



Biology 3410 – Ecology and Evolution
Spring Semester 2021
MWF, 10:45-11:35am; Canvas Zoom (IVC)

Instructors

Dr. Dale Clayton

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Office hours: ASB 570a, available for questions immediately after each class and office hours by appointment, please email to set up a Zoom meeting (he/him/his)

Dr. Amanda Hoepfner

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Office hours: Bldg 44 Rm 221, available for questions immediately after each class and office hours by appointment, please email to set up a Zoom meeting (she/her/hers)

Please do not email instructors through Canvas, email 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

- 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).
- Smith, T. M and R. L. Smith (2009) Elements of Ecology, 9th ed., Benjamin Cummings (We also have the readings for older editions which can be purchased more cheaply, if you do purchase edition 7 or 8, please contact Dr. Hoepfner for the corresponding reading list.)

iClickers

This class will be using iClickers and REEF software 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 week of class. 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.

Zoom class etiquette

This class is being offered as an Instructional Video Conferencing (IVC) class. Class sessions will be held at the scheduled times via Zoom. Exams will also be handled online.

Participation in the course will depend on having access to a computer and a broadband internet connection, as well as being able to use Canvas, Zoom and other online resources effectively. Please contact the instructor as soon as possible if you have concerns about these requirements.

When you join our live class on Zoom, please conduct yourself in the same manner as if we were in a classroom. Join the Zoom meeting 5 minutes early to make sure you can connect because class will start promptly on time. As you join, please make sure that you are muted the entire time unless you are asking a question. To ask a question during class, feel free to ask it over Zoom chat, which will be monitored by the TAs, or use the raise of hand function in Zoom and wait to speak until the instructor calls on you. In Zoom chat, please only post messages that are relevant to the class. The instructor has the right to ask you to leave for inappropriate behavior.

To join class, please go to our class page on Canvas and click on the Zoom tab. There you will see all upcoming scheduled meetings, including the meeting to join our class (this link will be the same for all class days, MWF, unless an announcement on Canvas is made to state otherwise). Please always join our class through this Canvas link.

*Each class will be recorded on Zoom and posted to Canvas after the class. These recordings should not be the primary form of participating in the class, but instead will help you review the material if you want to hear the lecture again or if you miss a class.

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 (see below), and in-class participation via clicker (see below). The three lowest scores for the pre-class problems will be dropped automatically by Canvas. The three lowest scores for clicker questions will be dropped by the instructors at the end of the semester. **This allows you to miss 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.

- **Pre-class Problems:** Before most classes, there will be an online graded 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. 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. This is to allow some productive struggling on your own, 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 Reef App, will be used to assess student learning during class. During most classes, questions will be posed throughout the lecture. Clickers (the Reef 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 each 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 some questions due to a slow internet connection or joining a few minutes late. Clickers are *optional but highly encouraged*. If you are unable to attend class regularly (for example, you are currently living in a very different time zone), 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.
- **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 online during class time through the Quizzes tab on Canvas. On exam days, you must join class on Zoom for exam proctoring. When you sign into Zoom, you must turn on your webcam (or smart phone if you do not have a webcam on your computer) so the TAs can proctor the exam. Once you sign in, the TAs will provide you with a code to access the exam.

Once you are finished with the exam, you must type finished into the Zoom chat so we can compare that time with the time you submit your exam. Even though these exams are online, they are to be taken as if they were in class, meaning no notes, book, friends, or the internet. If we find evidence of cheating on an exam, such as working with another student or uploading questions to an online website, 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). This procedure allows you to "bomb" one midterm - or miss it entirely - and still get a good grade. Note, however, that we will NOT give make-up exams. Exceptions are made for participation in NCAA sports, band, or other University activities that require absence on the day of an exam. To receive an exception, you must submit the standard release form signed by your coach, etc. 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>	15%	15%	<ul style="list-style-type: none"> • Due at 9am before the beginning of each class. • <u>Lowest 3 scores dropped.</u> • Missed assignments cannot be made up; students use score drop for missed assignments.
In-Class Clicker Questions OPTIONAL <i>Students will use the Reef app to participate in clicker activities.</i>	15%	N/A	<ul style="list-style-type: none"> • <u>Lowest 3 scores are dropped.</u> • Missed clicker questions or sessions cannot be made up; students use score drop for missed assignments.
Mid Term exams <i>Online through Canvas quiz tab, see schedule for dates</i>	42% (14% per exam)	51% (17% 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>Online through Canvas quiz tab, see schedule for dates, compulsory</i>	28%	34%	<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 in order to participate in the online portion of 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.

Re-grading Requests: Students may request the reconsideration of a grade 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. Please email your re-grade requests to the instructor of that section. 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); Smith and Smith textbook (SS)

Date		Lecture topic		Readings
The first half of this class is focused on evolution and is taught by Dr. Clayton				
Week 1	Jan 20	W	Linking ecology and evolution: Both instructors	
	22	F	Whale & the virus: How scientists study evolution	EZ Chap 1
Week 2	25	M	From Natural Philosophy to Darwin: History	EZ Chap 2
	27	W	What the rocks say: Geology & paleontology	EZ Chap 3
	29	F	The tree of life: Phylogenetic reconstruction	EZ Chap 4
Week 3	Feb 1	M	Raw material: Heritable variation	EZ Chap 5
	3	W	Ways of change: Drift and selection	EZ Chap 6
	5	F	Beyond alleles: Quantitative genetics	EZ Chap 7
Week 4	8	M	The history in our genes	EZ Chap 8
	10	W	Evolution of genetic networks and development	EZ Chap 9
	12	F	MIDTERM 1	
Week 5	15	M	PRESIDENTS' DAY – NO CLASS	
	17	W	Natural selection: Empirical studies in the wild	EZ Chap 10
	19	F	Sex: Causes and consequences	EZ Chap 11
Week 6	22	M	After conception: Life history and parental care	EZ Chap 12
	24	W	The origin of species	EZ Chap 13
	26	F	Macroevolution: The long run	EZ Chap 14
Week 7	Mar 1	M	Intimate partnerships: How species co-adapt	EZ Chap 15
	3	W	Brains and behavior	EZ Chap 16
	5	F	NON-INSTRUCTIONAL DAY – NO CLASS	
Week 8	8	M	Evolutionary Medicine (Online asynchronously)	EZ Chap 18
The second half of this class is focused on ecology and is taught by Dr. Hoepfner				

	10	W	Introduction to ecology & Adaptive responses to environmental variation (Online asynchronously)	Please see the Canvas page for each class for the pre-class reading in the SS textbook
	12	F	Behavioral ecology (Online asynchronously)	
Week 9	15	M	Population growth	
	17	W	Competition I	
	19	F	MIDTERM 2	
Week 10	22	M	Competition II	
	24	W	Mutualisms	
	26	F	Predation I	
Week 11	29	M	Predation II	
	31	W	Coevolution of herbivores and plants	
	Apr 2	F	Plant defenses and herbivore adaptations	
Week 12	5	M	NON-INSTRUCTIONAL DAY - NO CLASS	
	7	W	MIDTERM 3	
	9	F	Community structure and dynamics	
Week 13	12	M	Diversity	
	14	W	Island biogeography	
	16	F	Ecosystem biology - productivity	
Week 14	19	M	Ecosystem biology - nutrient cycling	
	21	W	Global patterns of climate and vegetation	
	23	F	Human impacts on global climate	
Week 15	26	M	Science and public policy	
Finals Week	May 5	W	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. COVID-19 Campus Guidelines.** Students are required to self-report if they test positive for COVID-19. To report, please contact: COVID-19 Central @ The U 801-213-2874; coronavirus.utah.edu

To reduce the spread of COVID-19 on campus, **face coverings are required in all in-person classes for both students and faculty.**

Based on CDC guidelines, the University requires everyone to wear face coverings in shared public spaces on campus. **If you repeatedly fail to wear a face covering in class, you may be referred to the Dean of Students for a possible violation of the Student Code.**
- 2. 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 Services, 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 Services.
- 3. 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 safeu.utah.edu.
- 4. 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, 135 Park Building, 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).
- 5. Undocumented Student Support Statement.** Immigration is a complex phenomenon with broad impact—those who are directly affected by it, as well as those who are indirectly affected by their relationships with family members, friends, and loved ones. If your immigration status presents obstacles to engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center. Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence. The Dream Center offers a wide range of resources to support undocumented students (with and without DACA) as well as students from mixed-

status families. To learn more, please contact the Dream Center at 801.213.3697 or visit dream.utah.edu.

6. **Drop/Withdrawal.** The University of Utah drop and withdrawal dates are available at <http://registrar.utah.edu/academic-calendars/index.php>. University policy allows assignment of a grade of incomplete (I) if 80% or more of the course work has been completed. We will consider assigning an “incomplete (I)” only under exceptional circumstances unrelated to academic performance, and only if a student is passing the course with a C or better when the “Incomplete” is requested. Please check the academic calendar for more information pertaining to dropping and withdrawing from a course. Withdrawing from a course and other matters of registration are the student’s responsibility.
7. **Academic Misconduct.** All suspected cases of academic misconduct including cheating, answering clicker questions for someone else, and plagiarizing will be dealt with according to rules in the student code, University policy 6-400(V). Please know that looking into someone else’s exam is cheating and will be dealt with seriously as stated above. By accepting admission to the University, you have agreed to abide by the University rules provided to you in the student handbook. Cheating and plagiarism are serious offenses and can result in getting a zero on the assignment, failing a class, a note in your record, or being expelled. Here is the link: <http://www.admin.utah.edu/ppmanual/8/8-10.html>
8. **Wellness Statement.** Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student’s ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at www.wellness.utah.edu or 801 - 581 - 7776.
9. **Veterans Center.** If you are a student veteran, the U of Utah has a Veterans Support Center located in Room 161 in the Olpin Union Building. Hours: M-F 8-5pm. Please visit their website for more information about what support they offer, a list of ongoing events and links to outside resources: <http://veteranscenter.utah.edu/>. Please also let us know if you need additional support in this class for any reason.
10. **Diversity / Inclusivity Statement.** It is the intent of the instructors that students from all diverse backgrounds and perspectives be well served by this course, that students’ learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is our intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let us know ways to improve the effectiveness of the course for you personally or other students or groups.
11. **Learners of English as an Additional/Second Language.** If you are an English language learner, please be aware of several resources on campus that will support you with your language and writing development. These resources include: the Writing Center (<http://writingcenter.utah.edu/>); the Writing Program (<http://writing-program.utah.edu/>); the English Language Institute (<http://continue.utah.edu/eli/>). Please let me know if there is any additional support you would like to discuss for this class.