

The Indiana Academy for Science, Mathematics, and Humanities
SCI04309.1 Principles of Ecology Spring 2025

Instructor: Donald Winslow, Ph.D.

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Office hours: MWF 12:45-1:45 PM, 5-6 PM
Tuesday 10 AM-12 noon, 2-3 PM
Thursday 11 AM-12 noon

Class meetings: In Burriss 211. MWF 11-11:50 AM, Lab on Thursdays 4-5:45 PM
Some “laboratory” activities will be field excursions; i.e., we will conduct them outside. Also, our schedule will be somewhat flexible as students will be working on independent research projects.

Description:

Corequisite: Principles of Ecology Laboratory (SCI4309L)

Credit: 1.5 credits

Offered: Spring

This course explores the ways in which organisms interact with their environment. Topics include physiological ecology, population ecology, life history, social ecology, population genetics and natural selection, species interactions, community structure and diversity, broad-scale ecology, ecosystem ecology, biogeography, and global ecology. Hands-on laboratory and field activities reinforce fundamental concepts.

Student learning outcomes:

Upon completing this course, students will be able to describe the ways in which organisms interact with their environment at the levels of physiology, population, species interactions, ecological communities, ecosystems, biomes, and the biosphere. Students completing this course will be able to apply the concepts of life history, social ecology, population dynamics, population genetics, natural selection, community structure and diversity, nutrient cycling, energy flow, and biogeography to discuss ecological processes. Students who complete this course will be able to use laboratory and field techniques to investigate ecological phenomena. Students who complete this course will also be able to design and conduct independent research projects in ecology.

Course materials:

We will use various information sources throughout the semester. You should have a lab and field notebook (separate from your lecture notes) for recording data for lab exercises and your independent research project.

Please note that some aspects of this course may need to be changed during the semester, so this syllabus is subject to revision. If the syllabus is revised during the semester, the updated syllabus will be posted on Canvas. Please refer to Canvas for updated information.

I welcome input from students on how to develop this course.

Assignments:

Assignment	Points	Number	Total
Quizzes	5	12	60
Homework	5	12	60
Lab/field project reports	10	9	90
Lecture exams during the semester	50	2	100
Comprehensive final exam	60	1	60
Problems	5	12	60
Discussions	50	4	200
Independent research project proposal	20	1	20
Independent research project report	100	1	100
Independent research project presentation	50	1	50
Mini-lecture presentations	25	4	100
Lab/field notebook	100	1	100
Total		60	1000

Quizzes—We will have quizzes in class or on Canvas. Quiz questions will be multiple choice, short answer, or matching. I will assess answers based on correctness, completeness, and clarity.

Homework—Students will complete homework assignments throughout the semester. I will assess answers to homework questions and problems based on correctness and completeness.

Lab/field investigations—We will complete lab- and/or field-based investigations weekly during the early part of the semester, leaving time later in the semester for students to work on independent projects. Most studies we will design ourselves. For most investigations, each student will be expected to submit an original report that describes the background, methods, results, and findings. I will assess reports based on completeness, organization, correctness of analysis, and justification of conclusions.

Examinations—Exam questions will include multiple choice and free response questions. The final exam will be comprehensive. I will grade answers based on correctness, completeness, and clarity.

Problems—Students will complete problems inside or outside of class. These are like homework assignments but tend to be quantitative or analytic. I will grade answers based on correctness, completeness, and clarity.

Discussions—We will have several discussions over articles from peer-reviewed ecological journals. Each student will choose an article to read and facilitate a discussion over that article. I will assess participation in discussions based on degree of preparation, willingness to engage with the material, and quality of contributions.

Independent project—Each student will design and conduct an independent research project on an ecological question of interest to that student. Early in the semester each student should submit a proposal detailing plans for the project, so that I can evaluate the feasibility, provide suggestions, order

equipment, plan field excursions, etc. This project will involve laboratory and/or field work. The report should cite peer-reviewed references and present the student's observations and data, hopefully answering the question addressed. I will assess the report based on accuracy, organization, clarity, originality, and reasoning. Students will also present their projects in class.

Mini-lecture presentations—Each student will choose lecture topics to cover during the semester. The student will present the topic to the class. Presentations will be assessed based on preparation, accuracy, and articulation.

Lab notebook—Each student will maintain a lab notebook with observations, drawings, and data from lab and field exercises. This notebook will be submitted at the end of the semester. You can bring it to the final exam, and I will look through it while you take the exam. I will assess the notebook for neatness, completeness, and attention to detail.

Attendance

Please arrive on time to class. The instructor is required to take attendance so that all students are accounted for. If you arrive late to class, someone might start checking to see where you may be. If you are late, you may need to remind the instructor to change the absence to tardy. This will disrupt our workflow and possibly the workflow of others, so please try to avoid being late.

If you miss class for any reason, you are responsible for obtaining any notes, announcements, reading materials, or assignments from the instructor or a classmate. If an unavoidable conflict, emergency, or illness prevents you from attending class or completing an assignment on time, please inform the instructor as soon as possible (preferably beforehand). The Academy and not the instructor determines whether an absence is excused or unexcused. No direct grade penalty is assessed for an absence. However, you will have a much greater chance of success if you are present as much as possible.

Indiana Academy Absence Policy

It is the policy of the Indiana Academy that any absence from class is unexcused, except for illness, death in the family, college or school-related activities, and extenuating circumstances. When a student is absent from a class, the instructor reports the student absence to the Faculty Attendance Coordinator in the Office of Academic Affairs. Unless the absence is excused by a school official, it is considered unexcused. The decision as to whether an absence is excused is not determined by the instructor. Four or more unexcused absences in any particular class a student takes will lead to academic and residential consequences to be determined by the Office of Academic Affairs and the Office of Residential Life that may include detention, residential groundings, parent/principal conference, among others.

Academic conduct

It is important to prepare for each class meeting by completing the reading and any assignments that are due. Assignments should be submitted on Canvas or in class, depending on the assignment. Although some activities such as labs may be completed together as a class, each student is individually responsible for submitting assignments with original writing (not copied from your lab mate). You are encouraged to discuss answers to lab activities with other class members, but the wording should not be the same. Do not share word processing files with each other, but make sure each student has access to the raw data for analysis.

You are expected to conduct yourself according to the Indiana Academy Student Handbook (<https://academy.bsu.edu/handbook/>), especially the Code of Conduct and the section on Academic Integrity. On writing assignments, please be sure to use your own wording and cite all sources of information, whether from the Internet or otherwise. If you are not sure how to cite something, ask the instructor. Note that language copied verbatim from a book, website, another student's paper, or any other source is considered plagiarism unless it is in quotation marks and cited. Plagiarism is a form of academic dishonesty. Please do not plagiarize or cheat in any other way. An infraction may result in a 0 for the assignment. Also, the instructor is required to report any ethics violations to the Academic Integrity Board or (the Director of Academic Affairs and your parents).

Artificial intelligence (AI) technology

Technologies referred to as “artificial intelligence” (AI) are becoming increasingly salient in our lives, sometimes with more emphasis on artificial than on intelligence. The original Turing test (Turing, 1950) for artificial intelligence is to engage in dialogue with what we would now call a “chatbot”. If the discourse is indistinguishable from that of a human, then it is considered artificial intelligence. Modern large language models such as ChatGPT (OpenAI, 2022) exemplify this approach by stringing together words from human writing to sound intelligent (without always being intelligent).

These tools can be very useful, from simple spellchecks to generating computer code. As we adopt these technologies, however, it is important to verify that information obtained is correct and to avoid presenting as our own work that was produced by software or anyone else. We can avoid these pitfalls if we use the auto-generated content as a starting point but not as a finished product. Find the original sources of information and cite those. ChatGPT has a reputation for making up references that don't exist, so don't rely on it.

References and resources on AI:

OpenAI. 2022. ChatGPT, Version 3.5. OpenAI, accessed 12 May 2024 at <https://chatgpt.com/>.

Turing, Alan M. 1950. Computing machinery and intelligence. *Mind* LIX(236):433-460, <https://doi.org/10.1093/mind/LIX.236.433>, accessed 12 May 2024 at <https://academic.oup.com/mind/article/LIX/236/433/986238?login=false>.

Classroom conduct

Please be considerate of other classmates. Keep any devices not used for classroom activities silenced or off. Use of electronic devices during class can be distracting to yourself and others and interfere with the learning process. Your phone should be put away if it's not being used for class. A new Indiana state law prohibits the use of phones in class by high school students except during an emergency or when being used for class activities with the instructor's permission. Laptops can be used in class for class activities, but repeated use for non-class activities may result in a loss of that privilege. A calculator (but not a phone) may be used for exams.

IA Wireless Device Policy:

Pursuant to Indiana Code 20-26-5-40.7, The Indiana Academy for Science, Mathematics and Humanities

prohibits student use of wireless communication devices for non-instructional purposes in the classroom. As such, any and all portable wireless devices, that have the capability to provide voice, messaging, or other data communication between two or more parties, must only be used for academic purposes directly tied to the classroom activity or related educational task. Exceptions to this wireless device policy are eligible through academic accommodations, individualized education programs, or with instructor approval permitting the use of a wireless device for justification related to health, safety, and/or well-being. The improper use of a wireless device in an active classroom setting is subject to disciplinary action including but not limited to; a verbal warning, temporary seizure of said device by a school official, an unexcused absence for the class in question, written communication to parent/guardian, among other elevated consequences for repeated improper use.

Please treat each other with respect and refrain from annoying behavior. Do not interrupt another student or the instructor. If you are having difficulty getting a word in, you can raise your hand. Examples of improper conduct include having extended conversations, working on assignments for other courses, sleeping, etc. Serious and/or chronic problems may be cause for dismissal from the course.

Late work

If you are late submitting an assignment because you missed class, see the section above on attendance. If an absence is excused by the Academy, the instructor will make every reasonable effort to ensure you have the opportunity to make up any assignments associated with the absence. If you are late submitting an assignment associated with an unexcused absence or for a reason unrelated to missing class, the instructor may grade the assignment as time allows.

If an exam is missed because of an excused absence, the instructor will make every reasonable effort to ensure you have the opportunity to make it up. If the absence is unexcused, a make-up exam may be allowed at the instructor's discretion. If a lab is missed, it may be difficult to arrange for a student to make it up due to supplies and logistical constraints. If the absence was excused, the instructor may need to substitute an alternate activity.

Library research

Through your association with Ball State University, you have access to an academic research library with many useful materials. This includes online access to many peer-reviewed scientific journals through bibliographic databases to which Ball State subscribes. To access these databases, go to <https://www.bsu.edu/library>, and scroll down to "Databases". The databases are listed in alphabetical order by the first letter. Two good ones to try are Academic Search Complete under "A" and JSTOR under "J". When you click on one of these databases, you will be prompted to log into your Ball State account. You can search for articles on particular topics and then access the full text of many articles from the journal publishers' websites. Also, if you are logged into <https://my.bsu.edu>, try searching on Google Scholar at <https://scholar.google.com>. You should see "Find it at Ball State" for references available through university subscriptions.

Student accommodations and special circumstances

If you have an IEP or a 504 that provides accommodations, have emergency medical information to share, or need special arrangements in case the building needs to be evacuated, please make an appointment to speak with me as soon as possible.

If you are struggling with study habits, stress, and/or personal issues, I encourage you to discuss the situation with your SLC and/or contact the Guidance Office for help in addressing these issues so that you can thrive at the Academy. Many resources are available for students, and important contact information is listed below:

For guidance: Meg Wright (mewright@bsu.edu), phone:765-285-7407; office: WA183.

To find a tutor: Meg Wright (mewright@bsu.edu), phone:765-285-7407; office: WA183.

For mental health: Dr. Mindy Wallpe (mcwallpe@bsu.edu), phone: 765-285-5483; office: WA 160-C.

Course evaluations

At the end of the semester, each student will have the opportunity to evaluate the course, instructor, and materials. The instructor will not see the results of the evaluations until after grades have been submitted. Your frank and constructive responses will help improve the course for future semesters.

INDIANA ACADEMY INCLUSIVE EXCELLENCE STATEMENT:

Ball State University aspires to be a university that attracts and retains a diverse faculty, staff and student body. We are committed to ensuring that all members of the community are welcome through valuing the various experiences and worldviews represented at Ball State and among those we serve. We promote a culture of respect and civil discourse as expressed in our Beneficence Pledge. As a reflection of Ball State's commitment to respect, civil discourse, and the Beneficence Pledge, Inclusive Excellence at the Indiana Academy emerges as one of the priorities of our living and learning community. We strive to exist together respectfully and compassionately, creating an environment where every member can thrive. Unfortunately, there might be occasions when something occurs that disrupts our progress toward meeting these objectives. In this case, we encourage any member of the Academy community to file a Campus Climate Report (CCR) https://bsu.qualtrics.com/jfe/form/SV_6mbRbL5acAntUTI. All reports will be taken seriously, and appropriate responses will be carried out by Academy administration.

Schedule (subject to revision as needed)

6 January	Introduction to course, introduction to the scientific method and ecology	Syllabus
8 January	Physiological ecology	Energy budget problems
9 January	Transpiration measurement lab	AP Biology Investigation 11
10 January	Climates and biomes	Physiology homework
13 January	Adaptations to aquatic environments	
15 January	Adaptations to terrestrial environments	Bat hibernation
16 January	Planning squirrel time budget investigation	
17 January	Organisms, adaptations to variable environments	Physiological ecology quiz
22 January	Discussion on squirrel journal articles	squirrels module on Canvas
23 January	Respiration lab with germinating peas	AP Biology Investigation 6
24 January	Evolution and adaptation	Hardy-Weinberg problems
27 January	Life histories	Life history matrices
29 January	Reproductive strategies	Quiz, natural selection problems
30 January	Natural selection lab	AP Biology Investigation 2
31 January	Social behaviors	Population genetics problems
5 February	Population ecology, research study design	Population problems
6 February	Squirrel social behavior investigation	
7 February	Population distributions	Nearest neighbor homework

10 February	Population growth	Reproduction homework
12 February	Population regulation	Proposal for independent project due
13 February	Tree distribution lab	
14 February	Population dynamics over space and time	Quiz, population dynamics problem
17 February	Species interactions	Metapopulation dynamics homework
19 February	Population ecology quiz, species interactions quiz	
20 February	Cardinal population investigation, birdwatching field trip	
21 February	Review for exam 1	
24 February	Exam 1	
26 February	Journal article discussion, predation	Quiz
27 February	Effect of tree distribution on squirrel abundance, species diversity investigation	
28 February	Herbivory	Lotka-Volterra predation problems
10 March	Parasitism and infectious diseases	Epidemiology homework
12 March	Competition	Lotka-Volterra competition problems
13 March	Regional Envirothon, Rinard Greenhouse	https://indianaenvirothon.org
14 March	Mutualism	Competition quiz
17 March	Irish potato famine, journal article discussion	
19 March	Community ecology	Species interactions problems
20 March	Spring squirrel time budget investigation	
21 March	Community structure and diversity	Community ecology homework
24 March	Community succession	Community ecology quiz
26 March	Ecosystem ecology	Species diversity problems
27 March	Work on independent projects	
28 March	Movement of energy in ecosystems, energy flow	Trophic pyramid problems
31 March	Cycling of elements in ecosystems	Nutrient cycling homework
2 April	Journal article discussion	
3 April	Work on independent projects	
4 April	Broad-scale ecology	Ecosystem ecology quiz
7 April	Course evaluations, landscape ecology	Landscape ecology homework
9 April	Biogeography	Landscape ecology quiz
10 April	Work on independent projects	
11 April	Biomes	Biogeography homework
14 April	Global ecology	Biogeography quiz
16 April	The biosphere	Biosphere homework
17 April	Work on independent projects	
18 April	Global biodiversity	Biodiversity problems
23 April	State Envirothon Competition	https://indianaenvirothon.org/
24 April	Work on independent projects	
25 April	Biodiversity conservation	Broad-scale ecology quiz
28 April	Review for exam 2	Independent project report due
30 April	Examination 2	
1 May	Independent research project presentations	
2 May	Review for final exam	
5-9 May	Finals week, time of final exam to be announced	Lab/field notebook due at final exam