Final Portfolio
Sophie Buysse
ISE870
Spring 2024

Course Content:

This course is part of a 3 course introductory biology series. This is the second course. The first course covered macromolecules, organelles, cell structure, cellular respiration, transcription, translation, and DNA replication. Thus, the first course was focused on within cell processes. In this course, we review cellular processes, discuss ways that different cells communicate, and learn how genetic information is passed on between generations. Most of the information in unit 1 will be review from the prior course, but students may have transfer credit for that course from other universities or college credit from high school courses, so time to review these critical topics is necessary. This course introduces natural selection and population genetics in the final unit, but the third course in the introductory series will spend more time on evolution and ecology to expand on these subjects.

Because this course is part of an introductory series, it is taken mostly by first and second year students. These students are mostly STEM majors who take this course because it is a prerequisite to upper division biology courses or because it is required for their major. Students who take this course may have future career plans as doctors, chemists, environmental scientists, or other STEM positions. I am designing the lecture portion of this course. The lab is required concurrently but is treated as a separate course.

Syllabus:

College of Natural Science
MICHIGAN STATE UNIVERSITY

BIOL 201 - Fall 2024 Syllabus

Instructor: Sophie Buysse

Intermediate Cell Biology and Genetics (BIOL 201)

Credit hours: 4 Modality: face-to-face

Class Time: Tue/Thur 9:10 – 10:30am

Class location: STEM 2130

Class website: D2L

Table of Contents

The following is a hyperlinked table of contents for this syllabus.

Instructors

Instructor Information

Instructor: Sophie Buysse (pronounced buy-see)

- **Pronouns**: she/her
- **Office**: PLB 266
- **Student Help Hours**: Monday and Wednesday from 2-4pm
- **Additional Appointments**: If student help hours do not work with your schedule, you may set up additional appointments by requesting a meeting through outlook calendar. My calendar is kept up to date with my availability for in-person meetings. Zoom appointments are not available. To request an appointment, navigate to your outlook calendar, choose new meeting, enter my email as required, navigate to scheduling assistant, and choose a time when I am available. All meetings will be in my office. Please describe any particular topics you would like to discuss in the meeting description.
- **Office Telephone**: 555-555-5555
- **E-mail**: buysseso@msu.edu (see the How to Contact the Instructor section below for details)
- **Website**: sfbuysse.github.io

Graduate Teaching Assistant or Undergraduate Learning Assistant

This course will have 1 TA who assists during lectures, holds weekly help hours, and holds exam review sessions. There is also 1 ULA who assists during lectures.

TA: Name

- **Pronouns**:
- **Office**: Location
- **Office Hours**: Times & Days (Note: if online explain how to access)
- **Appointments Outside Office Hours**: describe how to make an appointment
- **Office Telephone**: Phone Number, if applicable
- **E-mail**: E-mail address, or another preferred form of communication

ULA: Name

- **Pronouns**:
- **Appointments**: describe how to make an appointment
- **E-mail**: E-mail address, or another preferred form of communication

How to Contact the Instructor

Please contact me via email or by coming to student help hours. If sending an email, please use "BIOL 201" to help keep my inbox organized – my inbox gets quite full but I do want to hear from you! I will respond to emails within 48 work hours. It is OK to reach out with a second email if I have not responded within 3 work days (i.e., if you email on Friday morning, send another email if I have not responded by Wednesday morning). If you are emailing regarding grading that was done by the TA, please cc the TA on the email.

Student help hours are held weekly by my and the TA. Their purpose is to answer concept questions from the week or review material from prior weeks. They are a great place to get feedback on homework assignments, assistance with current topics, discuss problem solving strategies, or make a plan for studying. I care about the success of each student, even if I cannot meet with all of you individually due to the size of this class. When you have questions about the course material, subject more broadly, or any concerns, needed accommodations, or thoughts you want to share, please contact me or the TA.

Course organization questions and content questions can be posted as discussions on D2L for peers or the instructional team to answer. I encourage you to use this format for asking content questions because other students likely have the same question. D2L discussions are considered an extension of the classroom and will be monitored for appropriate language and adherence to class culture norms.

Course announcements will be sent out through D2L posts. You can configure your D2L settings to get a notification when D2L announcements are posted for the course.

Course Information

Course Description

BIOL 201 builds on the material covered in BIOL 101. This course includes biological molecules, cell structure, metabolism, classical genetics, and population genetics. These topics provide fundamental understanding for future careers in a variety of STEM fields. The main goal of this course is to provide you with a basic understanding of cell structure and genetics. We will also focus on skills needed to interpret scientific information in everyday settings. This course is a building block for future courses in biology or other STEM fields. Assessment in this course is through in-class activities, weekly quizzes, and exams. Material in BIOL 205 will build on this course. Prerequisite BIOL 101 and Corequisite BIOL201-L or BIOL-201HL

Course Overview

This course is composed of 3 units with an exam following each unit. The first unit focusses on reviewing macromolecules, plant and animal cells, gene expression, and protein targeting. This unit is designed to provide a cellular overview before covering the specifics of gene expression. The next unit focuses on cellular interactions including signal transduction and metabolism. This unit will include group projects to write research proposals to investigate cellular respiration in different organisms. The final unit focuses on how genetic information is passed on to further generations and an introduction to population genetics. This unit includes group projects to review literature and draw a model for how an assigned gene is expressed to produce a phenotype. The final exam will occur during final exam week at the University assigned time. This exam will be 75% on material in unit 3 and 25% cumulative material.

This course includes a mixture of readings and pre-class video lectures as well as weekly quizzes. Time in class is dedicated to problem solving and cooperative learning activities. Cooperative learning activities are all designed with both individual and group accountability. The instructional team is here to support all students!

This course is expected to be challenging, and being challenged is a normal part of the learning process. However, the exams and assignments are designed so that any student who is willing to put in the time to attend class consistently, work extensively outside of class, use or develop good study strategies, and contact the TA or instructor when they are struggling can develop a thorough understanding of the course material and succeed in the course.

Course Structure

This course will meet face-to-face weekly on Tuesdays and Thursdays from 9:10am-10:30am. We use a course management system, and you will need your MSY NetID to log in to the course from the D2L homepage. The online components of the course include accessing the syllabus and other course materials, submitting assignments, and receiving feedback on assignments.

Prerequisite and Corequisite

Prerequisite: BIOL101 (or equivalent transfer credit)

Corequisite: BIOL201-L or BIOL201-HL (1 credit)

Required Textbook & Course Materials

A textbook will likely be required for this course but is not currently chosen. The textbook will be available to check out from the library. The e-book version is acceptable. Older versions are also acceptable. Page numbers may be different, so reading assignments will be given based on chapter and section headings.

A hard copy of the book is on reserve at MSU Libraries. At the main library, go to the 1st-floor circulation desk to reserve it. Reservations are for two-hour blocks with in-building use only so plan accordingly. One copy is on reserve; if you find that it is often checked out, then let the instructor know to request an additional copy to be placed on reserve.

Any student who is having difficulty accessing our textbook or is concerned about other important needs (e.g., food; rent) is encouraged to reach out to me. I will connect you with resources that may be available to help you so that these challenges do not affect your learning in our course.

You do **not** have to purchase any other tools for this course. Any additional readings or course materials will be available for free on our course website.

Required Technologies

Students are required to have use of a calculator (not on their phones) for exams and use of a computer with internet connection to complete in class activities. During other class days, the calculator on a phone is acceptable. If your computer is not working, then consider using a computer lab on campus. They are located across campus: see the Computer Lab Locations and Hours page for details. Students will need to be able to navigate D2L and Microsoft products (Word, Excel, PowerPoint). All assignment instructions will be compatible with Microsoft products. It is free for MSU students to use Microsoft products through Spartan 365. Students are expected to log in to D2L during class and to complete homework assignments between class periods.

All course materials will be shared through D2L. If you are new to D2L, then register for a D2L self-guided course: log in with your MSU NetID and password at d2l.msu.edu, select "Self Registration" from the menu bar, register for and complete the course named "Students - Getting Started with D2L." Also, be aware of the "Help" option on the D2L Home page menu.

This course will use the free version of Tophat. Visit https://tophat.com/students/ to register for Tophat and join our course with the code: COURSECODE

The teaching team is not responsible for technical issues associated with the use for D2L, the MSU server, or Tophat. Alternate options will be made if Tophat is having technical issues during class, but otherwise technical issues are not acceptable reasons to miss deadlines.

Instructional Objectives

Course Objectives

After completing this course, students will be able to:

- Describe the processes of transcription, translation, DNA replication, glycolysis, mitosis, meiosis, natural selection and their importance in cellular biology or genetics.
- Create and interpret graphical representations of data and models of biological phenomena
- Apply concepts of cellular biology and genetics to real world scenarios

Students will meet the course objectives through the following actions:

- Attend class sessions and participate collaboratively with peers to complete in-class activities
- Complete modelling and research projects throughout the semester to apply course content to their future goals
- Complete 3 exams

Unit level objectives will be posted on D2L.

Course Schedule

See the Academic Calendar for other important dates this semester.

Assessment Dates

All exams, including the final exam, will be in person in STEM 2130. Exams 1 and 2 will occur on normal class days during the scheduled class time. The final exam is during final exam week on Wednesday, Dec. 11th at 8:30am in STEM 2130. The final exam may be taken early for approved absences. The final exam may not be taken late if it is missed.

See the detailed schedule below for dates of other assessments. Weekly quizzes will be given through D2L and due at 8:00am on Tuesday morning. You will have 2 attempts for each quiz, and each quiz is worth 10 points. All dates in the below schedule are tentative besides the final exam date and can be changed at the discretion of the professor.

Course Schedule

The table below describes the weekly activities including week, topic, readings, activities, and due date. The first column describes the week. The second column describes day of the week. The third column described the date. The fourth column described the topic. The fifth column describes the readings. The sixth column describes the class activities. The seventh column describes the due date.

Week	***Day***	***Date***	***Topic***	***Readings***	***Class Activities***	***Due Dates***
Week 1	Tue	*Aug. 27*	Introductions + review		Week 1 Activity	Jan. 18
	Thur	*Aug. 29*	Plant and Animal Cells			
Week 2	Tue	Sept. 3	DNA Structure			
	Thur	Sept. 5	Transcription			
Week 3	Tue	Sept. 10	Translation			

Week	*Day*	*Date*	*Topic*	*Readings*	*Class Activities*	*Due Dates*
	Thur	Sept. 12	Gene Expression			
Week 4	Tue	Sept. 17	Proteins			
	Thur	Sept. 19	Protein Targetting			
Week 5	Tue	Sept. 24	**Exam 1**			
	Thur	Sept. 26	Membrane Transport			
Week 6	Tue	Oct. 1	Endomembrane System			
	Thur	Oct. 3	Signal Transduction 1			
Week 7	Tue	Oct. 8	Signal Transduction 2			
	Thur	Oct. 10	Glycolysis			
Week 8	Tue	Oct. 15	Oxidative Phosphorylation			
	Thur	Oct. 17	Alternate Energy Pathways			
Week 9	Tue	Oct. 22	No Class. Break Day.			
	Thur	Oct. 24	Respiration Projects			
Week 10	Tue	Oct. 29	Exam 2			
	Thur	Oct. 31	DNA Replication			
Week 11	Tue	Nov. 5	Replication errors + correction			
	Thur	Nov. 7	Mitosis			
Week 12	Tue	Nov. 12	Cell Cycle & Regulation			
	Thur	Nov. 14	Meiosis		Meiosis Activity	
Week 13	Tue	Nov. 19	Modes of inheritance		Genetic Diversity activity	
	Thur	Nov. 21	Genotype to Phenotype Projects			
Week 14	Tue	Nov. 26	Natural Selection			
	Thur	Nov. 28	No class. Thanksgiving Break.			
Week 15	Tue	Dec. 3	Genetic Drift			

Week	*Day*	*Date*	*Topic*	*Readings*	*Class Activities*	*Due Dates*
	Thur	Dec. 5	Migration			
Final Exam	Wed	Dec. 11	75% unit 3, 25% cumulative			

Grading Policies

Assignment Submission

All assignments will be submitted through D2L as either word documents or as images of whiteboards from in class activities unless otherwise instructed. Assignments must be submitted by the given deadline or special permission must be requested from the instructor before the due date. Extensions will not be given beyond the next assignment expect under extreme circumstances. Late work is not accepted in this course except under extreme circumstances.

All exams will be taken in-person on paper with scantrons and free response questions.

Grade Determination

The final grade will be determined as follows:

10% pre-class quizzes (15 total, lowest 2 scores are dropped)

30% in class activities (15)

15% Group projects (2)

15% Exam 1 (after corrections)

15% Exam 2 (after corrections)

15% Exam 3 (no opportunity for corrections)

Grades will not be curved.

Viewing Grades and Feedback

Grades for all assignments and exams will be provided through D2L. Written feedback on assignments will be given through D2L. This information will be important for correcting any misunderstandings before an exam. Please set up a meeting with me or the TA for personalized exam feedback. You may also set up a meeting with me at any time to discuss your grade. If you believe an assignment has been inaccurately graded, you must bring it to my attention within a week of the grades for that assignment being released.

All grades are saved in D2L. ***This tutorial explains how to view your grades on D2L*** and ***this tutorial shows how to view your class progress***, which includes your minimum and maximum possible final grade.

Grading Scale

The table below illustrates the relationships between grades and percentages. The first column identifies the grade. The second column provides the percentage range associated with that grade.

Grade	Percentage
4.0	At least 90%
3.5	85% to 89.9%
3.0	80% to 84.9%
2.5	75% to 79.9%
2.0	70% to 74.9%
1.5	65% to 69.9%
1.0	60% to 64.9%
0	59.9% and below

Testing Guidelines

All exams will be face-to-face and taken on paper in STEM 2130. Students may use on side of an 8.5x11 sheet of paper for notes. Student can use a calculator (not on their phone) during each exam.

Following each exam, there will be the opportunity to make test corrections to earn back partial credit. ¼ point will be added to your test score for each test correction turned in. Test corrections must be turned in one week after graded exams are passed out. Further details on the format for test corrections will be provided in class.

Outside of test corrections, students are not permitted to revise assignments after they have been graded. If you are ever confused about instructions while working on an assignment, please reach out to me. See the How to Contact the Instructor section.

Late Work Policy

Late assignments are not accepted in this course. *If you find that you are falling behind in the course, then please contact me, and I can help you develop or refine your time management strategy. If you are feeling overwhelmed with all your courses, please talk with your advisor for guidance. You are not alone.*

Course Policies

Students are expected to adhere to the policies of Michigan State University whether noted in this syllabus or not. Instructors have the right to add or adjust policies within limits for the specifics of their courses. While the below may appear at first glance to be common policy boilerplate there may be nuances or course specifics within it that the student must be aware of and adhere to.

Spartan Code of Honor

On March 22, 2016, The Associated Students of Michigan State University (ASMSU) adopted the following Spartan Code of Honor:

"As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do."

Commit to Integrity: Academic Honesty

All participants in this class are held to the standard set by MSU's Policy on Integrity of Scholarship and Grades. The policy can be read in full at the all-University Policy on Integrity of Scholarship and Grades.

Article 2.III.B.2 of the Academic Rights and Responsibilities states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the *[insert name of unit offering course]* adheres to the policies on academic honesty as specified in General Student Regulations, 1.00 Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades, and 17.00 Examinations.

Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, lab work, quizzes, tests, and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit coursework you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use the www.allmsu.com Web site to complete any coursework in this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your coursework.

Use of ChatGPT and AI Technology

Unless otherwise noted, ChatGPT is not allowed to answer test questions. Any use of ChatGPT or AI Technology must be detailed in assignments. ChatGPT may be used as a guide and could be helpful to explain course concepts, but cannot be used to complete assignments.

Violations of Academic Dishonesty

You are capable of meeting my expectations for this course. If you feel overwhelmed and cannot complete your assignments by the due date or if you want to help a friend who is struggling to complete an assignment, please talk to me about the situation. We will work together to come up with a solution. I strongly recommend that you not consider academic misconduct to solve your problem or a friend's problem.

Resource Center for Persons with Disabilities (RCPD): Inform Your Instructor of Accommodations

Please inform me of any Accomodation Letters as soon as possible so we can make a plan and I can make sure my instruction meets your needs.

Attendance and Participation

This course followed the University Attendance Policy which states, in part: Students whose names do not appear on the official class list for this course may not attend this class. Students who fail to attend the first four class sessions or class by the fifth day of the semester, whichever occurs first, may be dropped from the course.

Attendance is important for this course because many assignments will be completed in groups during class time. In the case of an absence, the in-class activities are still expected to be completed by the due date (8:00am before the next class) to receive credit.

Religious Observances

Michigan State University is home to a vibrant, diverse, and multicultural community of students, faculty, and staff, and we value and actively support that diversity, including the diversity of spiritual expression and practice. Therefore, it is the policy of the University to enable students and faculty to observe those days set aside by their chosen religious faith.

I reviewed MSU's religious observance calendar while developing the course schedule to ensure that no point-heavy assignments or assessments will be due on major holidays- please let me know if I missed anything. However, class periods may fall on holidays. In these cases, in accordance with MSU's Religious Observance Policy, if you will be absent from class due to a religious observance, please inform me **at least two weeks** beforehand. We will develop a plan for you to make up any missed work. Please see MSU's Religious Observance Policy for more information.

Grief Absences

An unfortunate part of life is the loss of loved ones. If you experience the death of a family member or emotional distress from a similar tragedy, then please complete a Grief Absence form, which signals to your Associate Dean or designee of your college that you need time to grieve and heal. Upon approval, the Associate Dean or designee will contact your instructors on your behalf with the approved accommodations. Then I and the rest of your instructors will develop plans for you to make up the work at a later date. I also recommend talking to someone through MSU Counseling and Psychiatric Services.

Limits to Faculty/Student Confidentiality; Mandatory Reporting

Essays, journals, and other materials submitted for this class are generally considered confidential according to the University's student record policies. However, students should be aware that University employees, including instructors, may not be able to maintain confidentiality when it conflicts with their responsibility to report certain issues to protect the health and safety of MSU

community members and others. As the instructor, I must report the following information to other University offices (including the Department of Police and Public Safety) if you share it with me:

- Suspected child abuse/neglect, even if this maltreatment happened when you were a child,
- Allegations of sexual assault or sexual harassment when they involve MSU students, faculty, or staff, and
- Credible threats of harm to oneself or others.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In almost all cases, it will be your decision whether you wish to speak with that individual. ***If you would like to talk about an event in a more confidential setting you are encouraged to make an appointment with the MSU Counseling & Psychiatric Services or the MSU Center for Survivors.***

Disruptive Behavior

Article 2.III.B.4 of Student Rights and Responsibilities for students at Michigan State University states: "The student's behavior in the classroom shall be conducive to the teaching and learning process for all concerned." Article 2.III.B.10 states that "The student and the faculty share the responsibility for maintaining professional relationships based on mutual trust and civility." General Student Regulation 5.02 states: "No student shall . . . obstruct, disrupt, or interfere with the functions, services, or directives of the University, its offices, or its employees (e.g., classes, social, cultural, and athletic events, computing services, registration, housing and food services, governance meetings, and hearings)." Students whose conduct adversely affects the learning environment may be subject to disciplinary action through the Student Judicial Affairs office.

Classroom Building Information

General information about the STEM building *to be filled in when this class exists*:

- Lab supplies room # (if students are in charge of collecting their supplies):
- "Lost and Found" room #:
- Lactation room # (or closest building with a designated lactation room; see map):
- All-gender bathrooms:
- If applicable, which floors have men's and women's bathrooms

Food and Beverage Policy

If you bring food or beverages into the classroom, please be mindful of allergens (i.e., avoid bringing peanuts as your peers may have severe allergies). If consuming food is distracting for those around you, please step out of the classroom to eat quickly.

Course Recordings, Intellectual Property, and Social Media Use

Course Recordings: Meetings of this course may be recorded. The recordings may be available to students registered for this class. This is intended to supplement the classroom experience. Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Recordings may not be reproduced, shared with those not in the class, or uploaded to other online environments. Doing so may result in disciplinary

action. If the instructor or another University office plan other uses for the recordings beyond this class, students identifiable in the recordings will be notified to request consent before such use.

Commercialized Lecture Notes: Commercialization of lecture notes and university-provided course materials is *not permitted* in this course.

As members of a learning community, students are expected to respect the intellectual property of course instructors. All course materials presented to students are the copyrighted property of the course instructor and are subject to the following conditions of use:

Students may not record lectures or other classroom activities

University Concerns

The Office of the University Ombudsperson is available to assist students with any conflict or problem that has to do with being a student at Michigan State University. You may visit the Ombudsperson at 129 North Kedzie, call (517) 353-8830, or e-mail ombud@msu.edu. The Office of the University Ombudsperson is an independent, neutral, informal, and confidential resource and does not accept formal complaints, nor does it provide notice to the University.

Student Perceptions of Learning Survey (SPLS)

Michigan State University takes seriously the opinion of students in evaluating and enhancing the quality of instruction and has implemented the SPLS process to gather student feedback. You will receive an email in the last ten calendar days of class asking you to complete the SPLS at your convenience. You have the option to decline to participate in the survey by not responding to any of the questions. We hope students are willing to provide frank and constructive feedback so the information can be used to enhance the quality of teaching in the future. MSU protects student confidentiality by reporting SPLS responses as an aggregated summary after the window closes for instructors to submit grades and responses are not reported when fewer than three students participate. More information about the SPLS is available at spls.msu.edu.

Expectations for Student Research

Students are expected to conduct themselves in accordance with the policies and procedures outlined in their Responsible Conduct of Research (RCR) training, given at orientation.

Learning Continuity Statement

If you should become ill or become otherwise unexpectedly unable to participate in the course, let me know via email as soon as possible with an explanation and appropriate documentation. At that point we will work together to come up with new deadlines if needed. If your absence is prolonged, we will discuss options to complete the course with the potential for alternate assignments if you cannot participate in class activities. We may also discuss if an “Incomplete” is a good option for you. In cases of prolonged absences, groups may be restructured so the remaining members do not have additional duties compared to other groups. Due to the activity focused nature of this course, remote attendance is not possible.

Course Continuity Statement

If I become unable to teach the course for a period of time this semester, a substitute will be able to step in. This may be the TA for a single class, but will be a faculty member for longer periods of time. If this happens, you will be notified via a D2L announcement. If this occurs, grading assessments may be delayed. This is not expected to change the course schedule.

In the even of an emergency that requires all instruction be moved online-only, we will meet via zoom at the same time. A zoom meeting link will be announced on D2L.

Emergency Procedures

In the event of an emergency arising within the classroom, the instructor will notify you of what actions may be required to ensure your safety. It is the responsibility of each student to understand the evacuation, "shelter-in-place," and "secure-in-place" guidelines posted in each facility and to act safely. You are allowed to maintain cellular devices in silent mode during this course to receive an emergency SMS text, phone, or email messages distributed by the university. When anyone receives such a notification or observes an emergency situation, they should immediately bring it to the attention of the instructor or a TA in a way that causes the least disruption. If an evacuation is ordered, please ensure that you do it safely and facilitate those around you that may not otherwise be able to safely leave. When these orders are given, you do have the right as a member of this community to follow that order. If a shelter-in-place or secure-in-place is ordered, please seek areas of refuge that are safe depending on the emergency encountered and assist if it is advisable to do so. Policy prepared by Former Captain Penny Fischer Michigan State University Police.

I also encourage you to download the SafeMSU app and allow for push notifications to receive emergency notices. The app is available for free on the App Store and Google Play.

Policies for Student Athletes

If you are a student-athlete, please bring your team schedule to me during office hours at the beginning of the semester and contact me in advance of any missed classes to set up a plan for completing any missed work. The absence is excused, but this does not excuse the student-athlete from completing the work assigned. If assignments are due in class on a day that you will be away, they must be completed and turned in before you leave for the event.

Honors Option

There is no Honors option for this course. If you are an Honors student, be sure to register for the Honors lab course concurrently.

Syllabus Revision

The instructor reserves the right to revise or adjust the course syllabus to best accommodate the pace and needs of the students. Syllabus revisions will be communicated in class and through D2L announcements with an updated syllabus uploaded to the D2L site.

MSU Resources for Students

MSU provides extensive academic support for students designed to let them achieve the academic success they are truly capable of. I have provided a list of many of the academic support offices and resources offered by MSU and East Lansing below (see this Student Resources page for additional resources). Each name is linked to their website. The resources vary quite a bit in their purpose: whether they help directly with students' courses, such as the Writing Center, help students find belonging, such as the English Language Center, help with personal lives, such as the Student Parent Resource Center, or help with managing the intersection of personal and professional lives, such as the Counseling and Psychiatric Services.

These resources are freely available to students, so please take advantage and use them. Most students access them at some point in pursuit of their degree.

Academic and Future Career Resources

- The Writing Center: Helps with writing essays, making posters or infographics, or citing
- Libraries (or call 517-432-6123): Helps with finding information sources and citing
- IT Service Desk (or call 353-8830 or 844-678-6200 or email ithelp@msu.edu): Helps with any technical issues, such as if a course program is not working on your personal computer
- Desire2Learn Help Site: Helps with understanding how to use D2L, MSU's learning management system
- SpartansLearn: Provides assistance with technologies, including Microsoft 365 applications
- Computer Lab Locations and Hours: Available if your computer/tablet or printer breaks down
- How to Connect Online Page: Includes options on what to do if your internet is not working and a list of free and low-cost internet connectivity programs
- Spartan Life Handbook: Provides your rights and responsibilities as a student
- Office of the Ombudsperson (or call 517-353-8830): A neutral party to discuss any university or faculty concerns
- Advising: Provides advising information by major
- Career Services Network: Provides campus jobs lists and future career advice
- I am also here to help! If you have any concerns or questions, please reach out (find my contact information toward the beginning of the syllabus).

Resources for Getting Around Campus

- Campus Maps: Provides interactive maps for campus buildings
- Campus Transportation: Provides ideas on how to get around campus
- CATA MSU Bus Services: Provides information and maps for MSU's campus bus services
- Associated Students of MSU: Includes Safe Ride services

Funding Resources for Tuition or Personal

- Emergency Aid: Lists financial aid available to special populations
- Associated Students of MSU: Provides iClicker and calculator rentals, interest-free loans, legal services, and Safe Ride

- Student Advocates for Essential Needs Security: Provides food and shelter resources
- Student Food Bank: Aids students with food insecurity 12 months per year
- Greater Lansing food bank: Lists food banks available in the Lansing area

Community Engagement Resources

- Student Organizations (Involve@State): Lists the organizations on campus
- Neighborhood Resources: Lists various ways to engage with students
- East Lansing/Campus Community Activities and Resources: Lists events occurring in East Lansing
- Student Life & Engagement Job Postings: Provides on-campus job opportunities

Physical and Mental Health Resources

- Olin Student Health Center: Provides medical services
- Counseling and Psychiatric Services: Provides mental health assistance (For anytime support, call (517) 355-8270 and press "1" at the prompt to speak with a crisis counselor)
- Psychological Clinic (call 517-355-9564): Provides individual and group therapy
- Health4U Program: Provides education in a variety of health topics
- Health Promotion & Engagement: A data-driven approach to wellbeing
- MSU Meditation Map: Lists meditation site locations
- Recreational Sports and Fitness Services: Provides information about the fitness center including online and in person group fitness classes
- Medical Leave: Describes medical leave information for students

Survivors Resources

- Center for Survivors: Provides resources for sexual assault survivors (the 24/7 sexual assault crisis hotline is (517)372-6666)
- Safe Place (or call 517-355-1100 or email noabuse@msu.edu): Provides aid to those experiencing relationship violence or stalking
- Culture of Support: Lists resources for anyone undergoing trauma, including those that are not sure what happened or what they want to do
- Office for Civil Rights and Title IX Education and Compliance: Provides reporting services for violations of MSU's Anti-Discrimination Policy and Relationship Violence and Sexual Misconduct and Title IX Policy.

Resource Centers for Specific Populations

- Fostering Academics, Mentoring Excellence (FAME): Resource center for foster youth alumni and those who have experienced homelessness or otherwise independent
- The Gender and Sexuality Campus Center: Resource center for LGBTQIA2S+ members of MSU
- English Language Center: Resource center that provides English language instruction
- TRIO Student Support Services Program: Resource center for first-generation college students
- Student Parent Resource Center: Resource center for students who are also parents
- Student Veterans Resource Center: Resource center for student veterans

- Resource Center for Persons with Disabilities: Resource center for persons with disabilities

Lesson Plan 1 – genetic diversity

Big Ideas

Summary of Key Content

Genes are DNA sequences that are translated and transcribed into proteins. Different versions of genes are called alleles and occur when individuals have different DNA sequences for the same gene. All the alleles that the individual has are expressed to determine an individual's phenotype (with some environmental influence, too). The way that alleles interact to produce the genetic component of the phenotype depend on the mode of inheritance of the allele (complete dominance, incomplete dominance, codominance, epistasis, etc.). The variation in all the alleles in a population represents the genetic diversity of the population and is shaped by evolution.

Objective: Identify phenotypes from given DNA sequences and gene modes of inheritance.

Stage 1 Desired Results

ESTABLISHED LEARNING GOALS

- Given DNA sequences and modes of inheritance, students can determine the genetic component of the phenotype.

Acquisition

Students will be able to independently use their learning to…

- Identify phenotypes from given genotypes and modes of inheritance.

Meaning

UNDERSTANDINGS

Students will understand that…

- Alleles are different versions of DNA sequences for the same gene

Transfer

Students will know…	*Students will be skilled at…*
• Genotypes determine phenotypes (important to know at this point is that the environment also matters)	• Knowing what the genotypes of each individual are (identifying genotypes from sequences, amino acid sequences, whatever it may be)

Stage 2 - Evidence

Assessment Evidence/Evaluative Criteria

PERFORMANCE TASK(S):

- Produce a whiteboard that describes the DNA given to the group, the genotype, and the phenotype
- Can have other options with assessment further down the line like test questions and such

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction (class time =70 minutes ish)

- Interpretive question to start discussion: what do we already know about DNA? (10 minutes)
- Recap slides to summarize what we know (5-10 minutes)
- Activity step 1: give out DNA sequences, determine the genotype (5 minutes)
    - 3 genes per group
- Quick recap lecture about the info to address any misconceptions – alleles are DNA sequences. Discuss homozygous, heterozygous, diploid (but mostly avoid talking about ploidy) (5 minutes)
- Activity step 2: determine the phenotype from their genotype and draw the fish (15 minutes)
    - Slides will show the colors and patterns to use for each gene to determine the phenotype
    - During this step, I also want them to answer some questions about the modes of inheritance for the different phenotypes – these question need to be written – maybe ask for observations here rather than vocabulary terms or include a 'why' in the questions
    - Note: after presenting in class, slides have been amended to remove the lower case as dominant example and instead use A1 and A2 labels because the importance was on showing different ways to refer to alleles, not on trying to have students mess up by challenging their prior knowledge/naming convention
- Quick recap lecture: give names to the modes of inheritance and how dominance and recessive works (15 minutes)
    - Would like to incorporate this lecture part in with a show and tell about the fish each group drew
- Challenge: push understanding by posing the question of what if we grew up some of these fish in a different environment? (5 min)
- Extension: Draw a white striped fish. Can you see the phenotype? Is this an example of epistasis? (5 min)
    - This needs a bit more thought on how to incorporate well.
- Extension 2: add a mutation to one of the genes, what do you think would happen with this mutation? Then have them need to remember things about start codons and where their mutation is and if their mutation caused a frameshift and a bunch of other review information that I don't think is necessary to understanding genotype to phenotype but could better connect this lesson with prior lessons and might be something that could appear as a test question so they could have a start on that
    - Could be good as an end of the semester/unit review activity
- Bring back in later weeks: take all the fish our class made and have that be the population, and then use it as an example for some pop gen add ons like what would happen if a predator entered the pool that only ate red fish

Materials

- Need the printed DNA sequences
- Whiteboards
- Red, blue, black markers

Lesson plan 2 – meiosis

Big Ideas

Summary of Key Content

The key content for this lesson is for students to define the laws of segregation and independent assortment. During meiosis, cells produce gametes with half the number of chromosomes (haploid cells). During this process, each chromosome is duplicated (sister chromatids) and sister chromatids separate from each other in meiosis II (homologous chromosomes separate in meiosis I). This is the law of segregation. Before separation, chromosomes pairs (meiosis I) or chromosomes (meiosis II) line up at the metaphase plate. Each chromosome or set of homologous chromosomes lines up independently from each other (independent assortment). These two processes together create the gamete combinations possible from each parent cell. These laws can be applied to predict offspring genotypes from parent genotypes. These concepts are fundamental to later genetics concepts in heredity and evolution.

Objectives:

1. Define the law of segregation and independent assortment
2. Predict offspring genotypes and their frequencies from parent genotypes (and the other way around)?

Stage 1 Desired Results

ESTABLISHED LEARNING GOALS

- Given parent genotypes, students can apply the law of segregation and the law of independent assortment to predict offspring genotypes and their expected frequencies

Acquisition

Students will be able to independently use their learning to…

- Predict offspring genotypes from parent genotypes with one and two loci

Meaning

UNDERSTANDINGS

Students will understand that…

- Meiosis creates gametes. Gametes from each parent form offspring.

Transfer

Students will know…

- Homologous chromosomes and sister chromatids separate during meiosis to create haploid daughter cells.

Students will be skilled at…

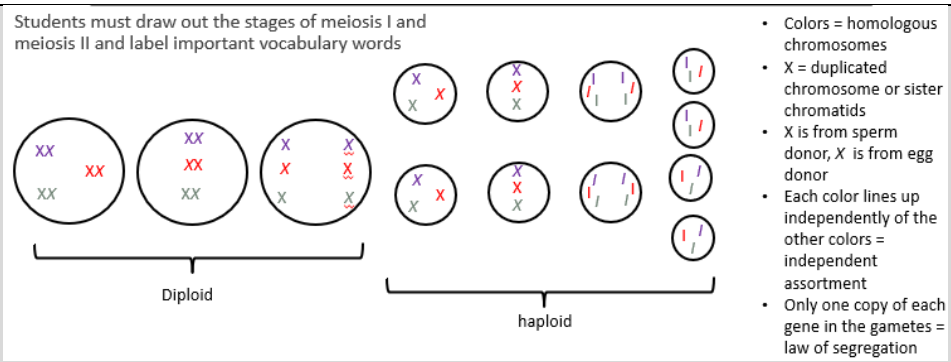
- Identifying possible gametes from parent genotypes
- Predicting offspring genotypes from parent gametes

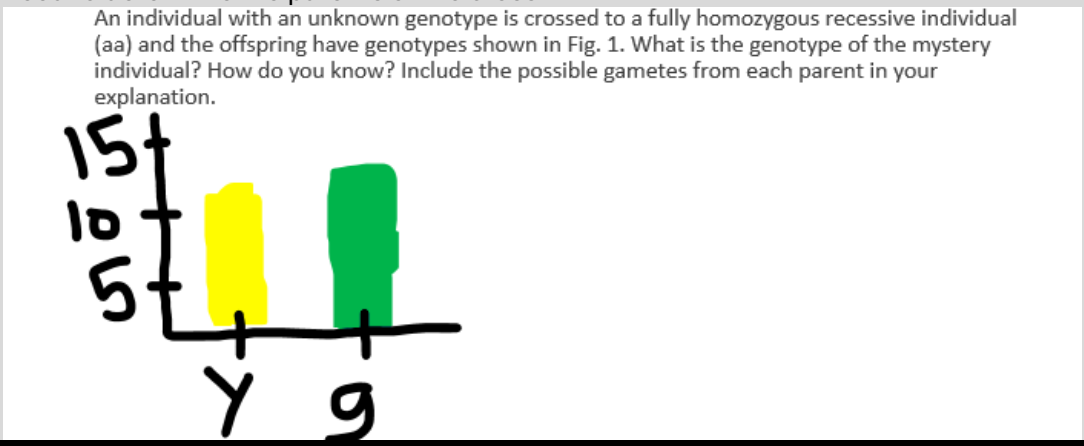
Stage 2 - Evidence

Assessment Evidence/Evaluative Criteria

PERFORMANCE TASK(S):

- Whiteboard with the stages of meiosis I and meiosis II drawn out. Student must label vocab words given to them: homologous chromosomes, sister chromatids, metaphase plate, diploid, haploid, gamete. They then must also label where the law of segregation and the law of independent assortment apply

- 

- Inquiry activity (CER) where they predict the parents of a cross designed by their classmates from offspring. See the lesson plan below for more details.
- Exam questions: predicting where we give offspring genotypes in graphical form and they need to determine the parents of the cross
- 

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction (80 minute class period or 2 50 minute class periods – first on introducing meiosis, second for inquiry activity)

- Introduction mini lecture on meiosis and why we should learn about it (10 mintes)
- Draw the stages, take photo, can go around the room and show different groups while students work through it (15 minutes)
- Mini recap lecture (10 minutes)
  - Can use photos from student drawings
  - Transitions from we can predict gametes to why we want to predict gametes
  - Introduces punnete squares and (if including dihybrid cross) branching diagrams
- Inquiry activity (40 minutes)
  - In small groups, work through a single locus cross and two locus cross – given parents, predict offspring genotypes (10 min)
  - Then as a group they need to come up with the offspring ratios of a two locus cross and draw hypothetical data on the whiteboard (5 min)
  - White board will rotate groups, and now each group needs create a CER to determine the parents of the cross they were just given (10 min)
  - Present CERs (15 min) – did they find the correct parents?
- Conclusion (5 minutes)

Materials

- Whiteboards
- Markers

Teaching Philosophy

Scientific literacy is a critical skill for navigating our world. Whether through media or informal conversations, we are confronted with scenarios that require scientific literacy skills such as identifying valid arguments, interpreting data, and justifying conclusions. These skills are transferable outside the classroom and are appropriate goals for teaching introductory biology classes where students have diverse backgrounds and diverse career goals. My own teaching-as-research project and the work of others has shown that we struggle to teach students science literacy skills (Gormally et al. 2012). Thus, my teaching aims to center science literacy through (1) cooperative learning, (2) inquiry, and (3) reflection focused on keeping content relevant to real world applications and scenarios where students may need these skills in their everyday life or their future career.

In my teaching, I aim to use cooperative learning to introduce students to working collaboratively, as scientists do daily. First, I designate students into small groups throughout the semester to build a classroom community. These groups provide an important support structure to students, especially if students are taking their first college biology course. Student groups, however, are not inherently cooperative. I incorporate cooperative learning through activities that require students to be responsible for their own work and to work together to create a final product. For example, I have implemented cooperative learning in activities where students use backward design to develop lesson plans that align with learning objectives and compare data analysis strategies for quantitative and qualitative data. I have also developed a cooperative learning activity where students must collectively decide how to spend a research budget to answer their individual research questions. In each case, students within a group are assigned specific roles while they need to work together to produce the final product which may vary from a short verbal summary to a written report.

While inquiry is often used to support concepts introduced during a lecture, I aim to use inquiry for discovery that is then reinforced through short lectures, discussions, and homework. I have developed a series of inquiry-based activities where students use checkers to represent alleles and they ask questions and test them to identify how natural selection, genetic drift, and migration can lead to evolution. I also aim to emphasize inquiry in my classes through independent research projects that provide students autonomy over their learning to apply the course material to their interests. In lab courses, these may be completed in groups depending on the size of the course. In large lecture courses, these may consist of topic papers, literature reviews, or research proposals. In both large and small inquiry activities, students must use their science literacy skills to present their findings to their peers including graphical representations of data and conclusions supported by their findings.

Students in college classrooms have unique prior experiences they bring to the classroom. To effectively build science literacy skills through cooperative learning and inquiry, I do not assume students enter the classroom having already learned skills in prior courses. I aim to explicitly teach skills that it is often assumed students already know such as how to interpret different types of graphs, how to read scientific articles, and how to be effective group members. Incorporating these scientific literacy skills into my classroom ensures students have been taught the skills needed to succeed in my course.

My role as an educator also includes teaching students about learning. I have increasingly observed students in the classroom who are discouraged when they struggle with the material and/or have not learned studying skills. I aim to introduce a growth mindset and studying strategies during class that are reinforced with guided reflection assignments throughout the semester. Promoting a growth mindset in the classroom in addition to active learning has been shown to improve learning outcomes of marginalized students (Bauer et al. 2020). Learning takes time and effort, just as scientific discoveries take time and effort. In particular, I will incorporate a reflection question at the end of each exam asking how the student prepared for the exam. When exam grades are released to students, there will be a follow up reflection assignment asking students how effective they feel their studying was, what strategies we have discussed in class they might use next time and evaluating student growth mindset. The data collected through these assignments will inform changes to my teaching to ensure I am achieving my goal of increasing student growth mindsets.

All student belong in my classroom and are able to succeed in my course. Because I teach about genetics in particular, I am committed to using examples throughout my course that demonstrate the complexity of family structures and gender identities in the world. To this end, I have attended a workshop on increasing diversity representation when using pedigrees to ensure I have diverse examples and that I am teaching students to use pedigrees in a way that aligns with the current practices of genetic counselors. My courses do include high stakes exams, but students are given clear guidance on what to expect for each exam and the opportunity to earn back points through test corrections on all exams besides the final exam. This allows students to learn from their mistakes and succeed in my course. I will continue to adapt my instruction to the needs of my students each semester and pursue workshops or other training opportunities to increase the accessibility and inclusivity in my classroom.

My goal as an educator is to center science literacy skills through cooperative learning, inquiry, and reflection. My role in this process is to guide students through activities focused on content application with frequent feedback. With these teaching practices, students leave my classroom with knowledge and skills they can transfer to their everyday lives and their future careers.

Summary of Teaching Experience

a. General Public
    a. Naturalist at Chippewa National Forest (summer 2018)
        i. Led 5x weekly naturalist programs throughout the summer
    b. MI DNA Day – April 2023
        i. Visit to DeWitt high school classroom to present lesson on DNA and scientific careers
    c. Skype a Scientist – May 2023
        i. Virtual visit to an elementary school classroom in London, England to talk about plant science
    d. Graduate Women in Science Girls and Science Day Volunteer – May 2022
        i. Assisted in running 4 sessions of an activity on fish evolution for middle school girls
    e. Tech Savvy Day at Saint Coud State University – Spring 2017,2019
        i. Role model for girls in STEM
        ii. Help lead STEM activities including how solar panels work and what is a non-Newtonian fluid
b. Peer
    a. Personal Website Workshop - led Nov 2022
    b. CV workshop - led in May 2023 and Feb 2024
    c. FASTer Fellow - 2023-2024
        i. Peer mentor to graduate students completing teaching-as-research projects. Led weekly meetings on pedagogy and research best practices.
        ii. FAST=Future Academic Scholars in Teaching
    d. PLB Peer Mentorship Program- mentor 2021-2023, president of the committee 2023-2025
    e. Led 90min meeting to peers on Climate Justice and REDD+ policy in Chile – March 2020
c. Teaching assistant
    a. Plant Biology Department – PLB341: Fundamental Genetics – Fall 2022
        i. Assisted during lecture section twice a week
        ii. Led 2 weekly recitation sections focused on teaching problem solving strategies
        iii. Contributed to course materials to improve inclusivity in teaching language and example problems
        iv. Mini-lecture on the application of recombination to study genetics
    b. Biological Sciences program – BS161: Cells and Molecules Lecture – Spring 2022
        i. Team teaching of 250 student 'flipped' lecture section consisting of pre-recorded lectures and in class activities
    c. Biological Sciences program – BS171: Cells and Molecules Laboratory Online – Fall 2021
        i. Led 2 lab sections of 28 students each through online labs to simulate experiments, analyze data, and communicate results

d. In your lab
    a. Evan Adamski – MSU undergraduate. I mentored Evan on a bioinformatics project where he completed a pipeline to identify quantitative trait loci from recombinant inbred line phenotypes
    b. Athena Dila – Plant Genomics REU. I mentored Athena on a bioinformatics project where she identified genomic signatures of urban adaptation in *Arabidopsis thaliana*
    c. Tori Nicholes – Kellogg Biological Station REU. I mentored Tori on a project where she identified differences in plasticity to increased temperature and drought in two populations of *Arabidopsis thaliana*. Tori was awarded 2 extensions to complete her project and we have a manuscript in preparation.
    d. Led undergraduate journal club – summer 2023
    e. Other mentoring (students without independent projects): Claudia Colligan, Kennedy Barnes, Claire Henley, Tianyi Xia, Trevor Markwood
e. Presenting at conferences
    a. Recombinant inbred lines expand variation in plasticity in A. thaliana; Coauthors: Emily Josephs Jeffrey Conner
        i. Poster presentation: June 2023, Evolution, Albuquerque, NM
        ii. Poster presentation: August 2023, Midwest Population Genetics, Ann Arbor, MI
    b. Making Connections: The impact of modelling connections between reasoning and results on scientific literacy in an introductory biology lab; Collaborator: Mike Wiser
        i. Poster presentation: May 2023, Teaching Fellows Showcase, East Lansing, MI
        ii. Poster presentation: May 2023, EEB Symposium, East Lansing, MI
        iii. Oral presentation (15 minutes): May 2023, FAST Symposium, East Lansing, MI
    c. Population Differentiation for Plasticity in Arabidopsis thaliana; Coauthors: Jeffrey Conner and Emily Josephs
        i. Poster presentation: May 2022, EEB Symposium, East Lansing, MI *awarded 2nd place poster*
        ii. Poster presentation: June 2022, Evolution, Cleveland, OH
        iii. Hybrid oral presentation (45 minutes): July 2022, East Lansing, MI
    d. Population Structure and Trail Loss along an Elevational Gradient; Coauthors: Ava Garrison, Sam Peréz, Joshua Puzey, Steve Tonsor, Xavier Picó, Gideon Bradburd, Emily Josephs, and Jeffrey Conner
        i. Virtual oral presentation (10 min): May 2021, EEB Symposium, East Lansing, MI
        ii. Virtual oral presentation (10 min): June 2021, Virtual Evolution Conference
        iii. Oral presentation (20 minutes): December 2022, EEB Colloquium, East Lansing, MI
f. Pedagogy Training
    a. Teaching College Science – Spring 2024
    b. Future Academic Scholar in Teaching (FAST) Fellow

        i. Developed and completed a teaching-as-research project to identify if a modeling activity could help increase student's ability to describe connections between introductory biology lab experiments on antibiotic resistance and the general public
    c. Introduction to Evidence-Based Undergraduate STEM Teaching (CIRTL, Fall 2022)
    d. Advanced Learning Through Evidence-Based STEM Teaching (CIRTL, Spring 2023)
    e. Exploring Differences in the Biology Classroom: "How to represent wide-ranging family structures and personal identities using the latest pedigree nomenclature", November 2022
    f. Participation in monthly STEM pedagogy journal club, 2021-present
    g. Project Learning Tree Outdoor Education Training (summer 2018)
g. Awards
    a. Fields Award for Outstanding Teaching – PLB, MSU, awarded April 2024