COURSE SYLLABUS - FOREST ENTOMOLOGY (ENTM OR FNR 441)

GENERAL INFORMATION

Instructor: Dr. Matthew Ginzel
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Office: WSLR 228; Phone: 494-9369
Office hours: TBA
Prerequisites: BIOL 110 & BIOL 111 or BTNY 210

BOOKS AND INSTRUCTIONAL MATERIALS

Laboratory Field Guide:
Borrer, D.J. and White, R.E. (1998) *A Field Guide to Insects: America North of Mexico. 2nd Edition.* Houghton Mifflin Co. Boston.

Supplemental Books and Guides on reserve at the Life Sciences Library:
Berryman, A. (1986) *Forest Insects: Principles and Practice of Population Management.* Plenum Press, New York.
Gullan, P.J. and Cranston, P.S. (2005) *The Insects: An Outline of Entomology*. Blackwell Publishing, Oxford, UK
Leather, S. (2005) *Insect Sampling in Forest Ecosystems.* Blackwell Publishing, Oxford, UK
Solomon, J.D. (1995) *Guide to Insect Borers of North American Broadleaf Trees and Shrubs.* Agric. Handbk. 706. Washington, DC: U.S. Department of Agriculture, Forest Service.

Online support: This course is supported by an on-line resource (Vista Blackboard) that provides a secure and convenient environment for disseminating course material. Students are able to view grades and download class material (*e.g.*, supplemental readings, lab handouts, lecture outlines, links to websites). This site also provides chat rooms and discussions forums where students can post comments or opinions and interact with classmates.

COURSE OBJECTIVES

The goals of this course are broadly classified into understanding the identity, ecology, and management of forest insect pests. Specific objectives are as follows:

1) Understand classification, biology, natural history and diversity of insects affecting forest ecosystems.
2) Identify insects common to forests and recognize their damage.
3) Understand the ecology of forest pests; including host-plant interactions, population dynamics, and natural enemies of forest insects.
4) Appreciate insect sampling in forest ecosystems, with particular attention paid to monitoring, forecasting and assessing the risk of insect outbreaks.
5) Illustrate the importance of silvicultural practices and management of natural enemies in preventing insect outbreaks.
6) Recognize the importance of cultural, physical, biological, and chemical strategies for preventing, controlling and managing forest pests.
7) Foster an appreciation for the significance of research on insect pests of forests.

LECTURE SCHEDULE

WEEK	TOPIC
	GENERAL ENTOMOLOGY
1 (Aug 22)	Introduction; arthropod classification and diversity
2 (Aug 29)	Insect structure and function (external and internal anatomy)
	Growth, development and adaptive features of insects
	INSECT FEEDING GROUPS
3 (Sept 9)	Insect feeding guilds (no class Sept 5–Labor Day
4 (Sept 12)	1st hour exam
	Bark beetles
5 (Sept 19)	Wood borers and invasive species
6 (Sept 26)	Gall makers and defoliating insects
7 (Oct 3)	Fluid-feeding insects
	Bud and shoot; seed and cone pests
8 (Oct 14)	2nd hour exam (no class Oct. 10–Fall Break)
	ECOLOGY
9 (Oct 17)	Insects and trees: diet, defense and coevolution
	Insect population dynamics
10 (Oct 24)	Natural enemies
	MANAGEMENT
	Sampling in a forest ecosystem: surveying and forecasting
11 (Oct 31)	Assessing risk of insect outbreaks
	Outbreak prevention and silviculture (e.g., species composition, planting schedules, thinning, harvesting)
12 (Nov 7)	Controlling insect outbreaks (containment versus suppression)
	3rd hour exam (Nov 11)
13 (Nov 14)	Biological control: natural components, introduced species, enhancement of natural enemies, and biotic insecticides
14 (Nov 21)	Chemical control: insecticides, pheromones, growth regulators, and antifeedants (no class Nov 25–Thanksgiving Vacation)
15 (Nov 28)	Integrated pest management (IPM) of forest pests
	4th hour exam (Dec 2)
16 (Dec 7)	Pheromones and forest pests; biotechnology
Dec 12-17	Final Exam (TBA)

LABORATORY SCHEDULE

WEEK (DATE)	TOPIC
1 (Aug 24)	Orientation and introduction to arthropod diversity: external anatomy
2 (Aug 31)	Field trip: Insect sampling in forest ecosystems and making a collection
3 (Sept 7)	Field trip: collecting and setting traps (e.g., Lindgren funnels, pitfall, tube, malaise traps)
4 (Sept 14)	Field trip: collecting and recovering traps
5 (Sept 21)	Feeding groups: comparative morphology of insect mouthparts and introduce damage caused by insect feeding groups
6 (Sept 28)	Lab Practical 1
	Inner bark boring Insects: bark beetles and buprestids
7 (Oct 5)	Wood Boring Insects: longhorned beetles, ambrosia beetles, cossids, clearwing moths, horntails
8 (Oct 12)	Lab Practical 2
	Gall forming arthropods: *e.g.* wasps (cynipids, sawflies, eurytomids), gall midges, homopterans, mites

9 (Oct 19)	Lab Practical 3 Defoliators: Lepidoptera (*e.g.*, lymantriids, tent caterpillars, webworms, geometrids, and notodontids), Coleoptera (leaf beetles, leaf miners and scarabs), Diptera (agromyzids), grasshoppers, walkingsticks, and thrips
10 (Oct 26)	Lab Practical 4 Fluid feeders: Aphids, scale insects, spittlebugs, leafhoppers, cicadas, and mites
11 (Nov 2)	Bud and shoot feeders: weevils, shoot moths, and bark beetles Seed and cone feeders: bark beetles, weevils, seed moths and others
12 (Nov 9)	Lab Practical 5 Parasites and Predators
13 (Nov 16)	Invasive species
14 (Nov 23)	No lab – Thanksgiving Vacation
15 (Nov 30)	Lab Practical 6 Oral presentations
16 (Dec 7)	Oral presentations

EXAMS

There will be four exams given throughout the semester. Each of these exams will be completed during a single lecture period. Exams are based primarily on lecture material, but you will be held responsible for content of assigned supplementary readings. There will be no make-up exams available. You will be able to drop your lowest score on the hour exams and only the three highest scores on hour exams will count toward your final grade. If you miss an exam, for any reason, that will be the one that does not count. The cumulative final exam is mandatory and your grade on the final exam cannot be dropped.

DISCUSSIONS OF THE PRIMARY LITERATURE

As a group, we will discuss current and/or seminal papers from the primary literature that relate to and supplement topics covered in lecture. The article will be provided to you one week prior to the discussion, and each student will be responsible for leading one discussion session. Discussions will take place during the laboratory sessions of weeks 7-13. Each week you will be required to turn in a half-page written critique of the paper along with at least three questions relating to the study. Further explanation of the grading and format of these discussions will provided.

LAB QUIZZES

There will be six short practical quizzes throughout the semester given during laboratory sessions. These tests will take about 15 minutes to complete and evaluate your ability to identify common insect pests of forests and their associated damage.

SHORT RESEARCH PAPER

You will be required to write a short research paper (3-5 pages, 12 pt., single spaced) describing the biology of an insect forest pest. This paper should include natural history of the insect along with a rational management plan. This paper must include at least 6 references, including three "research papers", *i.e.*, papers from the primary literature rather than books, book chapters, or review papers. Your topic must be approved by me no later than the end of lab on week 9. Papers are due at the beginning of lab on week 15.

ORAL PRESENTATION

Each student will give a 10-12 minute oral presentation describing his or her short research paper. These PowerPoint presentations will be given during laboratory sessions, beginning on week 15 and continuing until the end of the semester.

COLLECTION

You will be required to make a collection consisting of specimens of at least 8 orders and 25 major families of forest pests or natural enemies (e.g., predators and parasitoids), collected by you alone during the current semester. Acquiring specimens by any means other than collecting them yourself is considered cheating. A collection will not only provide you an opportunity to collect and preserve insect specimens, but also hone your skills at identifying forest insects. Your collection is due at the beginning of lab on week 16 and late collections will not be accepted.

You will probably find it quite difficult to collect flying insects as the weather turns colder, so begin working on your collection immediately. Several field trips will be conducted early in the semester to increase your contact with suitable habitats, and techniques of insect identification and labeling will be covered in lab.

Grades on the collection will be determined as follows:

	Points
8 Orders (10 points each)	80
25 Families (4 points each)	100
Curation (presentation and proper labeling)	20
TOTAL	200

A maximum of 30 extra credit points can be earned by collecting additional specimens. Additional orders will earn you 5 points and additional families are worth 2 points.

GRADING

Your final grade will be based on exams, lab quizzes, a written and oral presentation and an insect collection as follows:

Component	Points
LECTURE	
Exam (3 at 100 pts each)	300
Final	150
Participation in paper discussion	50
LAB	
Quizzes (6 at 25 pts each)	150
Research paper	100
Oral presentation	50
Collection	200
TOTAL	1000

At the end of the semester, all points will be added together and grades will be assigned based on the following scale

Grade	Points	Percent
A	1000-900	100-90
B	899-800	89-80
C	799-700	79-70
D	699-600	69-60
F	<599	<59

ATTENDANCE

Your presence in class and lab is required. This course is structured to provide opportunities for hands-on and active learning, and you cannot effectively assimilate this material unless you are present. It is your responsibility to notify me if unavoidable circumstances prevent you from attending class or being punctual. Students missing more than three classes or labs

will receive a reduction of ten percentage points (one letter grade) in their final grade. However, in the event of a major campus emergency (e.g., pandemic), course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances.

ACADEMIC INTEGRITY

Cheating and/or plagiarism, in any form, will NOT be tolerated. There is a statement on academic integrity in the University Regulations, Part 5, Section III and I expect you to fully comply with those guidelines. I take cheating and plagiarism very seriously and encourage you to embrace the highest standards of scientific and academic integrity. Additional information concerning academic integrity may be found in the online brochure, *Academic Integrity: A Guide for Students* from the Dean of Students office (http://www.purdue.edu/ODOS/osrr/integrity.htm). Copies of this brochure are also available through the Office of Student Rights and Responsibilities at no cost, (765) 494-1250

STUDENTS WITH DISABILITIES

Both in compliance with and in the spirit of the Americans with Disabilities Act (ADA), the instructor will work with each student with a disability that impacts their participation in this class and its activities. Students with a Dean of Students-documented disability should contact the instructor within the first three weeks of class to discuss accommodations.