

ENTOMOLOGY (ENTOM)

ENTOM/AGROECOL/C&E SOC/ENVIR ST 103 – AGROECOLOGY: AN INTRODUCTION TO THE ECOLOGY OF FOOD AND AGRICULTURE

3 credits.

Agroecology has blossomed across the world in recent decades as not only a science, but also a practice, and a movement. Employ the multiple disciplines and perspectives that Agroecology affords to analyze our agricultural and food systems within a broader context of dynamic social and ecological relationships.

Requisites: None

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Explain and analyze basic biophysical processes of agricultural ecosystems and the challenges and benefits of various management systems

Audience: Undergraduate

2. Interrogate social, economic, and political structures underlying agriculture at local, regional, national, and global scales

Audience: Undergraduate

3. Describe how they personally connect to local to global agricultural landscape as humans, ecological actors, food and fuel consumers, and thoughtful citizens

Audience: Undergraduate

ENTOM/ENVIR ST 201 – INSECTS AND HUMAN CULTURE-A SURVEY COURSE IN ENTOMOLOGY

3 credits.

Importance of insects in the environment, emphasizing beneficial insects, disease carriers, and agricultural pests that interfere with the food supply. Environmental problems due to insect control agents.

Requisites: None

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Identify and summarize biological concepts through knowledge of insects.

Audience: Undergraduate

2. Integrate knowledge of human culture and international issues with entomological science.

Audience: Undergraduate

3. Analyze biological/cultural concepts and compose creative, well-composed arguments.

Audience: Undergraduate

4. Demonstrate critical thinking and comparative perspectives about biological science/cultural issues by reviewing and discussing evidence-based research.

Audience: Undergraduate

ENTOM/NUTR SCI 203 – INTRODUCTION TO GLOBAL HEALTH

3 credits.

Introduces students to global health concepts through multidisciplinary speakers dedicated to improving health through their unique training. It targets students with an interest in public health and those who wish to learn how their field impacts their global issues.

Requisites: None

Course Designation: Breadth - Social Science

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Define global health and identify major global health trends and metrics

Audience: Undergraduate

2. Recognize the “determinants of health” that contribute to health disparities/inequities

Audience: Undergraduate

3. Examine global health through the lens of agriculture, food, and nutrition

Audience: Undergraduate

4. Describe the role of ecology and the changing environment in global health

Audience: Undergraduate

5. Explain the importance of collaborative and interdisciplinary approaches in global health

Audience: Undergraduate

6. Discuss a variety of global health careers and areas of specialty through guest speakers and connections with their area of interest

Audience: Undergraduate

ENTOM/ENVIR ST 205 – OUR PLANET, OUR HEALTH

3 credits.

An introduction to the multiple determinants of health, global disease burden and disparities, foundational global health principles, and the overlap between ecosystem stability, planetary boundaries, and human health. Explore the core fundamentals of global health scholarship, including but not limited to infectious disease, sanitation, and mental health, and also consider ecological perspectives on these issues through the lens of planetary boundaries. Attention is placed on how human-mediated global change (e.g. climate change, biodiversity loss, land-use patterns, geochemical cycling, agricultural practice) impacts human health and the ecosystem services we depend on. An overview of pertinent issues in sustainability science and planetary health discourse, including the 'Anthropocene' and resilience to understand and critically assess global trends.

Requisites: None

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Use a local to global perspective to assess the historical, current and future trends in human health and well-being

Audience: Undergraduate

2. Describe the use of planetary boundaries to measure Earth system sustainability and the potential impacts of instability in these systems on global health and human well being

Audience: Undergraduate

3. Describe current primary global health challenges, their distribution, and prevention strategies

Audience: Undergraduate

4. Analyze global health disparities through a social justice and human rights lens

Audience: Undergraduate

5. Demonstrate a basic understanding of contemporary issues, problems, and controversies in global health through an interdisciplinary perspective that recognizes the complex relationships between social, economic, political, and environmental systems.

Audience: Undergraduate

6. Analyze ecological perspectives on the connections among human health and well being, animal health, and ecosystem health

Audience: Undergraduate

7. Assess and reflect on the successes and failures of global health interventions and become familiar with current events and current literature that describes these efforts

Audience: Undergraduate

8. Reflect on personal goals, objectives, and role as a global citizen and future professional or researcher

Audience: Undergraduate

ENTOM 289 – HONORS INDEPENDENT STUDY

1-2 credits.

Research work for Honors students under direct guidance of a faculty member in an area of Entomology. Students are responsible for arranging the work and credits with the supervising instructor.

Requisites: Consent of instructor

Course Designation: Honors - Honors Only Courses (H)

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2005

Learning Outcomes: 1. Develop critical, analytical, and independent thinking skills.

Audience: Undergraduate

2. Apply the scientific method and engage in constructive problem solving.

Audience: Undergraduate

3. Demonstrate application of research skills and methodologies.

Audience: Undergraduate

4. Effectively communicate findings.

Audience: Undergraduate

ENTOM 299 – INDEPENDENT STUDY

1-3 credits.

Research work for students under direct guidance of a faculty member in an area of Entomology. Students are responsible for arranging the work and credits with the supervising instructor.

Requisites: Consent of instructor

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2026

Learning Outcomes: 1. Develop critical, analytical, and independent thinking skills.

Audience: Undergraduate

2. Apply the scientific method and engage in constructive problem solving.

Audience: Undergraduate

3. Demonstrate application of research skills and methodologies.

Audience: Undergraduate

4. Effectively communicate findings.

Audience: Undergraduate

ENTOM/ZOOLOGY 302 – INTRODUCTION TO ENTOMOLOGY

4 credits.

Principles including morphology and classification.

Requisites: ZOOLOGY/BIOLOGY 101, ZOOLOGY/BIOLOGY/BOTANY 151, ZOOLOGY 153, or BIOCORE 381

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Identify and describe the external and internal anatomical structures of insects, including specialized mouthparts, wing structures, and leg adaptations.

Audience: Undergraduate

2. Classify insects into their respective orders and families using taxonomic keys, and describe the hierarchical levels of classification within the Phylum Arthropoda.

Audience: Undergraduate

3. Differentiate between the types of metamorphosis (e.g., holometabolous, hemimetabolous) and discuss the selective advantages of each developmental pathway.

Audience: Undergraduate

4. Explain the ecological roles of insects, their trophic interactions, and their significance in various ecosystems, including their economic impact on agriculture and human health.

Audience: Undergraduate

5. Collect, preserve, and accurately identify insect specimens, demonstrating proficiency in using entomological tools and techniques.

Audience: Undergraduate

6. Describe the physiological processes of insects, including digestion, circulation, and respiration, and compare these processes to those of other organisms.

Audience: Undergraduate

7. Discuss the evolutionary significance of insects, including concepts of mimicry, adaptation, and the evolutionary relationships among different insect groups.

Audience: Undergraduate

ENTOM 321 – PHYSIOLOGY OF INSECTS

3 credits.

Anatomy, histology and basic physiology of organ systems in insects.

Requisites: ZOOLOGY/ENTOM 302 or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2021

Learning Outcomes: 1. Identify and describe the anatomical structures and histological features of various insect organ systems, including the digestive, respiratory, circulatory, and nervous systems.

Audience: Both Grad & Undergrad

2. Explain the basic physiological processes in insects, such as digestion, respiration, circulation, and excretion, and how these processes are adapted to their environments.

Audience: Both Grad & Undergrad

3. Analyze the functions of different insect organ systems and understand how these systems interact to maintain homeostasis and support insect life.

Audience: Both Grad & Undergrad

4. Compare and contrast the physiological mechanisms in insects with those in vertebrates, highlighting the unique adaptations and evolutionary significance of insect physiology.

Audience: Both Grad & Undergrad

5. Interpret experimental data and apply findings to broader biological and ecological contexts.

Audience: Graduate

ENTOM 331 – TAXONOMY OF MATURE INSECTS

4 credits.

Principles of taxonomy, identification and taxonomic morphology of adult insects.

Requisites: ZOOLOGY/ENTOM 302 or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Explain the fundamental principles of taxonomy, including the rules of nomenclature, classification systems, and the importance of taxonomic hierarchy in biological sciences.

Audience: Both Grad & Undergrad

2. Identify adult insects to the order, family, and genus levels using taxonomic keys and diagnostic morphological features.

Audience: Both Grad & Undergrad

3. Describe the key morphological characteristics used in the taxonomy of adult insects, including structures such as wings, antennae, mouthparts, and reproductive organs.

Audience: Both Grad & Undergrad

4. Apply various taxonomic methods and techniques, such as specimen collection, preservation, and preparation, to conduct taxonomic studies and create insect collections.

Audience: Both Grad & Undergrad

5. Analyze and interpret the taxonomic relationships among different insect groups, understanding their evolutionary relationships and the significance of morphological variations.

Audience: Both Grad & Undergrad

6. Apply advanced taxonomic principles and methodologies to identify and classify adult insects.

Audience: Graduate

ENTOM 344 – FROM FLOWERS TO FOOD: POLLINATOR ECOLOGY AND CONSERVATION

3 credits.

Explores the vital roles that pollinators play in ecosystems and agriculture. Dives into the biology, diversity, and ecology of pollinators, examining plant-pollinator interactions, co-evolution, and pollinator foraging behaviors. Examines pollinator decline and the stressors that affect pollinators, such as climate change, land-use changes, pesticides, and pathogens, as well as conservation strategies. Offers opportunities to directly observe pollinators and apply pollinator ecology.

Requisites: (ZOOLOGY/BIOLOGY 101 and 102), BOTANY/BIOLOGY 130, (ZOOLOGY/BIOLOGY/BOTANY 151 and 152), or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Learning Outcomes: 1. Describe the breadth of animal pollinator taxa and the role of pollinators in both natural and agricultural systems

Audience: Both Grad & Undergrad

2. Explain basic concepts of pollination ecology and apply these concepts to real-world phenomena in ecosystems

Audience: Both Grad & Undergrad

3. Evaluate factors affecting pollinator populations and compare their consequences on pollinator decline

Audience: Both Grad & Undergrad

4. Analyze, interpret and critique scientific literature

Audience: Both Grad & Undergrad

5. Create an educational piece to teach pollinator ecology concepts to peers

Audience: Both Grad & Undergrad

6. Communicate scientific concepts related to pollinator ecology and conservation in written and oral formats

Audience: Both Grad & Undergrad

7. Develop a research proposal related to pollinator ecology

Audience: Graduate

ENTOM/M M & I/PATH-BIO/ZOOLOGY 350 – PARASITOLOGY

3 credits.

The biology of water-borne, food-borne, soil-borne and vector-borne parasites of animals including humans. Parasites are explored in the context of transmission, associated disease, diagnosis and treatment options, and environmental, cultural and socioeconomic drivers of disease epidemiology.

Requisites: ZOOLOGY/BIOLOGY 101 and 102, or ZOOLOGY/BIOLOGY/BOTANY 152 or ZOOLOGY 153, or BIOCORE 381

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Be conversant in terminology used in the field of Parasitology.

Audience: Undergraduate

2. Recall scientific and common names for parasites and hosts, and the name of the resulting disease in humans or animals.

Audience: Undergraduate

3. Attribute parasite behavior and characteristics to specific disease features in the host.

Audience: Undergraduate

4. Identify appropriate means to diagnose infections with parasites.

Audience: Undergraduate

5. Describe and identify factors that determine when, where, and why parasitic diseases exist.

Audience: Undergraduate

6. Integrate terminology, scientific nomenclature, diagnostic features and demographics to solve case studies where the parasitic culprit is unknown.

Audience: Undergraduate

7. Compare and contrast commonalities in parasite life cycles to demonstrate how flexibility in those life cycles has resulted in many different potential means of transmission.

Audience: Undergraduate

8. Deconstruct the impact of parasitic diseases on human and animal health, from disease symptoms and pathology in an individual, to socioeconomics in communities and countries.

Audience: Undergraduate

9. Identify reliable resources (primarily internet-based) available for researching the biology and epidemiology parasitic diseases.

Audience: Undergraduate

ENTOM 351 – PRINCIPLES OF ECONOMIC ENTOMOLOGY

3 credits.

Major economic insects: identification, life histories, bionomics, distribution, control; procedures in fundamental and practical inquiry.

Requisites: ZOOLOGY/BIOLOGY 101, ZOOLOGY/BIOLOGY/BOTANY 151, BIOCORE 381, ZOOLOGY 153, or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Identify major insect groups and understand their structures and functions.

Audience: Both Grad & Undergrad

2. Explain the ecological roles of insects and the factors that contribute to them becoming pests.

Audience: Both Grad & Undergrad

3. Describe the principles and evaluate various pest management strategies, including chemical and non-chemical control methods.

Audience: Both Grad & Undergrad

4. Critically evaluate information sources and research articles.

Audience: Both Grad & Undergrad

5. Conduct research on specific pest insects and their population dynamics and critically develop a detailed pest profile.

Audience: Both Grad & Undergrad

6. Synthesize primary scientific literature related to economic entomology and apply this knowledge to develop advanced pest management strategies and evaluate the ecological and economic impacts of pest insects.

Audience: Graduate

ENTOM/ZOOLOGY 371 – MEDICAL ENTOMOLOGY: BIOLOGY OF VECTOR AND VECTOR-BORNE DISEASES

3-4 credits.

Explore the biological and molecular adaptations of parasitic arthropods that allow them to feed on vertebrate host and facilitate the transmission of vector-borne pathogens. Examines how anthropogenic activities, behaviors, and effects on climate affect the biology of vectors, the pathogens they transmit, and the emergence of vector-borne epidemics in the world. Emphasis on the molecular and physiological interaction between pathogens, their vector, and the vertebrate host and the fundamentals on how vectors and vector-borne pathogens cause disease in humans. Evaluate real control programs deployed globally for the control of vector-borne diseases.

Requisites: ZOOLOGY/BIOLOGY 101, ZOOLOGY/BIOLOGY/BOTANY 151, BIOCORE 383, ZOOLOGY 153, or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Identify vector-borne pathogens of public health importance and their respective vectors.

Audience: Both Grad & Undergrad

2. Distinguish how biological and physiological adaptations facilitate the relationship between vectors and particular pathogens.

Audience: Both Grad & Undergrad

3. Apply information on disease epidemiology, vector ecology, vector distribution, and disease manifestation to solve hypothetical scenarios of vector-borne disease transmission.

Audience: Both Grad & Undergrad

4. Discuss current issues delaying the development of diagnostics, prevention, treatment, and control of vector-borne diseases.

Audience: Both Grad & Undergrad

5. Evaluate vector control programs currently deployed internationally based on knowledge of vector biology.

Audience: Both Grad & Undergrad

6. Design project proposals to study different aspects of vector physiology, biology, ecology, and pathogen-vector interactions.

Audience: Graduate

ENTOM 375 – SPECIAL TOPICS

1-4 credits.

Specialized subject matter of current interest to undergraduate students.

Requisites: None

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2026

ENTOM 399 – COORDINATIVE INTERNSHIP/COOPERATIVE EDUCATION

1-8 credits.

An internship under guidance of a faculty or instructional academic staff member in Entomology and internship site supervisor. Students are responsible for arranging the work and credits with the faculty or instructional academic staff member and the internship site supervisor.

Requisites: Consent of instructor**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: Yes, unlimited number of completions**Last Taught:** Summer 2017**Learning Outcomes:** 1. Apply concepts learned in coursework to authentic professional situations.

Audience: Undergraduate

2. Demonstrate professional skills appropriate for the industry.

Audience: Undergraduate

3. Identify and reflect on how concepts learned in coursework apply to specific work settings and situations.

Audience: Undergraduate

ENTOM 400 – STUDY ABROAD IN ENTOMOLOGY

1-6 credits.

Provides an area equivalency for courses taken on Madison Study Abroad Programs that do not equate to existing UW courses. Current enrollment in a UW-Madison study abroad program

Requisites: None**Repeatable for Credit:** Yes, unlimited number of completions**ENTOM 432 – TAXONOMY AND BIONOMICS OF IMMATURE INSECTS**

4 credits.

Covers anatomy/morphology, taxonomy, and bionomics of immature insects (ordinal and familial levels). Identification of insects (order and family) using taxonomic keys.

Requisites: ZOOLOGY/ENTOM 302 or graduate/professional standing**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No**Last Taught:** Spring 2025**Learning Outcomes:** 1. Identify and describe the anatomical and morphological characteristics of immature insects, including key structures and their functions.

Audience: Both Grad & Undergrad

2. Classify immature insects to the order and family levels using taxonomic keys, understanding the hierarchical levels of classification and the distinguishing features of each group.

Audience: Both Grad & Undergrad

3. Explain the bionomics of immature insects, including their life cycles, developmental stages, ecological roles, and interactions with their environments.

Audience: Both Grad & Undergrad

4. Apply various taxonomic methods and techniques to identify and classify immature insects, demonstrating proficiency in using taxonomic keys and other identification tools.

Audience: Both Grad & Undergrad

5. Synthesize current research findings to enhance their understanding of anatomical and morphological characteristics, taxonomic classification, and ecological roles of immature insects.

Audience: Graduate

ENTOM 450 – BASIC AND APPLIED INSECT ECOLOGY

3 credits.

Covers population and community ecology, plant-insect interactions, insect biodiversity and biogeography, and applied ecology. Weaves basic ecological theory and principles with their application to entomological problems such as conservation, biological control, agriculture, and insect-vector diseases of plants and humans. Uses current entomological and ecological scientific literature and draws on examples from a broad range of natural and managed ecosystems. Broadens from pairwise species interactions (e.g., a predator and its prey) to the entire community of organisms and their physical environment. Emphasizes the theoretical principles and historical background underlying the various topics with a link to potential applications in agriculture, conservation, pest management, and/or invasion biology.

Requisites: ZOOLOGY/BIOLOGY 101, ZOOLOGY/BIOLOGY/BOTANY 152, BIOCORE 381, or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Outline and explain basic ecological concepts and principles at the physiological, population, community and ecosystem levels as they pertain to insects.

Audience: Both Grad & Undergrad

2. Describe the mechanisms mediating interactions of insects with their biotic and abiotic environments.

Audience: Both Grad & Undergrad

3. Articulate the importance of insects as selective, stabilizing and potentially disruptive components of ecosystems.

Audience: Both Grad & Undergrad

4. Apply basic ecological theory to explain real-world entomological problems.

Audience: Both Grad & Undergrad

5. Communicate the significance of ecological research based on the primary literature.

Audience: Both Grad & Undergrad

6. Connect insect ecology with real-world problems as they affect people.

Audience: Both Grad & Undergrad

7. Communicate complex scientific concepts to a broader audience, integrating current research findings and contributing to the public understanding of insect ecology.

Audience: Graduate

ENTOM 468 – STUDIES IN FIELD ENTOMOLOGY

3 credits.

Concentration on structural, behavioral adaptations of insects to diverse habitats; dynamic relations between insects and plants, other animals and other insects.

Requisites: ZOOLOGY/ENTOM 302

Repeatable for Credit: No

Last Taught: Summer 2025

Learning Outcomes: 1. Analyze the structural and behavioral adaptations of insects that enable them to thrive in diverse habitats, understanding the evolutionary significance of these adaptations.

Audience: Undergraduate

2. Examine the dynamic relationships between insects and plants, including pollination, herbivory, and mutualistic interactions, and assess the ecological and evolutionary implications of these interactions.

Audience: Undergraduate

3. Investigate the interactions between insects and other animals, including predation, parasitism, and competition, and describe how these interactions influence insect behavior, population dynamics, and community structure.

Audience: Undergraduate

ENTOM/BOTANY/ZOOLOGY 473 – PLANT-INSECT INTERACTIONS

3 credits.

Multiple ways in which arthropods exploit plants, plant traits that deter or augment insects, environmental mediation of these interactions, effects on population dynamics, community ecology and co-evolution, and implications to natural resource management, environmental quality, and sustainable development.

Requisites: F&W ECOL/BOTANY/ZOOLOGY 460, FW ECOL 500, ENTOM/BOTANY/PL PATH 505, or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Identify the fundamental mechanisms mediating interactions of plants and insects.

Audience: Both Grad & Undergrad

2. Describe the implications of plant and insect interactions for population, community, and ecosystem ecology.

Audience: Both Grad & Undergrad

3. Discuss the implications of plant and insect interactions for natural resource management and sustainable ecosystems.

Audience: Both Grad & Undergrad

4. Communicate relevant and current scientific literature to peers.

Audience: Both Grad & Undergrad

5. Synthesize current research findings in plant and insect interactions and apply this knowledge to evaluate implications of plant-insect co-evolution.

Audience: Graduate

ENTOM 490 – BIODIVERSITY AND GLOBAL CHANGE

3 credits.

Explores the impact of global environmental change on biodiversity and the subsequent consequences for ecosystem function and human well-being. Examines species response to these environmental changes, such as migration, adaptation, and extinction, and the implications for the delivery of ecosystem services and planetary health. Applies ecological principles to identify and evaluate practical solutions to pressing environmental challenges.

Requisites: (BIOLOGY/ZOOLOGY 101, BOTANY/BIOLOGY/ZOOLOGY 151, BOTANY/BIOLOGY 130, ZOOLOGY 153, BIOCORE 381, GEOSCI/ATM OCN/ENVIR ST 102, ILS/ENVIR ST 126, GEOG/ENVIR ST 120, 127, or 139) and (MATH 112, 114, 171, or placement into MATH 221) or grad/prof standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Identify key aspects of climate change and other human-driven environmental changes across the globe in the Anthropocene

Audience: Both Grad & Undergrad

2. Evaluate the impacts of these changes on biological systems across scales of organization, including individual organisms, populations, communities, and ecosystems

Audience: Both Grad & Undergrad

3. Explain the importance of feedbacks, interactions, non-linear responses, and irreversible changes in driving ecosystem responses to global change

Audience: Both Grad & Undergrad

4. Compare and contrast the values and services provided by biological diversity

Audience: Both Grad & Undergrad

5. Evaluate the role of biodiversity in mitigating or exacerbating the impacts of global environmental change, and in supporting human health and wellbeing

Audience: Both Grad & Undergrad

6. Critically interpret data and results from primary literature and apply this interpretation to supporting scientific arguments

Audience: Both Grad & Undergrad

7. Synthesize and critically evaluate scientific claims and hypotheses in global change biology using quantitative data analysis

Audience: Graduate

ENTOM/BOTANY/PL PATH 505 – PLANT-MICROBE INTERACTIONS: MOLECULAR AND ECOLOGICAL ASPECTS

3 credits.

Molecular and ecological aspects of the interactions between plants and microorganisms. Explores many of the themes, from genetic to integrative, of modern biology, and illustrates how study of plant-microbe interactions contributes to understanding of fundamental plant science.

Requisites: MICROBIO 303, GENETICS 466, 468, BIOCHEM 501, 508, or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Assess research papers from the peer-reviewed science literature by critically reading.

Audience: Both Grad & Undergrad

2. Discuss our current understanding of molecular plant-microbe interactions.

Audience: Both Grad & Undergrad

3. Present ideas at a professional level, in both oral and written form.

Audience: Both Grad & Undergrad

4. Facilitate an in-depth discussion about the complex relationships between plants and microbes.

Audience: Graduate

ENTOM/ZOOLOGY 540 – THEORETICAL ECOLOGY

3 credits.

Introduction to theoretical ecology, including hands-on experience in computer modeling.

Requisites: STAT/F&W ECOL 571

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Describe the purpose and the use of analytical statistical models.

Audience: Both Grad & Undergrad

2. Apply appropriate statistical methods to analyze complex ecological data.

Audience: Both Grad & Undergrad

3. Use the statistical tools available in the R programming language to analyze the type of data that derives from their graduate research.

Audience: Graduate

ENTOM 570 – SYSTEMS THINKING IN GLOBAL HEALTH

3 credits.

A systems approach to examination of the multiple determinants of health and well-being. Case studies and group projects explore complex issues including, but not limited to, the root causes of infectious and noncommunicable disease, health inequities in the context of global change, and trade-offs in addressing global and planetary health problems, particularly where information is incomplete, projections about future states are uncertain, or social equity concerns must be taken into account as scientific knowledge is applied. Group projects emphasize systems thinking to critically assess global issues. Teamwork and communication skills are required for case study analysis and project management.

Requisites: ENVIR ST/ENTOM 205

Course Designation: Breadth - Social Science

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Analyze place-based case studies to understand the complex relationships and connections between human health and the preservation and restoration of our environment. Analysis will link to global and planetary health precepts.

Audience: Undergraduate

2. Work within groups to identify and describe complex problems from different and multiple disciplinary perspectives.

Audience: Undergraduate

3. Identify and practice methods for designing interventions and making decisions that are informed by systems thinking, understanding of complexity and uncertainty, and planetary health principles.

Audience: Undergraduate

4. Work in groups to develop reports and presentations that apply a systems thinking lens to questions related to human health and well-being from multiple perspectives.

Audience: Undergraduate

5. Communicate about working strategy/directions, and find and share reliable and appropriate information for the audience indicated (specialists, members of the public, children, etc.)

Audience: Undergraduate

6. Reflect on and specify personal goals, values, and ethics as a global (and local) citizen and future professional or researcher, describe how your thinking has evolved over time in your study of global and planetary health.

Audience: Undergraduate

ENTOM/GENETICS/ZOOLOGY 624 – MOLECULAR ECOLOGY

3 credits.

Basic principles of molecular ecology. Lecture topics include population genetics, molecular phylogenetics, rates and patterns of evolution, genome evolution, and molecular ecology.

Requisites: GENETICS 466, 467, BIOCORE 383, or graduate student standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Identify and describe common molecular genetic techniques.

Audience: Both Grad & Undergrad

2. Demonstrate knowledge about the significance of genetic diversity in species biology.

Audience: Both Grad & Undergrad

3. Differentiate how ecological and evolutionary processes shape genetic variation.

Audience: Both Grad & Undergrad

4. Analyze genetic data and communicate the results.

Audience: Both Grad & Undergrad

5. Evaluate whether genetic data are appropriate for answering scientific questions.

Audience: Both Grad & Undergrad

6. Summarize and critique the primary literature in the field of Molecular Ecology.

Audience: Graduate

ENTOM 681 – SENIOR HONORS THESIS

2-4 credits.

Individual study for undergraduate students in an Honors program completing a thesis in the area of Entomology, as arranged with a faculty member.

Requisites: Consent of instructor

Course Designation: Honors - Honors Only Courses (H)

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Review and analyze scientific literature.

Audience: Undergraduate

2. Identify and use appropriate research methodologies to address a research question.

Audience: Undergraduate

3. Begin structuring and writing a thesis based on original research.

Audience: Undergraduate

ENTOM 682 – SENIOR HONORS THESIS

2-4 credits.

Second semester of individual study for undergraduate students in an Honors program completing a thesis in the area of Entomology, as arranged with a faculty member. ENTOM 681

Requisites: Consent of instructor

Course Designation: Honors - Honors Only Courses (H)

Repeatable for Credit: No

Last Taught: Spring 2023

Learning Outcomes: 1. Review and analyze scientific literature.

Audience: Undergraduate

2. Identify and use appropriate research methodologies to address a research question.

Audience: Undergraduate

3. Write a thesis based on original research.

Audience: Undergraduate

ENTOM 691 – SENIOR THESIS

2 credits.

Individual study for undergraduate students completing a thesis in the area of Entomology, as arranged with a faculty member.

Requisites: Consent of instructor

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Review and analyze scientific literature.

Audience: Undergraduate

2. Identify and use appropriate research methodologies to address a research question.

Audience: Undergraduate

3. Write a thesis based on original research.

Audience: Undergraduate

ENTOM 692 – SENIOR THESIS

1-3 credits.

Individual study for undergraduate students completing a thesis in the area of Entomology, as arranged with a faculty member.

Requisites: Consent of instructor

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Investigate a topic in conjunction with other investigators to develop a deep understanding of a research problem

Audience: Undergraduate

2. Identify a research problem and develop a set of testable hypotheses

Audience: Undergraduate

3. Carry out analysis of data related to the testable hypotheses

Audience: Undergraduate

4. Communicate the results of investigations via written and/or oral means to an appropriate audience

Audience: Undergraduate

5. Write an honors thesis that contains an abstract, background, a demonstration of research skills, analysis of the research question, and a summary of the impact of the work

Audience: Undergraduate

ENTOM 699 – SPECIAL PROBLEMS

1-4 credits.

Individual advanced work in an area of Entomology under the direct guidance of a faculty member.

Requisites: Consent of instructor

Course Designation: Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Fall 2025

Learning Outcomes: 1. Develop critical, analytical, and independent thinking skills.

Audience: Undergraduate

2. Apply the scientific method and engage in constructive problem solving.

Audience: Undergraduate

3. Demonstrate application of research skills and methodologies.

Audience: Undergraduate

4. Effectively communicate findings.

Audience: Undergraduate

ENTOM 701 – ADVANCED TAXONOMY

3 credits.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Fall 2024

Learning Outcomes: 1. Identify and describe the anatomical and morphological characteristics of insects, including key structures and their functions.

Audience: Graduate

2. Classify insects using taxonomic keys, understanding the hierarchical levels of classification and the distinguishing features of each group.

Audience: Graduate

3. Explain the bionomics of insects, including their life cycles, developmental stages, ecological roles, and interactions with their environments.

Audience: Graduate

4. Apply taxonomic methods and techniques to identify and classify insects, demonstrating proficiency in using taxonomic keys and other identification tools.

Audience: Graduate

ENTOM/F&W ECOL 711 – MULTIVARIATE ANALYSIS OF ECOLOGICAL AND COMMUNITY DATA

2 credits.

Examines common methods of multivariate data analysis in ecology and environmental science. Covers methods for the analysis of complex, multidimensional datasets that are collected in the study of plant, invertebrate, fish, and bird communities. Addresses the concurrent analysis of the environmental factors that may drive community distributions. Provides the basis for predictive modeling of distributions across landscapes. General methods covered include ordination (PCA, DCA, NMDS, CCA), clustering (or classification), and other comparative analyses of data matrices (ANOSIM, Mantel tests). Includes an applied, "hands-on" approach on how to use these tools, and the circumstances under which their uses are either appropriate or inappropriate.

Requisites: Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2026

Learning Outcomes: 1. Apply common multivariate analysis techniques, such as ordination (PCA, DCA, NMDS, CCA) and clustering, to analyze complex, multidimensional datasets in ecology and environmental science.
Audience: Graduate

2. Interpret the results of multivariate analyses, understanding the ecological and environmental factors that drive community distributions and the relationships among different species and environmental variables.
Audience: Graduate

3. Develop predictive models of species distributions across landscapes using multivariate analysis methods, and evaluate the accuracy and reliability of these models.
Audience: Graduate

4. Conduct comparative analyses of data matrices using methods such as ANOSIM and Mantel tests, and understand the appropriate contexts for their application.
Audience: Graduate

5. Implement hands-on analytical approaches to multivariate data analysis, gaining practical experience with software tools and techniques, and understanding the circumstances under which different methods are appropriate or inappropriate.
Audience: Graduate

ENTOM 799 – PRACTICUM IN ENTOMOLOGY TEACHING

1-3 credits.

Instructional orientation to teaching at the higher education level in the agricultural life sciences, direct teaching experience under faculty supervision, experience in testing and evaluation of students, and the analysis of teaching performance.

Requisites: Consent of instructor**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2025

Learning Outcomes: 1. Communicate knowledge of entomology to a general audience.
Audience: Graduate

Audience: Graduate

2. Prepare appropriate plans for classroom instruction and/or activities.
Audience: Graduate

3. Facilitate classroom discussions.
Audience: Graduate

Audience: Graduate

4. Monitor student performance through assessment.
Audience: Graduate

Audience: Graduate

5. Evaluate personal strengths and areas of growth in biological sciences instruction.
Audience: Graduate

Audience: Graduate

ENTOM 801 – COLLOQUIUM

1 credit.

Provides exposure to current research in Entomology. Weekly speakers represent diverse career backgrounds.

Requisites: Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2026

Learning Outcomes: 1. Describe the breadth of entomological research and identify new linkages and potential partnerships for research.
Audience: Graduate

Audience: Graduate

2. Evaluate different methods of data presentation and science communication.
Audience: Graduate

Audience: Graduate

3. Demonstrate interrogatory and communication skills during interactions with other professionals.
Audience: Graduate

Audience: Graduate

4. Apply professional networking skills.
Audience: Graduate

Audience: Graduate

ENTOM/BOTANY/GENETICS/ZOOLOGY 820 – FOUNDATIONS OF EVOLUTION

2 credits.

Explore some of the most important themes and debates that have permeated evolutionary biology over the last 50 years. Read key papers related to each controversial topic, debate the pros and cons of competing viewpoints, and reflect on the relevance of the issue to contemporary evolutionary biology.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Explain important evolutionary concepts, including basic population and quantitative genetics.

Audience: Graduate

2. Identify key ideas and controversies in evolutionary biology.

Audience: Graduate

3. Develop an ability to think about evolution in the manner of a professional in the field.

Audience: Graduate

4. Interpret and critique conceptual theories using rigorous logic and references to established biological phenomena.

Audience: Graduate

5. Summarize, interpret, and synthesize scientific concepts orally and in writing.

Audience: Graduate

6. Communicate and debate in a respectful and constructive manner with fellow evolutionary biologists, including as a peer reviewer.

Audience: Graduate

ENTOM/BOTANY/F&W ECOL/ZOOLOGY 821 – FOUNDATIONS OF ECOLOGY

2 credits.

Foundational ideas in the field of ecology. Discussion topics trace the development of ecology as a discipline, and the roots of modern ecological thought, as well as the research approaches in ecology.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2026

Learning Outcomes: 1. Identify and describe key debates in the history of ecology and ongoing controversies in the field.

Audience: Graduate

2. Differentiate ecological processes and how they sustain ecological systems.

Audience: Graduate

3. Moderate and participate in discussions about the significance of important ecological concepts.

Audience: Graduate

4. Summarize, interpret, and synthesize conceptual theories of ecology orally and in writing.

Audience: Graduate

5. Evaluate peer work and provide constructive, professional feedback.

Audience: Graduate

ENTOM 875 – SPECIAL TOPICS

1-4 credits.

Specialized subject matter of current interest to graduate students.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Fall 2023

ENTOM 901 – SEMINAR IN ORGANISMAL ENTOMOLOGY

1 credit.

Presentations from the original literature on developments in natural products chemistry, biochemistry, physiology, developmental biology and/or ultrastructure of insects.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Fall 2024

Learning Outcomes: 1. Discuss entomological research by reviewing primary entomological literature with peers and scientific professionals.

Audience: Graduate

2. Interpret and critique scientific research results and conceptual theories in publications using rigorous logic.

Audience: Graduate

3. Summarize, interpret, and synthesize scientific concepts orally while debating in a respectful and constructive manner with fellow biologists.

Audience: Graduate

**ENTOM/AGROECOL/ATM OCN/BOTANY/ENVIR ST/GEOG/
ZOOLOGY 953 – INTRODUCTION TO ECOLOGY RESEARCH AT
UW-MADISON**

1-2 credits.

Introduction to diverse ecological research across the UW-Madison Campus. Discussions on adapting to graduate school and graduate-level ecological research, key topics in professional development, and research presentations by faculty members.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2025

Learning Outcomes: 1. Develop an appreciation for the foundations and legacy of ecology research and conservation science at UW-Madison

Audience: Graduate

2. Recognize the diversity and strength of current research in ecology at UW-Madison

Audience: Graduate

3. Differentiate expectations between undergraduate education and those of independent research for graduate degrees in ecology

Audience: Graduate

4. Develop appropriate expectations for advisors and advisees

Audience: Graduate

5. Reason through hypothetical ethical challenges and identify potential solutions based on professional codes of ethics

Audience: Graduate

6. Develop an understanding of the suite of skills associated with success in graduate school and in science

Audience: Graduate

ENTOM 990 – GRADUATE RESEARCH AND THESIS

1-12 credits.

Independent laboratory research in preparation of a graduate thesis under supervision of a faculty member.

Requisites: Consent of instructor

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2026

Learning Outcomes: 1. Devise an engaging overview of a research area.

Audience: Graduate

2. Explain background, methods, results, and a discussion of experimental data.

Audience: Graduate

3. Design charts/tables that effectively communicate data.

Audience: Graduate

4. Assess peers on the effectiveness of a scientific presentation.

Audience: Graduate

5. Generate goals to improve presentation skills.

Audience: Graduate