



Syllabus for
Biology 3410 – Ecology and Evolution
Fall Semester 2024
MWF, 10:45-11:35am; ASB 220 (in person)

Instructors

Dr. Amanda Hoepfner

Email: amanda.hoepfner@utah.edu

Office hours: Wed. 12:30-1:30pm, Bldg 44 Rm 221, also available for questions immediately after each class and by appointment scheduled via email (she/her/hers)

Dr. Jim Ehleringer

Email: jim.ehleringer@utah.edu

Office hours: available for questions immediately after each lecture and office hours by appointment, please email to set up a Zoom meeting (he/him/his)

Please do not email the instructors through Canvas, email the instructors directly through the email addresses listed above. Put Biol 3410 in the subject line so your email can be given preference. Please give the instructor 24 working hours to respond.

Required Materials

Textbooks – Required

- Emlen, D. J. and C. Zimmer (2020) Evolution, Making Sense of Life, 3rd ed., W. H. Freeman & Company (Do not rely on earlier editions of this text).
- Relyea, R. (2021) Ecology: The Economy of Nature, 9th ed., W. H. Freeman & Company (Do not rely on earlier editions of this text).

iClickers – Optional but highly encouraged

This class will be using iClickers to pose questions during class. These questions will be based on lecture or reading materials. We will discuss how to register your clickers during the first day of class. Instructions can also be found on the Canvas home page; please click on the *Start Here* link to access these instructions. Grading of clicker questions is covered below.

Course Description

Evolution is the cornerstone of modern biology, with all life descending from common ancestors, diversifying over time through processes of microevolution, speciation, and macroevolution. Ecology examines how species interactions and environmental constraints influence population dynamics, community structure, and ecosystem processes. Evolution and ecology are closely intertwined subfields of biology.

Course Outcomes

Students successfully completing Biology 3410 Ecology and Evolution will understand:

- Geophysical processes that influence life (climate, geography).
- Darwinian natural selection and other forces that cause evolutionary change.
- Phylogenetics: the estimation and use of evolutionary trees.
- The genetic basis of variation within populations and forces that shape variation over space and time.
- The nature of adaptation and the role of sexual selection, kin selection, and life-history trade-offs.
- The application of evolutionary thinking to human health.
- How new species form.
- How populations change over space and time, and how both the physical environment and biotic interactions influence population dynamics.
- Patterns and processes in the structure of ecological communities of species.
- Ecosystem processes of energy flow and nutrient cycling.
- The application of ecological and evolutionary processes to conservation and global change biology.

Lecture: This course will be held in person. Except in cases of ADA accommodations, you will be expected to attend class in person and complete assignments and exams in person. Changes to this policy are up to the discretion of the instructors.

According to the CDC, wearing a mask remains an effective means of preventing infection for both unvaccinated and vaccinated people. Regardless of what someone chooses (mask or no mask), the university seeks to foster a sense of community and asks everyone on campus to be respectful of individual decisions on mask wearing.

The class will not be live-streamed or recorded.

Course Structure and grading

Your performance in this class will be based on three midterms, a comprehensive final, pre-class problem sets due before the beginning of each class, in-class participation via clickers (optional), and weekly assignments. The four lowest scores for the pre-class problems will be dropped automatically by Canvas. The four lowest scores for clicker questions will be dropped by the instructor at the end of the semester. The two lowest scores for the weekly assignment will be dropped automatically by Canvas. **This allows you to miss about one non-exam week of class during the semester without any negative impact on your grade.** However, none of the midterms or the final can be dropped (see final exam section below).

- **Pre-class Problems:** Before each class, there will be a pre-class problem that must be turned in online through Canvas; emailed assignments will not be accepted. The plagiarism software Turnitin will be used to check for answers copied from other sources. **Problem answers are due by 9am prior to the relevant class period.** The correct answer to each problem will be discussed in class. Pre-class problem assignments will be posted on Canvas no later than the day before the relevant class (under the Module tab). *Each problem will be graded according to effort instead of accuracy*, as follows: 0 for no effort, 1 for minimal effort, and 2 for sufficient effort (out of a maximum of 2 points). The purpose of these

problems is to have you try to tackle a problem for yourself before we review it in class, which will assist in your learning. **NO credit for late submissions.** No extensions. No exceptions. It is up to you to upload the correct file on time.

- **Clickers/participation (optional):** An audience response system, the iClicker Student App, will be used to assess student learning during class. During most classes (not exam days), questions will be posed throughout the lecture. Clickers (the iClicker Student app) allow you to respond to those questions. This polling is a form of active learning that allows you to practice applying the information you are learning in class. Some clicker questions will be related to questions on exams, so they are an excellent form of practice. Polling via clickers also allows the instructors to assess how well the overall class is comprehending the material. If you answer 75% of the questions during a class period, you will receive full credit for participation that day (*points are awarded based on participation, not accuracy*). This allows you to receive credit even if you miss a question due to a slow internet connection or join a few minutes late. Clicker points are based on the participation score in iClicker, NOT attendance. Clickers are *optional but highly encouraged*. If you are unable to attend class regularly, then you will not be penalized for not having clicker responses be part of your final grade. We will compute your final grade with and without clickers and take the highest grade. But, to reiterate, clickers are great practice for exams.
- **Weekly Assignments:** After each class on Friday, a weekly post-class assignment will be available to complete through the Quizzes tab on Canvas. This assignment will be based on the material that was covered in class that week. For each assignment, you will have 3 attempts to answer all of the questions correctly. *These questions are graded based on accuracy* and Canvas will automatically keep your highest score. **This assignment is due by 9am the following Friday.** This assignment is an opportunity to test your understanding of the material and is great practice for the exams. The access to the weekly assignment will close at 9am on Friday. No extensions. No exceptions.
- **Midterm exams:** Three midterms will be given over the course of the semester. Unless otherwise noted, each midterm will be on material covered since the previous midterm. Exams will be administered in person during class time on paper. Exams are closed book meaning no notes, internet or a friend. If we find evidence of cheating on an exam, such as working with another student, all students involved will be given a zero for that exam and your cheating will be reported to the School of Biological Sciences and the university.
- **Final exam:** You are required to take the comprehensive final exam that will cover material from the entire class. If you do better on the final than on your lowest scored midterm, then your final exam score will replace your single lowest midterm score (the original score will remain listed in Canvas, but the higher score will be used when final grades are computed at the end of the class). Since each midterm exam is worth 75 points and the final is worth 150 points, your final exam will replace your lowest scoring midterm based on the percentage score; i.e. if your lowest midterm was 40% (30/75) and you earned a 80% (120/150) on the final, your lowest midterm will be replaced by 80% (60/75 points). This policy allows you to miss or "bomb" one midterm and still get a good grade.
- Note, however, that we will NOT give make-up exams. Exceptions are made for university sponsored activities that require absence on the day of an exam. To receive an exception, you must submit the standard letter by your faculty mentor, coach, etc., one week BEFORE you miss the exam.

| Assignment | Final Grade Weight Including Clickers | Final Grade Weight without Clickers | Notes |
|---|---------------------------------------|-------------------------------------|---|
| Pre-Class Problems <i>Students will upload their answer to a problem to Canvas</i> | 10% | 10% | <ul style="list-style-type: none"> • Due at 9am before the beginning of each class. • <u>Lowest 4 scores dropped.</u> • Missed assignments cannot be made up; students use score drop for missed assignments. |
| Weekly Assignments <i>Students will complete a weekly assignment through Canvas quiz tab</i> | 10% | 10% | <ul style="list-style-type: none"> • Due at 9am each Friday. • <u>Lowest 2 scores dropped.</u> • 3 Attempts, highest score is kept. • Missed assignments cannot be made up; students use score drop for missed assignments. |
| In-Class Clicker Questions OPTIONAL <i>Students will use the iClicker Student app to participate in clicker questions</i> | 10% | N/A | <ul style="list-style-type: none"> • <u>Lowest 4 scores are dropped.</u> • Missed clicker questions or sessions cannot be made up; students use score drop for missed assignments. |
| Mid Term exams <i>Taken in person on paper during class time, see schedule for dates</i> | 42% (14% per exam) | 48% (16% per exam) | <ul style="list-style-type: none"> • Three 75-point exams. • <u>No drops.</u> • Missed exams cannot be made up (see section on Final above). |
| Final exam <i>Taken in person on paper during finals week, see schedule for dates, compulsory</i> | 28% | 32% | <ul style="list-style-type: none"> • Comprehensive final (150 points) covering material from the entire class. • <u>No drops.</u> |
| | 100% | 100% | |

- **No extra credit** is available for this course. All grading opportunities are listed in the table above. **No exceptions.** Note that we do not “give” you a grade; the grade you receive is the grade you earn.

The scale for final, cumulative letter grades in this course is:

| | | |
|----------------|----------------|----------------|
| A 93 - 100% | B- 80 - 82.99% | D+ 67 - 69.99% |
| A- 90 - 92.99% | C+ 77 - 79.99% | D 63 - 66.99% |
| B+ 87 - 89.99% | C 73 - 76.99% | D- 60 - 62.99% |
| B 83 - 86.99% | C- 70 - 72.99% | E < 60% |

Course Policies

Attendance & Punctuality: The University and your instructors expect all students to attend all class meetings. Students are expected to acquaint themselves and satisfy the entire range of academic objectives and requirements as described in this syllabus.

Equipment Failure: It is your responsibility to maintain your computer and related equipment, including iClickers, in order to participate in the course. Equipment failures will not be an acceptable excuse for late or absent assignment. If you experience any equipment problem or have internet connectivity issues that cause you to miss a class or an assignment, one of your drops will be used for the missed class or assignment. If you need help with iClicker related issues, click on the FAQ link on Canvas (assessable from the home page).

To effectively participate in online components of this class and complete the assignments, you will need to have an adequate desktop or laptop computer and access to a broadband internet connection. As a very rough guideline, a computer manufactured in the past five years should be fine. Laptops are available for checkout from the Marriott Library for the semester, depending on availability:

<https://lib.utah.edu/coronavirus/checkout-equipment.php>.

You will also need to be able to smoothly navigate Canvas. If you have concerns about any of these requirements, please contact the instructor as soon as possible.

Re-grading Requests: Students may request the reconsideration of the grading of a question on an exam within one week of the day that the exam was returned. The re-grade will only be considered if accompanied by a written description of the perceived error in grading and why the answer provided by the student is appropriate. If you submit a regrade request, the entire exam may be regraded, which could result in the exam score increasing *or decreasing* as a result. Re-grade requests are only to be used if there is a genuine mistake made on your exam. Requests are not to be used if you disagree with the point allocation for a question, want to receive a higher grade on the exam, or if you do not understand why you did not receive full credit for a question. Points are received from demonstrating mastery of the material. If you did not receive full credit for a question, it is up to the student to discover what concept they omitted or stated incorrectly *before* they submit a re-grade request. For help, please visit your TAs during their office hours, ask the instructors after class, or set up an appointment with the instructors. The instructional team is here to help you understand the material and wants you to succeed! Detail and organization in the request are critical. **Re-grade requests will not be considered more than one week after the exam was returned.**

Online etiquette:

Discussion threads, emails, and Zoom chat rooms are all considered to be equivalent to classrooms, and student behavior within those environments shall conform to the Student Code. Specifically:

- Posting photos or comments that would be off-topic in a classroom are still off-topic in an online posting.

- Disrespectful language and photos are never appropriate.
- Using angry or abusive language is not acceptable and will be dealt with according to the Student Code. The instructor may remove online postings that are inappropriate.
- Do not use ALL CAPS, except for titles or overuse of certain punctuation marks such as exclamation points and question marks.
- Course emails, e-journals, and other online course communications are part of the classroom and as such, are University property and subject to the Student Code. Privacy regarding these communications between correspondents must not be assumed and should be mutually agreed upon in advance, in writing.

Course Schedule

*Emlen and Zimmer textbook (EZ); Relyea, R. textbook (RR)

| Date | | Lecture topic | | Readings |
|---|--------|---------------|---|------------|
| The first half of this class is focused on evolution and is taught by Dr. Hoepfner | | | | |
| Week 1 | Aug 19 | M | Linking ecology and evolution: Both instructors | |
| | 21 | W | Whale & the virus: How scientists study evolution | EZ Chap 1 |
| | 23 | F | From Natural Philosophy to Darwin: History | EZ Chap 2 |
| Week 2 | 26 | M | What the rocks say: Geology & paleontology | EZ Chap 3 |
| | 28 | W | The tree of life: Phylogenetic reconstruction | EZ Chap 4 |
| | 30 | F | Raw material: Heritable variation | EZ Chap 5 |
| Week 3 | Sept 2 | M | NO CLASS - Labor Day | |
| | 4 | W | Ways of change: Drift and selection | EZ Chap 6 |
| | 6 | F | Beyond alleles: Quantitative genetics | EZ Chap 7 |
| Week 4 | 9 | M | The history in our genes | EZ Chap 8 |
| | 11 | W | Evolution of genetic networks and development | EZ Chap 9 |
| | 13 | F | Natural selection: Empirical studies in the wild | EZ Chap 10 |
| Week 5 | 16 | M | MIDTERM 1 | |
| | 18 | W | Sex: Causes and consequences | EZ Chap 11 |
| | 20 | F | After conception: Life history and parental care | EZ Chap 12 |
| Week 6 | 23 | M | The origin of species | EZ Chap 13 |
| | 25 | W | Macroevolution: The long run | EZ Chap 14 |
| | 27 | F | Intimate partnerships: How species co-adapt | EZ Chap 15 |
| Week 7 | 30 | M | Brains and behavior | EZ Chap 16 |
| | Oct 2 | W | Human Evolution | EZ Chap 17 |
| | 4 | F | Evolutionary Medicine | EZ Chap 18 |
| Week 8 | 7-11 | | NO CLASS - Fall Break | |

| The second half of this class is focused on ecology and is taught by Dr. Ehleringer | | | | |
|--|-------|---|---|-----------------|
| Week 9 | 14 | M | Concepts in ecology | |
| | 16 | W | MIDTERM 2 | |
| | 18 | F | Climate influences ecosystem structure & biome distribution 1 – | RR Chap 1 & 2 |
| Week 10 | 21 | M | Climate influences ecosystem structure & biome distribution 2– | RR Chap 1 & 2 |
| | 23 | W | Acclimation & adaptation 1 | RR Chap 4 & 5 |
| | 25 | F | Acclimation & adaptation 2 | RR Chap 4 & 5 |
| Week 11 | 28 | M | What influences and controls population sizes? | TBD |
| | 30 | W | Biotic interactions: predation, herbivory, & parasitism 1 | RR Chap 10 & 11 |
| | Nov 1 | F | Biotic interactions: predation, herbivory, & parasitism 2 | RR Chap 12 & 13 |
| Week 12 | 4 | M | Biotic interactions: predation, herbivory, & parasitism 3 | RR Chap 14 |
| | 6 | W | Biotic interactions: competition and mutualism 1 | RR Chap 15 |
| | 8 | F | Biotic interactions: competition and mutualism 2 | RR Chap 15 |
| Week 13 | 11 | M | Biotic interactions: competition and mutualism 3 | RR Chap 16 |
| | 13 | W | MIDTERM 3 | |
| | 15 | F | Community structure & succession 1 | RR Chap 17 |
| Week 14 | 18 | M | Community structure & succession 2 | RR Chap 18 |
| | 20 | W | Energy & nutrient cycles in ecosystems 1 | RR Chap 19 & 20 |
| | 22 | F | Energy & nutrient cycles in ecosystems 2 | RR Chap 19 & 20 |
| Week 15 | 25 | M | Humans as drivers of ecological change | TBD |
| | 27 | W | Ecological impacts, conservation & biodiversity 1 | RR Chap 21 & 22 |
| | 29 | F | NO CLASS - Thanksgiving Break | |
| Week 16 | Dec 2 | M | Ecological impacts, conservation & biodiversity 2 | RR Chap 22 |
| | 4 | W | Ecological solutions: a sustainable path forward | TBD |
| | 6 | F | NO CLASS - READING DAY | |
| Finals Week | 9 | M | Monday: Comprehensive Final @ 10:30 am - 12:30 pm | |

Note: This syllabus is meant to serve as an outline and guide for our course. Please note that it may be modified to accommodate the needs of our class. Any changes will be announced in class and posted on Canvas under Announcements.

University Policies

- 1. *The Americans with Disabilities Act.*** The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability & Access, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability & Access. In compliance with ADA requirements, some students may need to record course content. Any recordings of course content are for personal use only, should not be shared, and should not be made publicly available. In addition, recordings should be destroyed at the conclusion of the course.

Given the nature of this course, attendance is required and adjustments will only be permitted as required by Policy 6-100(III)(O). If you need to seek an ADA accommodation to request an exception to this attendance policy due to a disability, please contact the [Center for Disability and Access](#) (CDA). CDA will work with us to determine what, if any, ADA accommodations are reasonable and appropriate.

- 2. *University Safety Statement.*** The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit <https://safeu.utah.edu>
- 3. *Addressing Sexual Misconduct.*** Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 383 South University Street, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

Lauren's Promise: Lauren's Promise is a vow that anyone – faculty, staff, students, parents, and community members – can take to indicate to others that they represent a safe haven for sharing incidents of sexual assault, domestic violence, or stalking. Anyone who makes Lauren's Promise vows to: 1.) listen to and believe those individuals who are being threatened or experiencing sexual assault, dating violence or stalking; 2.) represent a safe haven for sharing incidents of sexual

assault, domestic violence, or stalking; and 3.) change campus culture that responds poorly to dating violence and stalking. By making Lauren's Promise, individuals are helping to change campus cultures that respond poorly to dating violence and stalking throughout the nation.

4. **Academic Misconduct Statement.** It is expected that students adhere to University of Utah policies regarding academic honesty, including but not limited to refraining from cheating, plagiarizing, misrepresenting one's work, and/or inappropriately collaborating. This includes the use of generative artificial intelligence (AI) tools without citation, documentation, or authorization. Students are expected to adhere to the prescribed professional and ethical standards of the profession/discipline for which they are preparing. Any student who engages in academic dishonesty or who violates the professional and ethical standards for their profession/discipline may be subject to academic sanctions as per the University of Utah's Student Code: <https://regulations.utah.edu/academics/6-410.php>
5. **Drop/Withdrawal Policies.** Students may drop a course within the first two weeks of a given semester without any penalties. Students may officially withdraw (W) from a class or all classes after the drop deadline through the midpoint of a course. A "W" grade is recorded on the transcript and appropriate tuition/fees are assessed. The grade "W" is not used in calculating the student's GPA. For deadlines to withdraw from full-term, first, and second session classes, see the U's Academic Calendar.
6. **Supports for Students.** Your success at the University of Utah is important to all of us here! If you feel like you need extra support in academics, overcoming personal difficulties, or finding community, the U is here for you. Please refer to the [Student Support Services page for the U](#) for updated information.
7. **Basic Needs Student Support Statement.** Success at The University of Utah includes learning about and using available resources. The [Basic Needs Collective](#) (BNC) is a coordinated resource referral hub. They educate about and connect students to campus and community resources to help them meet their basic needs. As a central location for resource referrals related to food, housing, health insurance, managing finances, legal services, mental health, etc., any student experiencing difficulty with basic needs is encouraged to contact them. Drop into their office located in the Union basement or schedule with them online for an in-person or virtual visit through their webpage: <https://basicneeds.utah.edu/>.