaching Standards (NBPTS)

(<http://www.nbpts.org/standards-five-core-propositions/>)

First published in 1989 and updated in 2016, [\*What Teachers Should Know and Be Able to Do\*](#) articulates the National Board's Five Core Propositions for teaching. The Five Core Propositions - comparable to medicine's Hippocratic Oath — set forth the profession's vision for accomplished teaching. Together, the propositions form the basis of all National Board Standards and the foundation for National Board Certification. Course assignments have been designed so students can demonstrate excellence against these professional teaching standards whenever possible.

- Proposition 1: Teachers are committed to students and their learning
- Proposition 2: Teachers know the subject they teach and how to teach those subjects to students
- Proposition 3: Teachers are responsible for managing and monitoring student learning
- Proposition 4: Teachers think systematically about their practice and learn from experience
- Proposition 5: Teachers are members of learning communities

### Next Generation Science Standards (<http://www.nextgenscience.org/>)

The Next Generation Science Standards are designed to help realize a vision for education in the science and engineering in which students, over multiple years of school, actively engage in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields. (NRC Framework 2012, p. 10). Watch the introductory video at: <https://youtu.be/o9SrSBGDnfU>

### Common Core State Standards (CCSS) ([www.corestandards.org](http://www.corestandards.org))

The Common Core standards were drafted by experts and teachers from across the country and are designed to ensure students are prepared for today's entry-level careers, freshman-level college courses, and workforce training programs. Watch the introductory video at: <https://vimeo.com/116379560>

Student Learning Outcomes in the Bugs in the Classroom course are aligned to the Common Core English Language Arts Standards for Science & Technical Subjects.

Common Core English Language Arts Standards for Science & Technical Subjects:

- Craft and Structure
- Integration of Knowledge and Ideas

## Continuing Education Student Learning Outcomes (CE-SLO)

CE-SLO 1	Demonstrate proficient written communication by articulating a clear focus, synthesizing arguments, and utilizing standard formats in order to inform and persuade others, and present information applicable to targeted use.
CE-SLO 2	Demonstrate comprehension of content-specific knowledge and the ability to apply it in theoretical, personal, professional, or societal contexts.
CE-SLO 3	Reflect on their personal and professional growth and provide evidence of how such reflection is utilized to manage personal and professional improvement.
CE-SLO 4	Apply critical thinking competencies by generating probing questions, recognizing underlying assumptions, interpreting and evaluating relevant information, and applying their understandings to the professional setting.
CE-SLO 5	Reflect on values that inspire high standards of professional and ethical behavior as they pursue excellence in applying new learning to their chosen field.
CE-SLO 6	Identify information needed in order to fully understand a topic or task, organize that information, identify the best sources of information for a given enquiry, locate and critically evaluate sources, and accurately and effectively share that information.

## Course Student Learning Outcomes (C-SLO)

<b>Student Learning Outcomes for This Course</b> By the end of this course, the students will be able to:	<b>National Standards Addressed*</b>	<b>CE-SLO Addressed**</b>
1. Demonstrate an understanding of insect identification, structure, and function	LS1A, LS1C, LS2B, LS2D, LS3B, LS4C	CE 2,6
2. Recognize and describe the different types of insect development and relate this to insect classification	LS1B, LS3B, LS4A, LS4C	CE 1,2,4
3. Distinguish characteristics of the major insect orders	LS1A, LS1B, LS3B, LS4B, LS4C	CE 2,4
4. Discuss basic insect ecology	LS1C, LS2A, LS2B, LS2C, LS4D	CE 1,2,4,6
5. Describe the impacts of insects on man and the environment.	LS2A, LS2C, LS4D	CE 1,2,4,5
6. Acquire skills for collecting, mounting, and preserving insects for scientific study.	LS3B, LS4D	CE 2,4,6
7. Demonstrate basic biological principles and concepts using insects as examples.	All NGSS Life Science Disciplinary Core Ideas.	CE 2,4,5
8. Plan and carry out science investigations.	All 8 NRC Practices	CE 1,2,4,5,6
9. Locate and utilize entomological resources for creating science lessons.	NBPTS 1,2,3,4	CE 6

10. Develop creative hands-on, project based entomology lessons that align to national, state and/or local standards	NBPTS 1,2,3,4	CE 1,2,4,5,6
11. Incorporate technology in the teaching of entomology.	NBPTS 1	CE 4,6

\* Please refer to the section on **National Standards Addressed in This Course**

\*\* Please refer to the section on **Continuing Education Program Student Learning Outcomes**

## Topics, Assignments, and Activities

Module Title	Module Assignments and Activities	Points Possible
<b>Home Page</b>	<ul style="list-style-type: none"> <li>Welcome Video</li> <li>Course Syllabus</li> <li>Policies and Procedures</li> <li>Introduce Yourself Forum</li> </ul>	
<b>Module 1 – Welcome an Introductions</b>	<ul style="list-style-type: none"> <li>1.1 - Reflection/Goals Activity</li> <li>1.2 - Introductory Worksheet</li> <li>1.3 - Refection/Goal Forum</li> </ul>	20 pts 10 pts 10 pts
<b>Module 2 – Entomology Basics (Part 1)</b>	<ul style="list-style-type: none"> <li>2.1 - Insect Model Project</li> <li>2.2 - Insect Dissection Activity</li> <li>2.3 - Entomology Basics (Part 1) Worksheet</li> <li>2.4 - Entomology Basics (Part 1) Forum</li> </ul>	100 pts 20 pts 10 pts 10 pts
<b>Module 3 – Entomology Basics (Part 2)</b>	<ul style="list-style-type: none"> <li>3.1 - Digital Insect Collection Project</li> <li>3.2 - Insect Pet Activity</li> <li>3.3 - Entomology Basics (Part 2) Worksheet</li> <li>3.4 - Entomology Basics (Part 2) Forum</li> </ul>	60 pts 20 pts 10 pts 10 pts
<b>Module 4 – Entomology in Action</b>	<ul style="list-style-type: none"> <li>4.1 - True Insect Collection Project (Optional for letter A course grade)</li> <li>4.2 - Capturing Insects Activity</li> <li>4.3 - Entomology in Action Worksheet</li> <li>4.4 - Entomology in Action Forum</li> </ul>	160 pts  20 pts 10 pts 10 pts
<b>Module 5 – Odonata (Dragonflies &amp; Damselflies)</b>	<ul style="list-style-type: none"> <li>5.1 - Lesson Plan Project</li> <li>5.2 - Current Event Activity</li> <li>5.3 - Order Odonata Worksheet</li> <li>5.4 - Order Odonata Forum</li> </ul>	100 pts 20 pts 10 pts 10 pts
<b>Module 6 – Orthoptera (Grasshoppers, Katydid, &amp; Crickets)</b>	<ul style="list-style-type: none"> <li>6.1 - Entomology Research Paper</li> <li>6.2 - Cricket Thermometer Activity</li> <li>6.3 - Order Orthoptera Worksheet</li> <li>6.4 - Order Orthoptera Forum</li> </ul>	100 pts 20 pts 10 pts 10 pts
<b>Module 7 – Hemiptera (The True Bugs)</b>	<ul style="list-style-type: none"> <li>7.1 - Water Strider Activity</li> <li>7.2 - Order Hemiptera Worksheet</li> <li>7.3 -Order Hemiptera Forum</li> </ul>	20 pts 10 pts 10 pts
<b>Module 8 – Homoptera (Asphids, Cicades, &amp; Hoppers)</b>	<ul style="list-style-type: none"> <li>8.1 - Aphid Ranching Activity</li> <li>8.2 - Order Homoptera Worksheet</li> <li>8.3 - Order Homoptera Forum</li> </ul>	20 pts 10 pts 10 pts

<b>Module 9 –</b> Coleoptera (Beetles)	<ul style="list-style-type: none"> <li>• 9.1 - Beetle Observation Activity</li> <li>• 9.2 - Order Coleoptera Worksheet</li> <li>• 9.3 - Order Coleoptera Forum</li> </ul>	20 pts 10 pts 10 pts
<b>Module 10 –</b> Lepidoptera (Butterflies & Moths)	<ul style="list-style-type: none"> <li>• 10.1 - Metamorphosis Activity</li> <li>• 10.2 - Order Lepidoptera Worksheet</li> <li>• 10.3 - Order Lepidoptera Forum</li> </ul>	20 pts 10 pts 10 pts
<b>Module 11-</b> Diptera (Flies)	<ul style="list-style-type: none"> <li>• 11.1 - See Them Smell Activity</li> <li>• 11.2 - Order Diptera Worksheet</li> <li>• 11.3 - Order Diptera Forum</li> </ul>	20 pts 10 pts 10 pts
<b>Module 12 –</b> Hymenoptera (Ants, Bees, Wasps, & Kin)	<ul style="list-style-type: none"> <li>• 12.1 - Ant Farm Activity</li> <li>• 12.2 - Order Hymenoptera Worksheet</li> <li>• 12.3 Order Hymenoptera Forum</li> </ul>	20 pts 10 pts 10 pts
<b>Course Wrap-up –</b> Grading and Evaluation	<ul style="list-style-type: none"> <li>• Final Reflection Forum</li> <li>• Course Evaluation</li> <li>• Course Completion Checklist</li> <li>• Grade Request / Transcript Request</li> </ul>	
	<b>TOTAL POINTS</b>	<b>1,000 points</b>

## Grading Policies, Rubrics, and Requirements for Assignments

### Grading Policies

- Assignments will be graded per criteria presented in the course rubrics.
- A = 90-100% and B = 80-89%, (anything below 80% will not receive credit.)
- The discernment between an A or a B letter grade is at the discretion of the instructor based on the quality of work submitted (see course rubrics).
- Coursework falling below a B grade will be returned with further instructions.
- All assignments must be completed to receive a grade and are expected to reflect the quality that teacher-training institutions require of professional educators. If completed assignments do not meet this standard, students will be notified with further instructions from the instructor.

### Grading Rubrics

Grade	Percent	Description	Rubric
A	90-100%	Excellent	Meets all course / assignment requirements with significant evidence of subject mastery and demonstration of excellent graduate level professional development scholarship.
B	80-89%	Very Good	Adequately meets criteria for all course/assignment requirements - demonstrates subject competency with very good graduate level professional development scholarship.
NC	Below 80%	Unacceptable	Does not meet the minimum criteria for all course/assignment requirements and demonstrated little, if any, evidence of acceptable graduate level professional development scholarship.

## Writing Requirements

- **Superior:** Writing is clear, succinct, and reflects graduate level expectations. Clearly addresses all parts of the writing task. Maintains a consistent point of view and organizational structure. Includes relevant facts, details, and explanations.
- **Standard:** Writing is acceptable with very few mistakes in grammar and spelling. Addresses most parts of the writing task. Maintains a mostly consistent point of view and organizational structure. Includes mostly relevant facts, details, and explanations.
- **Sub-standard:** Writing contains noticeable mistakes in grammar and spelling. Does not address all parts of the writing task. Lacks a consistent point of view and organizational structure. May include marginally relevant facts, details, and explanations.

## Lesson Plan Requirements

- **Superior:** Instructional goals and objectives clearly stated. Instructional strategies appropriate for learning outcome(s). Method for assessing student learning and evaluating instruction is clearly delineated and authentic. All materials necessary for student and teacher to complete lesson clearly listed.
- **Standard:** Instructional goals and objectives are stated but are not easy to understand. Some instructional strategies are appropriate for learning outcome(s). Method for assessing student learning and evaluating instruction is present. Most materials necessary for student and teacher to complete lesson are listed.
- **Sub-standard:** Instructional goals and objectives are not stated. Learners cannot tell what is expected of them. Instructional strategies are missing or strategies used are inappropriate. Method for assessing student learning and evaluating instruction is missing. Materials necessary for student and teacher to complete lesson are missing.

## Instructor/Student Contact Information

Throughout the course participants will be communicating with the instructor and their classmates on a regular basis using asynchronous discussion forums. Students are provided with instructor contact information in the event they want to make email or phone contact. In addition, students are encouraged to email or phone the instructor at any time. Students will also receive feedback on the required assignments as they are submitted.

## Forums

Participation is an important expectation of this course and all online courses. Online discussions promote reflection and analysis while allowing students to appreciate and evaluate positions that others express. While students may not be engaging with the same students throughout this course, they will be expected to offer comments, questions, and replies to the discussion question whenever possible. The faculty role in the discussion forum is that of an observer and facilitator.

## Coursework Hours

Based on the Carnegie Unit standard, a unit of graduate credit measures academic credit based on the number of hours the student is engaged in learning. This includes all time spent on the course: reading the textbook, watching videos, listening to audio lessons, researching topics, writing papers, creating projects, developing lesson plans, posting to discussion boards, etc. Coursework offered for FPU Continuing Education graduate credit adheres to 45 hours per semester unit for the 900-level courses. Therefore, a student will spend approximately 135 hours on a typical 3-unit course.

## Services for Students with Disabilities

Students with disabilities are eligible for reasonable accommodations in their academic work in all classes. In order to receive assistance, the student with a disability must provide the Academic Support Center with documentation, which describes the specific disability. The documentation must be from a qualified professional in the area of the disability (i.e. psychologist, physician or educational diagnostician). Once documentation is on file, arrangements for reasonable accommodations can be made. For more information and for downloadable forms, please go to <https://www.fresno.edu/departments/disability-access-education>.

## Plagiarism and Academic Honesty

All people participating in the educational process at Fresno Pacific University are expected to pursue honesty and integrity in all aspects of their academic work. Academic dishonesty, including plagiarism, will be handled per the procedures set forth in the Fresno Pacific University Catalogue and Handbook - <https://handbook.fresno.edu/graduate/academic-policies>

## Technology Requirements

To successfully complete the course requirements, course participants will need Internet access, can send and receive email, know how to manage simple files in a word processing program, and have a basic understanding of the Internet. Please remember that the instructor is not able to offer technical support. If you need technical support, please contact your Internet Service Provider.

**Getting Help with Canvas:** If you need help with Canvas, please contact the FPU Help Desk by phone: (559) 453-3410 or email: [helpdesk@fresno.edu](mailto:helpdesk@fresno.edu). Help is available Mon-Fri 8:00 am to 7:00 pm.

## Final Course Grade and Transcripts

When all work for the course has been completed, students will need to logon to the Continuing Education website (<https://ce.fresno.edu/my-account>) and “Request Final Grade”. Once the instructor receives the requests and submits the grade online, students may log back in to view their Final Grade Report or order transcripts online. Please allow at least two weeks for the final grade to be posted. For more information, see the Continuing Education Policies and Procedures at <https://ce.fresno.edu/ce-policies-and-procedures>.

## University Policies and Procedures

Students are responsible for becoming familiar with the information presented in the Academic Catalog and for knowing and observing all policies and procedures related to their participation in the university community. A summary of university policies may be found on the university website at <https://www.fresno.edu/departments/registrars-office/academic-catalogs>.

## Fresno Pacific University Student Learning Outcomes (FPU-SLO)

FPU-SLO 1	<b>Oral Communication:</b> Students will <i>exhibit</i> clear, engaging, and confident oral communication – in both individual and group settings – and will critically <i>evaluate</i> content and delivery components.
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FPU-SLO 2	<b>Written Communication:</b> Students will <i>demonstrate</i> proficient written communication by <i>articulating</i> a clear focus, <i>synthesizing</i> arguments, and utilizing standard formats in order to <i>inform</i> and <i>persuade</i> others.
FPU-SLO 3	<b>Content Knowledge:</b> Students will <i>demonstrate</i> comprehension of content-specific knowledge and the ability to apply it in theoretical, personal, professional, or societal contexts.
FPU-SLO 4	<b>Reflection:</b> Students will <i>reflect</i> on their personal and professional growth and <i>provide evidence</i> of how such reflection is utilized to manage personal and vocational improvement.
FPU-SLO 5	<b>Critical Thinking:</b> Students will <i>apply</i> critical thinking competencies by <i>generating</i> probing questions, <i>recognizing</i> underlying assumptions, <i>interpreting</i> and <i>evaluating</i> relevant information, and <i>applying</i> their understandings to new situations.
FPU-SLO 6	<b>Moral Reasoning:</b> Students will <i>identify</i> and <i>apply</i> moral reasoning and ethical decision-making skills, and <i>articulate</i> the norms and principles underlying a Christian worldview.
FPU-SLO 7	<b>Service:</b> Students will <i>demonstrate</i> service and reconciliation as a way of leadership.
FPU-SLO 8	<b>Cultural and Global Perspective:</b> Students will <i>identify</i> personal, cultural, and global perspectives and will employ these perspectives to <i>evaluate</i> complex systems.
FPU-SLO 9	<b>Quantitative Reasoning:</b> Students will accurately <i>compute</i> calculations and symbolic operations and <i>explain</i> their use in a field of study.
FPU-SLO 10	<b>Information Literacy:</b> Students will <i>identify</i> information needed in order to fully understand a topic or task, <i>explain</i> how that information is organized, <i>identify</i> the best sources of information for a given enquiry, <i>locate</i> and critically <i>evaluate</i> sources, and accurately and effectively <i>share</i> that information.