

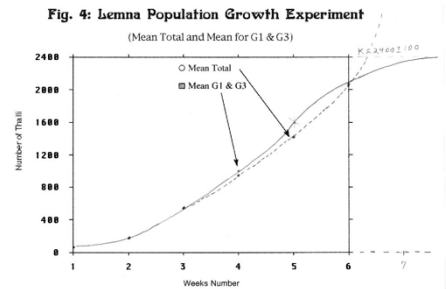
BI 213 GENERAL BIOLOGY III: POPULATIONS

Syllabus for Fall 2021

CRN: 11194

Instructor: Dr. Tobias Policha

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Office Hours and Tutor Sessions will be held in 116 Huestis, see Canvas for schedule.

Overview->Goals->Materials->Format->Policies->Resources->COVID->Schedule->Readings

COURSE OVERVIEW

In this third term of the general biology sequence we build on concepts of how cells and organisms function to study the patterns and mechanisms of evolutionary change over the past 4.5 billion years that have led to the diversity of life that exist on earth today. We begin by examining mechanisms that cause genetic change in populations over time with a special focus on natural selection. We then examine the species concept and look at patterns of evolutionary change over long time periods. In the second half of the term, we examine ecological theory including different models of population growth and factors that regulate population growth in various organisms. We study ways in which two or more species interact, how ecological communities are formed and organized, and apply these ideas to current issues such as invasive species and loss of biodiversity. We end the term by examining how energy flows and nutrient cycle in ecosystems, how we have altered these functions, and consider the consequences of these changes for global biodiversity. Students participate in a field trip to collect data on plant diversity in a local forest which is used as the basis of understanding evolution of land plants, succession and diversity.

COURSE GOALS

The goals for BI 213 fall into two general categories: (1) to learn the foundational concepts related to evolution and ecology (2) to build on the skills developed in BI 211, including critical thinking, quantitative reasoning, and the development of communication skills.

Concept-Based Goals:

1. To identify the mechanisms that cause biological evolution in populations; to identify and explain the tenets of natural selection.
2. To apply the Hardy-Weinberg model to populations to investigate evolution.
3. To understand the connections between some of the major events in the history of life on earth.
4. To apply mathematical models to understand growth in populations; to describe the factors involved in regulating population growth.

5. To identify the important types of species interactions, such as competition and predation, that are important for shaping biological communities.
6. To describe diversity at the genetic, species, and functional level, including mathematical indices.
7. To become familiar with how communities change across space and time. To describe how matter and energy flows through ecosystems and understand some of the major fluxes and stores in biogeochemical cycles.
8. To understand some of the ways in which humans have impacted the natural world.

Skill-Based Goals:

1. To develop competency in the basic terminology and methodologies used in the biological sciences.
2. To learn the process of scientific inquiry and its applications.
3. To learn how to learn about biology.
4. To learn to communicate knowledge, ideas and reasoning clearly and effectively in oral and written forms appropriate to the biological sciences; to prepare an oral presentation and practice public speaking.
5. To become familiar with the use of science relevant search engines, and learn to identify primary work; to develop the ability to think critically about information, evaluate the validity of arguments, and weigh the merits of disparate scientific conclusions.
6. To experience the collaborative nature of the biological sciences.

COURSE MATERIALS

Calculator

You will need a scientific calculator capable of doing natural logarithms and square roots for use on problem sets, in lab, and on exams. Calculators that have the ability to store text will not be allowed. Cell phone calculator-apps cannot be used during exams.

iClickers

Please purchase an iClicker for this course. You will need to register it on our Canvas site.

Textbook(s)

This term we will be adopting 'Biology 2ed' from OpenStax. This book is available as a **free PDF or as a low-cost e-book**. If you would prefer to have a hard copy, they are available directly from OpenStax for ~\$50. <https://openstax.org/details/books/biology-2e>. The text should be used as a general reference. The readings include background material useful for preparing you for lecture and for studying for exams. We don't expect you to remember all the details in the text. If you already have 'Biological Science' by Freeman *et al.* I will list the relevant readings from that text as well. ***There are hardcopies of the 'Freeman' text on reserve in the Science Library available for four-hour checkout.*** A good strategy would be to skim over the entire chapter first, concentrating on the major concepts, then to read more carefully the specific pages that are assigned.

COURSE FORMAT

Lectures (Mondays, Wednesdays and Fridays, 11:00-11:50 in 208 University)

You should do the assigned readings before coming to the lectures. During most of the lectures there will be activities that will help you to learn concepts; these will often be done collaboratively with students discussing the problem together for a few minutes before independently writing your own solution. You will not turn these in but your active participation will help you understand the material and prepare you for exams.

Lab/Discussion (Wednesdays and Thursdays in 112 Huestis)

We consider the labs to be an integral part of the course. We have tried to design active learning experiences that will broaden your understanding of what ecology and evolution are about. Often you will be working in groups, posing questions, designing experiments or making observations, and presenting your findings in written or oral form. There will be labs dealing with natural selection, population genetics, plant biodiversity, phylogenetics and behavior. Lab handouts will usually be turned in at the end of each lab. Part of the grade will be based on participation in lab. **Most labs cannot be made up because they involve special material or equipment.** Late lab reports will not be accepted. If you let us know in advance about a lab you cannot attend, it may be possible to attend another lab section. This is only an option if arrangements are made in advance and permission is granted from your instructor.

Clickers (Personal Response Systems)

Clickers will be used in almost every class to encourage participation and to provide valuable feedback to instructors and students. Each student is expected to purchase a clicker for use in this class. You should register your clicker on the course Canvas site. Questions during lecture that require clickers will be multiple choice. Points will be earned two different ways: (1) 2-point questions: 2 points will be awarded based on participation alone, not on whether the question is answered correctly; (2) 4-point questions: 4 points for correct answer, 2 points for incorrect answer. Total percent for the clicker portion of your grade will be based on 85% of the total possible points: your clicker grade = total points earned/85% of total possible (not to exceed 100%).

Issues Project

You will investigate an issue in ecology or evolution and give an oral group presentation in lab during week 8 or 10. Projects will consist of a thesis statement, rough and final draft of an annotated bibliography, a peer review, and a Google slide done by each person individually. Late work on the bibliography will be accepted but discounted for each day that it is late. There will be no late presentations. See issues project handout on Canvas for more details.

If you are retaking this course, you will NOT be allowed to resubmit issues project work from the previous time you took Bi213. ***The work you do this term must be original and on a different topic.***

Post-Lecture and Pre-Lab Quizzes

There will be two types of short Canvas quizzes: those based on the latest lecture and those based on the upcoming lab. We will drop your lowest score for each type of quiz. The quizzes will be posted on Canvas right after most lectures. You will need to read the pre-lab handout posted on Canvas in order to answer the lab questions. **All quizzes are due by 10:00AM on their due dates.** Solutions will be made available in the afternoon.

Problem Sets (not graded)

There will be several practice problem sets that will be posted on Canvas during the term. It is very important that you work on these during each week. We will help you to understand how to solve these problems in the help sessions. The practice problems are very similar to the types of questions you will see on the exams (in fact, many of the problems are from past exams). The practice problems are designed to help you master the material needed to do well on the exams.

Field Trip

Each student will take a field trip with the class to the Mohawk Resource Natural Area to investigate succession of woody plants. The material covered on the trip is an integral part of the course. If you cannot attend the trip, you will be given an alternative assignment (see handout on *Canvas*): a 4-5 page paper on plant succession in Cascade forests that will be graded - Due by 5PM on Friday Oct. 22nd . See schedule for field trip days and times. Each student will attend one of the trips. We will ask for your preferred date(s) during the first week of classes.

iNaturalist Observations

As a way to get you out and observing nature on your own, you will be responsible for making and posting twenty observations to the iNaturalist citizen science platform. You will need to make an (free) account at <https://www.inaturalist.org/>, and you will need access to a digital camera (phones ok). Further details will be available in the Assignments section of Canvas.

Discussion Posts

As a way to encourage interaction outside the classroom you will be required to post to Discussion Forums at a few points during the term. Sometimes this will be relatively personal, like introductions, mid-term feedback on the course or a final reflection, other weeks it will be more aligned with various assignments. You will be required to respond to someone else's post for all Discussions.

Exams

There will be three exams: two midterms and a final. All exams will be the same format: short-answer with occasional multiple choice or true/false questions. The final is cumulative. The exams will cover material from all aspects of the course including lectures, labs, the field trip, quizzes, readings and practice problems. Exams will be designed to probe a deep understanding of the concepts and principles discussed, and an ability to apply the concepts to novel situations rather than a memorization of detail. Exams cannot be made up. Exams are graded by the GEs under the supervision of the faculty. To promote consistency, a single GE grades each question. **There will be no early or late midterms or final exams given. Everyone is required to take the final on Monday December 6th at 10:15 AM.**

Midterm regrade policy To be fair to all students, it is essential that all exams be graded according to the same criteria. If you wish to submit a midterm for a regrade, you must use the following guidelines. First, refer to the exam key available on Canvas to see how closely your answer(s) match the key. If you still wish to have a midterm exam answer regraded, you must submit a written statement within one week of the return of the exam, along with your original exam, explaining specifically why your answer merits a higher score. Keep in mind that we will regrade the entire exam and a regrade may result in a higher, lower, or unchanged score. Please do not abuse this system. We reserve the right to eliminate this option at our discretion.

Evaluation

Assessment	Number	points each	Total
Labs	8	25	200
Midterm Exams	2	100	200
Final Exam	1	150	150
Lecture Quizzes	24	5	120
Bibliography	1	100	100
Presentation	1	55	50
iClickers	tbd		35
Field Trip	1	50	45
iNaturalist	20	2	40
Pre-lab quizzes	7	5	35
Discussion Posts	5	5	25
			1000

Posting of Grades

Scores for assignments and exams will be posted on Canvas. Check your scores every time we post them, as you will have only one week after the posting to notify us about mistakes or omissions. Final grades will follow typical >90%=A, >80%=B, >70%=C, >60%=D cutoffs with '+/-'s assigned within ~2% of each cutoff.

COURSE POLICIES

Course Context (COVID-19 + everything else!)

In ecology and evolution, one of the things that you will come to appreciate is that **context matters**. For example, plants will respond differently to herbivory when they are drought-stressed, or elk will change their browsing habits in the presence of predators. Mutations are either adaptive or deleterious depending on the environment. I want to acknowledge that we are all experiencing things outside the bounds of normalcy right now and that each of us are being stressed in ways that we have not entirely anticipated nor fully appreciate. This impacts our learning communities as much as any other aspect of our lives.

I urge us all to remember that we did not sign up for this. Not for the pandemic, not for the climate chaos, not for the systemic injustice, not for the unpredictability. We will get through this though, by prioritizing each other as human beings, by prioritizing simple solutions that work for the most people, and by sharing resources and communicating clearly. We must remain flexible and adjust to the situation as needed. **Everyone needs support and understanding** in this unprecedented moment.

I want you to know that **I stand in firm solidarity with those that are demanding social justice**. I realize that the events of the last year and a half are impacting each of you in unique ways, some of which may be difficult for others to understand. I am doing my best to encourage inclusivity and understanding around

the unique issues faced by our black students and other students of color, and **I encourage all of us to extend an extra measure of kindness and care to each other over the coming weeks and months as we collectively seek a more unified community.**

In light of everything, I want you to know that I am open to working with you on a range of accommodations to help you feel successful in our upcoming class. Please **contact me early with any anticipated issues**, it will be easier for me to help you if it does not become a last-minute emergency.

I intend to facilitate a learning experience that will be of value to you in a post-pandemic world. I truly believe that the awareness and the skills that we will develop together this term will go a long way toward **promoting a more sustainable and resilient world**, whatever the future holds.

"If there's any good to come of it, I'm trying to think of it as a reminder that despite our illusions of human exceptionalism, natural processes are still in charge, and (of) the importance of our collective responsibilities toward one another."

- Robin Kimmerer on the COVID-19 pandemic

Professional Conduct

We will work hard to make this course valuable to your learning. We welcome suggestions from you at anytime about things you think could be done to improve the course. In return, we ask that you arrive to lab and lecture on time and stay until class is over without making unnecessary noise that could distract your classmates. Please put away and do not use your own computers, cell phones, or other electronic devices during lecture or lab. We promise to respect you as students and as individuals, and ask that you return that respect to us and to your fellow classmates. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the quarter (or before) so that I may address you properly.

Academic Integrity

All students are expected to complete assignments in a manner consistent with academic integrity. Students must produce their own work and properly acknowledge and document all sources. Students can find more complete information about the University of Oregon's Policy on Academic Dishonesty in the [student conduct code](https://dos.uoregon.edu/conduct) (located at dos.uoregon.edu/conduct).

Inclusiveness

Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities. Our classroom is a learning environment, and as such should be a safe, inclusive and respectful place. Being respectful includes using preferred pronouns for your classmates. Disrespecting fellow students as well as combative approaches, tones and/or actions are not acceptable. Please make me aware if there are classroom dynamics that impede your (or someone else's) full engagement.

Communication

In general, our class will communicate through our Canvas site. Announcements and emails are archived there and automatically forwarded to your UO email, and can even reach you by text. Check and adjust your settings under Account > Notifications. I will have a running Discussion forum on our Canvas site called "Question Board" for the entire group to ask and answer questions.

I will make myself as available as possible for questions related to course material. However, I ask that you make an honest effort to find the answers yourself, including posing questions to fellow students first (you can do this through Canvas). If it pertains to course administration, double-check the syllabus and Canvas. If you email after regular business hours you may not hear back from me until the next day. *Please include "BI 213" in the subject line of all emails.*

Prohibited Discrimination and Harassment

UO is committed to providing an environment free of all forms of prohibited discrimination and harassment, including sex or gender based violence. As an instructor, one of my responsibilities is to help create a safe learning environment for my students and for the campus as a whole. Students experiencing any form of prohibited discrimination or harassment may seek further information on safe.uoregon.edu, respect.uoregon.edu, titleix.uoregon.edu, or aaeo.uoregon.edu or contact the Title IX office (541-346-8136), Office of Civil Rights Compliance office (541-346-3123), or Dean of Students offices (541-346-3216), or call the 24-7 hotline 541-346-SAFE for help.

Crises Happen

If you are having difficulties that are interfering with your ability to do well in the class, please tell an instructor as soon as possible. We may be able to refer you to someone for help or to make special arrangements if the need is real and you have done your best to deal with the situation in a timely manner. There is a Crisis Center on campus that you should not hesitate to call if you, or a friend, are in need of assistance. Their phone number is 346-4488.

Reporting

The instructor of this class is a *'Student-Directed Employee.'* As such, if you disclose to me, I will respond to you with respect and kindness. I will listen to you, and will be sensitive to your needs and desires. I will not judge you. I will support you. As part of that support, I will direct students who disclose sexual harassment or sexual violence to resources that can help. I will only report the information shared to the university administration when you as the student requests that the information be reported (unless someone is in imminent risk of serious harm or is a minor). Please note the difference between 'privacy' and 'confidentiality.' As a Student-Directed Employee I can offer privacy because I am not required to report certain information to the university. However, I cannot be bound by confidentiality in the same way that a counselor or attorney is. Confidential resources such as these means that information shared is protected by federal and state laws. Any information that I as a student-directed employee receive may still be accessed by university or court proceedings. This means, for example, that I could still be called as a witness or required to turn over any related documents or notes that I keep. Please note also that I am required to report all other forms of prohibited discrimination or harassment to the university administration. Specific details about confidentiality of information and reporting obligations of employees can be found at <https://investigations.uoregon.edu/>

Mandatory Reporting of Child Abuse

UO employees, including faculty, staff, and GEs, are mandatory reporters of child abuse. Child abuse pertains to individuals who are under the age of 18. This statement is to advise you that your disclosure of information about child abuse to the instructor may trigger my duty to report that information to the designated authorities. Please refer to the following link for detailed information about mandatory reporting: <https://hr.uoregon.edu/policies-leaves/general-information/mandatory-reporting-child-abuse-and-neglect>

CAMPUS RESOURCES

Class Encore

Class Encore sets up small, structured study groups for challenging classes. Groups meet once a week for 50 minutes, **weeks 2-10**, and are **FREE** and open to **ALL** students enrolled in the class. Class Encore sessions give students the opportunity to: ask questions, discuss course concepts, practice study strategies, collaborate to solve problems, groups are led by students who previously excelled in the class and maintain a high GPA. They attend the class, participate in weekly planning sessions, and lead the study groups in reviewing course concepts and study strategies. Registration opens Wednesday September 26th at 9am (<https://engage.uoregon.edu/class-encore>). Wednesdays: 2 pm & 3pm. Thursdays: 3 pm & 4pm.

Tutoring and Academic Engagement Center

Drop-in math and writing support in addition to tutoring, and study skills support. Located in the 4th Floor Knight Library (541) 346-3226, engage@uoregon.edu. <https://engage.uoregon.edu/services/>

Accessible Education Center (AEC)

The University of Oregon is working to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your participation, please notify us as soon as possible. You are also encouraged to contact the Accessible Education Center if you are not a student with a documented disability, but you would like for us to know about class issues that will impact your ability to learn, contact us so that we can strategize how you can get the most out of this course. They are available Monday-Friday 8am-5pm by calling (541) 346-1155 or emailing uoaec@uoregon.edu. <https://aec.uoregon.edu/>

UO Access Shuttle

The UO Access Shuttle is an on-campus ride service provided at no cost to students with conditions that limit mobility. More information and a sign-up form can be found on the parking & transportation department website: <https://parking.uoregon.edu/content/access-shuttle>.

Center for Multicultural Academic Excellence (CMAE)

Promoting student retention and persistence for historically underrepresented and underserved populations. Programs and services that support retention, academic excellence, and success at the UO and beyond. Committed to all students, including undocumented and tuition equity students. Email cmae@uoregon.edu. or call the front desk at 541-346-3479.

Counseling Center

The Counseling Center provides students with confidential consultation 24 hours a day, 7 days a week. Their number is 346-3227. Students often believe that their issues are not “severe” enough for them to call, but at the Counseling Center, no problem is too small. <https://counseling.uoregon.edu/>.

If you’re unable or don’t wish to come to the Counseling Center in person, help is still available. Our after-hours support/crisis line is open to all students, wherever you are located. Call 541-346-3227 when the Counseling Center is closed to speak to a therapist. Counseling Center staff can help you figure out how to find mental health services in your area. Call 541-346-3227 during business hours to schedule a consultation with a case manager.

Dean of Students

The Dean of Students website has additional resources targeted to specific communities on campus. Check out <https://dos.uoregon.edu/community> for information on the Black Cultural Center, LGBT+ Support Services, the Women's Center, as well as resources for Nontraditional students and Veterans.

Duck Rides (formerly 'Safe Rides')

Duck Rides is a student-led organization dedicated to providing free and accessible transportation to all university students, staff and faculty. The goal is to provide safe transportation that is an alternative to walking home alone at night, and to prevent sexual assault and driving under the influence. Hours of Operation: 6:00 pm – 12:00 am. 7-days-a-week. 541-346-7433. duckrides@uoregon.edu. <https://duckrides.uoregon.edu/>

COVID PROTOCOLS

Academic Disruption

In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in this course will be communicated as soon as possible by email, and on Canvas. If we are not able to meet face-to-face, students should immediately log onto Canvas and read any announcements and/or access alternative assignments. Students are also expected to continue coursework as outlined in this syllabus or other instructions on Canvas.

In the event that the instructor of this course has to quarantine, this course may be taught online during that time.

COVID Containment Plan for Classes

As the University of Oregon returns to in-person instruction, the key to keeping our community healthy and safe involves **prevention, containment, and support**. Here is information critical to how the UO is responding to COVID-19.

- **Prevention:** To prevent or reduce the spread of COVID-19 in classrooms and on campus, all students and employees must:
 - Comply with [vaccination policy](#)
 - [Wear face coverings](#) in all indoor spaces on UO campus
 - Complete weekly [testing](#) if not fully vaccinated or exempted
 - [Wash hands](#) frequently and practice social distancing when possible
 - Complete daily [self-checks](#)
 - Stay home/do not come to campus if feeling [symptomatic](#)
 - Complete the UO [COVID-19 case and contact reporting form](#) if you test positive or have been in close contact with a confirmed or presumptive case.

- **Containment:** If a student in class tests positive for COVID-19, all relevant classes will be notified via an email by the Corona Corps Care Team with instructions for students and staff based on their vaccination status. Specifically:

- **Vaccinated and Asymptomatic students:** Quarantine not required, but daily self-monitoring before coming on campus is advised; sign up for testing through MAP 3-5 days after exposure if advised you are a contact.”
- **Unvaccinated or partially vaccinated students:** 14-day quarantine advised – do not come to class – and sign up for testing 3-5 days after notification through MAP, if asymptomatic, or through University Health Services (541-346-2770) or your primary care provider, if symptomatic.
- **Symptomatic students:** stay home (**DO NOT** come to class/campus), complete the online case and contact form, and contact University Health Services (541-346-2770) or your primary care provide to arrange for immediate COVID-19 testing.

Students identified as a **close contacts** of a positive case will be contacted by the Corona Corps Care Team (541-346-2292).

- **Support:** The following resources are available to you as a student.
 - University Health Services or call (541) 346-2770
 - University Counseling Center or call (541) 346-3277 or (541) 346-3227 (after hrs.)
 - MAP Covid-19 Testing
 - Corona Corps or call (541) 346-2292
 - Academic Advising or call (541) 346-3211
 - Dean of Students or call (541)-346-3216

Good Classroom Citizenship

- **Wear your mask** and make sure it fits you well
- **Stay home** if you're sick (we will work with you to make sure that you are not penalized!)
- **Get to know your neighbors** in class, and let them know if you test positive
- **Get tested** regularly
- Watch for **signs and symptoms** with the daily symptom self-check
- **Wash your hands** frequently or use hand sanitizer

Complete the UO COVID-19 **case and contact reporting form** if you test positive or are a close contact of someone who tests positive.

COURSE SCHEDULE

Week	Date	Lecture Topic	LABS (W or R)
1	9/27	Natural Selection I	Plant Diversity & sow fern spores Artificial Selection (AS) 1: Survey Trichomes of P ₀
	9/29	Natural Selection II	
	10/1	Population Genetics I	
2	10/4	Population Genetics II	Population Genetics I & Issues Project Introduction AS2: Pollinate Hairiest P ₀
	10/6	Species Concepts	
	10/8	Speciation and Isolating Mechanisms	
3	10/11	History of Early Life on Earth	Population Genetics II & Field Trip Planning
	10/13	Evolutionary Trends in Plants	
	10/15	<i>no lecture due to fieldtrip</i>	
	10/16 or 10/17	FIELDTRIP	
4	10/18	Phylogenetics I	Plant Phylogenetics
	10/20	Phylogenetics II	
	10/22	Mechanisms of Evolution	
5	10/25	MIDTERM EXAM	Honey Bee Behavior
	10/27	Behavioral Ecology I	
	10/29	Behavioral Ecology II	
6	11/1	Population Ecology: Exponential Growth	Population Ecology Review AS 3: Harvest and Plant F ₁ Seeds
	11/3	Population Ecology: Logistic Growth	
	11/5	Population Ecology: Life Histories	
7	11/8	Community Ecology: species interactions	Veterans Day: no labs this week
	11/10	Community Ecology: consumption	
	11/12	Community Ecology: competition	
8	11/15	Community Ecology: mutualism	Project Presentations AS 4: Survey trichomes of F ₁
	11/17	Community Ecology: succession	
	11/19	Community Ecology: biodiversity	
9	11/22	MIDTERM EXAM II	Thanksgiving: no labs this week
	11/24	<i>no class due to Thanksgiving</i>	
	11/26	<i>no class due to Thanksgiving</i>	
10	11/29	Ecosystem Ecology: energy	Project Presentations AS5: Data Analysis
	12/1	Ecosystem Ecology: nutrients	
	12/3	Conservation biology	
FinalsWeek	12/6	FINAL EXAM 10:15	

FREEMAN etal EDITIONS

Lecture Topic	Open Stax 'Biology 2e'	6th edition	5th edition	4th edition
	Section	Ch. Pages	Ch. Pages	Ch. Pages
Natural Selection I	18.1	22 435-437, 445-455	25 444-446, 453-463	24 414-416, 422-432
Natural Selection II	19.3			
Population Genetics I	19.1 & 19.2	23 456-465, 469-479	26 465-475, 478-486	25 435-452
Population Genetics II				
Species Concepts		24 480-495	27 489-502	26 458-471
Speciation	18.2	tbd	28 516-517	27 484-486
History of Early Life	Appendix B	25 504-506	28 513-516,518-520	27 481-484
	22.1 & 22.3	26 528-532	29 536-541	28 506-510
	23.1	27 546-549	30 559-563	29 526-529
Evolutionary Trends in Plants	25.1	28 564-587	31 580-599, 601-609	30 549-564, 569-577
Phylogenetics I	Chapter 20	25 496-503	28 505-511	27 474-479
Phylogenetics II		BS13 47-48	BS7 B10-B11	BS3 B4-B6
Mechanisms of Evolution	Chapter 19	23 456-465, 469-479	26 465-475, 478-486	25 435-452
Behavioral Ecology I	45.7	50 1051-1054	53 1082-1085	51 1019-1020
Behavioral Ecology II		50 1064-1067	53 1095-1098	51 1031-1034
		50 1061-1062	53 1091-1095	51 1027-1030
Population Ecology: Exponential Growth	44.1 & 45.3	51 1070-1079	54 1101-1108	52 1037-1044
Population Ecology: Logistic Growth	45.4 & 45.5	51 1079-1080	54 1109-1112	52 1044-1047
		51 1084-1086	54 1115-1118	52 1050-1053
Population Ecology: Life Histories	45.2			
Community Ecology: species interactions	45.6	52 1092-1103	55 1123-1135	53 1058-1070
Community Ecology: consumption	45.6	51 1081-1083	54 1113-1115	52 1047-1050
Community Ecology: competition	45.6	52 1103-1107	55 1137-1138	53 1072-1073
Community Ecology: mutualism	45.6			
Community Ecology: succession	45.6	52 1107-1111	55 1135-1137, 1138-1	53 1070-1072,1073-107
Community Ecology: biodiversity	47.1, 47.2 & 47.3	52 1111-1113	55 1142-1145	53 1077-1080
Ecosystem Ecology: energy	44.3,44.4, 46.1 & 46.2	49 1039-1048	52 1068-1079	50 998-1008
		53 1117-1120	56 1148-1149,1153-1	54 1083-1086
		53 1117-1120	56 1149-1153	54 1087-1092
Ecosystem Ecology: nutrients	46.3	53 1123-1129	56 1156-1162	54 1092-1097
Conservation biology	47.4	54 1156-1159	57 1172-1193	55 1105-1113
		53 1129-1136	56 1166-1169	54 1098-1102