

Course ID:	Course Title:	Fall 2023
BIO 211	Principles of Genetics	Prerequisite: BIO 131
		Credits: 3

Class Information		Instructor Information		Important Dates	
Delivery:	In Class	Instructor:	Matthew Morris, PhD, MSc, BSc (Hnrs Co-op), BRE	First Day of Class:	Sept 6
Days:	T/R	Email:	Matthew.Morris@ambrose.edu	Last Day to Add/Drop:	Sept 17
Time:	9:45-11:00	Phone:	403-410-2000 ext 6932	Last Day to Withdraw:	Nov 20
Room:	A2212	Office:	A2158	Last Day to Apply for Coursework Extension:	Nov 23
Lab/Tutorial:	3 hrs/wk W 1-4 pm A2151	Office Hours:	by request	Last Day of Class:	Dec 11
Final Exam:	Tues, Dec 19 9 am – noon A2212				

Important Dates and Information

For a list of all important dates and information regarding participating in classes at Ambrose University, please refer to the Academic Calendar at <https://ambrose.edu/academic-calendar>.

Course Description

This course examines the principles of heredity, Mendelian laws, as well as basic concepts of gene structure and function, gene regulation and genetic recombination. Principles from prokaryotes, eukaryotes and viruses will be explored. The accompanying laboratory component contains experiments and exercises to illustrate key genetic principles and molecular genetic techniques.

Textbooks

Required. Pierce BA (2020) *Genetics: A Conceptual Approach, 7th ed.* W.H. Freeman and Co.: NY. **Ebook version with Achieve.** Older versions of the textbook will not work for this class.

Learning Outcomes

1. Understand

- a. **Genetic principles:** Demonstrate a comprehensive understanding of the principles of Mendelian and non-Mendelian inheritance, including genetic linkage, recombination, and epistasis, and connect these to the molecular mechanisms underlying DNA replication, transcription, translation, and gene expression.
- b. **Genetic variation:** Describe the role of mutations and their impact on gene function, genetic disorders, and mutation.
- c. **Historical context:** Describe key experiments from the history of genetics, and the principles these experiments helped establish.
- d. **Biotechnologies:** Compare and contrast biotechnologies with the molecular processes they emulate.

2. Assess

- a. **Inheritance analysis:** Evaluate the inheritance of specific traits using Punnett squares and pedigrees, and predict the outcomes of genetic crosses.
- b. **Quantitative measures:** Predict genotype and allele frequencies given assumptions of Hardy-Weinberg equilibrium.
- c. **Data interpretation:** Apply genetic knowledge to analyze and interpret experimental data from molecular techniques like PCR, gel electrophoresis, and Sanger sequencing.

3. Research

- a. **Research design:** Design and conduct genetic experiments, including hypothesis formulation, experimental design, data collection, and interpretation of results.
- b. **Bioinformatics:** Utilize online databases and bioinformatics tools to explore and analyze genetic sequences, gene functions, and evolutionary relationships.

4. Communicate

- a. **Scientific writing:** Effectively communicate genetic concepts and findings through written reports.
- b. **Oral presentation:** Develop an effective audiovisual presentation on a genetic topic, in a form that communicates findings to non-experts.

5. Form character

- a. **Critical thinking:** Cultivate critical thinking skills by evaluating genetic concepts, theories, and research findings.
- b. **Collaborative work:** Collaborate effectively with peers on group projects, fostering teamwork and interpersonal skills.
- c. **Ethical awareness:** Develop empathy for those with genetic disorders or variants, and evaluate the ethical uses of genetic biotechnologies.
- d. **Faith:** Consider the role one's personal faith plays in the study of genetics.

Course Schedule

Week	Topic	Ch: pg	Due
Sep 7	Introduction	1: all	
Sep 12	Cell cycle	2: all	
Sep 14	Classic Mendelian genetics	3: all	
Sep 19	Chromosomal theory of inheritance		
Sep 21	Sex-linked inheritance and pedigree analysis	4: all 6: 6.1, 6.2	
Sep 26	Linkage	7: 7.1, 7.2, 7.3	Homework 1
Sep 28	Allelic and genic interactions	5: all	
Oct 3	Allelic and genic interactions		
Oct 5	DNA	10: all	
Oct 10	DNA replication	12: 12.1, 12.2, 12.3	
Oct 12	RNA and transcription	13: 13.1, 13.2, 13.3	
Oct 17	Using replication: PCR and electrophoresis	19: 19.3	
Oct 19	Translation	15: all	Homework 2
Oct 24	Mutations and DNA repair	18: all but 18.4	
Oct 26	Mutations and DNA repair		
Nov 2	Chromosomal rearrangements and polyploidy	8: all	
Nov 4	DNA sequencing	19: 19.2, 19.5	
Nov 7	Reading break		
Nov 9	Reading break		
Nov 14	Prokaryotic genome	9: 9.1, 9.2, 9.3	Homework 3
Nov 16	Eukaryotic genome	11: 11.1, 11.2, 11.3 12: 12.4 13: 13.4 14: all	
Nov 21	Introduction to gene expression	16: all	
Nov 23	Epigenetics	17: all 21: all	
Nov 28	Population genetics	25: 25.1, 25.2	
Nov 30	Mitochondrial genome	5: 5.3 11: 11.4	
Dec 5	TBD		Homework 4
Dec 7	TBD		

Lab Schedule

Week	Topic	Lecture based on	Due date	Value (%)
Sept 6	No Lab			
Sept 13	Chi-squared tests		End of lab	2
Sept 20	Mendelian inheritance in corn	Mendelian genetics	End of lab	3
Sept 27	Meiosis	Chromosomal theory	Prelab: Start of lab Assign't: Oct 11	1 2
Oct 4	DEEPER LIFE			
Oct 11	Fruit flies I	Sex-linked traits	End of lab	3
Oct 18	Fruit flies II/Complications to Patterns of Mendelian Inheritance	Linkage, sex-linkage, interactions	Prelab: Start of lab Assignment: End of lab	1 2
Oct 25	Fruit flies III	Sex-linked traits	End of lab	3
Nov 1	Midterm			20
Nov 8	READING BREAK			
Nov 15	DNA extraction and PCR	DNA replication and PCR	Nov 22	3
Nov 22	Gel electrophoresis	DNA replication and PCR	Nov 29	3
Nov 29	Human genome		End of lab	2
Dec 6	Mini lecture and Review			5

Mark distribution:

Homework assignments: 5% each, total 20%

Midterm: 20%

Final: 30%

Lab: 30%

Chi-squared tests: 2%

Mendelian genetics of corn: 3%

Meiosis: 2%

 Prelab: 1%

Fruit flies:

 Part 1: 3%

 Part 3: 3%

Complications to patterns of Mendelian inheritance: 2%

 Prelab: 1%

DNA extraction and PCR: 3%

Gel electrophoresis: 3%

Human genome: 2%

Mini-lectures on human genome: 5%

Homework assignments

The purchase of your textbook comes with an Achieve account. There are four homework assignments posted to Moodle. These homework assignments come in two parts. Part 1 involves answering questions through the Achieve platform, which will be submitted through Achieve. Part 2 involves calculations and short answer questions that will be handwritten and submitted at the beginning of the class for which the assignment is due.

Collectively, these exercises sum to 20% of your overall grade.

Some optional exercise will be provided throughout the semester, especially prior to the midterm and final exam. It is strongly recommended that students do these optional exercises, as they will better prepare for testing.

Exams

The midterm will be completed during lab session over the full three hours. If you are with accessibility it is your responsibility to communicate with the instructor and the accessibility office about midterm accommodations.

Lab content is fair game for midterms.

The final exam is comprehensive and cumulative, and will be scheduled by the office of the Registrar.

Lab assignments

Laboratory assignments will involve individual or group work, as specified on the assignment. Group work will require only one submission per group; grades will be given to those named on the assignment. Some labs are due at the end of the lab period; others are due at the start of the following lab period.

Attendance

Attendance to lectures is not mandatory, but in my experience students who do not come to lecture do not perform well. Lectures will not be provided over Zoom unless there is a change in university policy as a response to some change to the pandemic. If you miss lectures, it is your responsibility to review the PPT slides provided and talk to your peers.

Attendance **to laboratories is mandatory**. Missing more than two lab periods results in an automatic F for the course.

Late assignment policies

Homework or lab assignments cannot be submitted late without cause and approval from the professor. Homework assigned during lecture is **due at the start of lecture** for which it is due; anything after the start of lecture will be considered late. Lab assignments not due at the end of the lab period in which the work is done

are due at the beginning of the next lab period; anything after the start of the lab will be considered late. The penalty for late homework or lab assignments are as follows:

Issue	Communicated to professor or lab instructor in advance?	Penalty
Late by 5 min – 7 days	Yes	5% deducted per day
Late by 5 min – 7 days	No	10% deducted per day
Late by >7 days	-	0 on assignment
No name on assignment	-	0 on assignment

Assignments officially receiving a grade of 0 as a penalty will still be “graded” so that you can have feedback before the exam, even if your official grade is 0.

Missed midterms or final exams, without cause, cannot be made up.

Use of artificial intelligence (AI)

In this class, you will be conducting a variety of written assignments, including an experimental report. All work should be your own. Use of AI-generated text or images is not permitted and will be considered an example of plagiarism (see policy below). For this reason, written assignments will be submitted through Moodle and assessed for AI content and other forms of plagiarism via Turnitin.

Plagiarism policy

Consult the Academic Calendar for Ambrose’s position on plagiarism and its consequences. In brief, it is your responsibility as a citizen of Ambrose to be aware of the policies of Ambrose and abide by them. Ignorance is no excuse. Plagiarism will not be tolerated.

Examples of plagiarism include, but are not limited, to:

1. Copying an assignment from someone else and submitting it as your own work.
2. Working with a friend and writing down identical answers, whether you understand the content or not, and submitting the assignments separately.
3. Quoting directly from a source without supplying quotation marks or a citation.
4. Quoting directly from a source without supplying quotation marks, even if it is referenced.
5. Copying nearly word-for-word from a source, changing only the occasional word, without providing quotation marks, even if it is referenced.
6. Submitting an assignment in which >30% of the content is properly quoted; that is, at least 70% of the words in an assignment need to be your own. A general rule of thumb: for every line quoted, there should be three lines of your own material explaining that quote.
7. Submitting the same or similar assignment for more than one class, or more than one iteration of the same class.
8. Not citing illustrations used in a paper.
9. Submitted AI-generated content as your own.

Penalties for plagiarism

Offence	Consequence
First	0% on assignment, no chance to resubmit; report on academic misconduct filed with the registrar
Second	F in course; report on academic misconduct filed with the registrar
Third	F in course and recommendation to registrar for expulsion; report on academic misconduct filed with the registrar

Note that Ambrose has an appeals process in place if you feel that allegations of plagiarism are unfounded; these are for final marks only, and not for individual assignments.

Note that my record of a student's past plagiarism does **not** reset with each semester.

Grade Summary:

The available letters for course grades are as follows:

Grade	Percentage	Interpretation	Grade Points
A+	96-100	Excellent	4.00
A	92-96		4.00
A-	88-92		3.70
B+	83-88	Good	3.30
B	78-83		3.00
B-	73-78		2.70
C+	68-73	Satisfactory	2.30
C	64-68		2.00
C-	60-64		1.70
D+	55-60	Poor	1.30
D	50-55		1.0
F	<50	Failure	0.00
P		Pass	No Grade Points

Because of the nature of the Alpha 4.00 system, there can be no uniform University-wide conversion scale. The relationship between raw scores (e.g. percentages) and the resultant letter grade will depend on the nature of the course and the instructor's assessment of the level of each class, compared to similar classes taught previously. Please note that final grades will be available on student registration system. Printed grade sheets are not mailed out.

Ambrose University Important Policies & Procedures:

Registration

Registration is the process of selecting and enrolling in classes for upcoming semesters. Only students who are registered will be permitted to attend class and receive a grade for the course. You are responsible for ensuring that the courses you take are appropriate for your program, that they do not have any scheduling conflicts, that they have the necessary prerequisites and that they meet all degree requirements.

Withdrawal From A Course

Prior to the Add/Drop deadline: through the student registration system whereby course(s) will be removed with no academic or financial penalty. After the Add/Drop deadline and until the Withdrawal deadline: through submission of the 'Withdrawal from Course' form whereby course(s) will remain on the permanent academic record/transcript with the symbol 'W'. (See ambrose.edu/registrar/request-forms.) Students who withdraw from more than 30 credits attempted at Ambrose University will be required to withdraw from their program. Students considering withdrawing from courses are encouraged to discuss with their Faculty Advisor and/or the Office of the Registrar questions relating to their withdrawal decision specifically relating to financial assistance, study permit requirements, prerequisites for subsequent courses, readmission, and/or graduation timeline. Students who do not formally withdraw from a course are still considered registered in the course, even if they are no longer attending classes. In this case, students will be assigned a grade based on coursework completed as per the course syllabus and are responsible to pay the tuition and fees assessed for the course. Under extenuating circumstances, students may request from the Office of the Registrar a course(s) withdrawal after the Withdrawal deadline and until the last day of classes. Extenuating circumstances typically consider situations such as medical emergencies, compassionate grounds, or unforeseen conditions/situations beyond the students' control that arise after the start of the semester and are considered on a case-by-case basis. Supporting documentation from a physician or Registered Health Professional must accompany this request.

Coursework Extensions

Should a request for a time extension on coursework exceed the end of the term, a *Coursework Extension Application* must be completed and submitted to the Office of the Registrar. The extension (if granted) will be recorded on the student record. Extensions are granted at the discretion of the instructor and registrar. If granted, time extensions do not excuse you from a final examination where one has been scheduled for the course. More conditions apply.

Exam Scheduling

Students who find a conflict in their exam schedule must submit a *Revised Final Exam Time Application* to the Office of the Registrar by the deadline noted in the Academic Calendar. Requests will be considered for the following reasons only: 1) the scheduled final examination slot conflicts with another exam; or 2) the scheduled final examination slot results in three consecutive examination periods. Travel is not considered a valid excuse for re-scheduling or missing a final exam.

Communication

Your Ambrose email account is the University's primary and official mode of communication with you. Information delivered to your Ambrose email is considered official notification. Ambrose University is not responsible for your failure to receive important information delivered to your Ambrose email.

Lecture Recording

The recording of lectures or any other classroom academic activity, other than an audio recording as an accommodation, is prohibited except at the discretion of the instructor. Any use other than that agreed upon with the instructor constitutes academic misconduct and may result in suspension or expulsion. Permission to allow a lecture recording is not a transfer of any copyrights, so such recordings may be used only for individual or group study with other students enrolled in the same class and may not be reproduced, transferred, distributed or displayed in any public or commercial manner. Student must destroy recordings in any, and all formats at the end of the semester in which they are enrolled in the class. All students recording lectures, must sign the Permission Form to audio record lectures which is available through the Office of the Registrar.

Standards of Behaviour in the Classroom Setting

Learning is an active and interactive process, a joint venture between student and instructor and between student and student. Some topics covered within a class may lead to strong reactions and opinions. It is important that Students understand that they are entitled to hold contradictory beliefs and that they should be encouraged to engage with these topics in a critical manner. Committing to this type of "active learning" significantly increases the learning experience for both teacher and student, and reflects the Christian imperative to pursue truth, which lies at the heart of the Ambrose educational experience. However, active discussion of controversial topics will be undertaken with respect and empathy, which are the foundations of civil discourse in the Classroom Setting. Primary responsibility for managing the classroom rests with the instructor. The instructor may direct a student to leave the class if the student engages in any behaviour that disrupts the classroom setting. If necessary, Ambrose security will be contacted to escort the student from class.

Academic Integrity

We are committed to fostering personal integrity and will not overlook breaches of integrity such as plagiarism and cheating. Academic dishonesty is taken seriously at Ambrose University as it undermines our academic standards and affects the integrity of each member of our learning community. Any attempt to obtain credit for academic work through fraudulent, deceptive, or dishonest means is academic dishonesty. Plagiarism involves presenting someone else's ideas, words, or work as one's own. Plagiarism is fraud and theft, but plagiarism can also occur by accident when a student fails or forgets to acknowledge to another person's ideas or words. Plagiarism and cheating can result in a failing grade for an assignment, for the course, or immediate dismissal from the university. Students are expected to be familiar with the policies in the current Academic Calendar that

deal with plagiarism, cheating, and the penalties and procedures for dealing with these matters. All cases of academic dishonesty are reported to the Academic Dean and become part of the student's permanent record.

Academic Policies

It is the responsibility of all students to become familiar with and adhere to academic policies as stated in the Academic Calendar. The academic calendar can be found at <https://ambrose.edu/academics/academic-calendar>

Privacy

Personal information (information about an individual that may be used to identify that individual) may be required as part of taking this class. Any information collected will only be used and disclosed for the purpose for which the collection was intended. For further information contact the Privacy Compliance Officer at privacy@ambrose.edu.

Academic Success and Supports

Accessibility Services

Academic accommodation is provided to Ambrose students with disabilities in accordance with the Alberta Human Rights Act and the Canadian Charter of Rights and Freedoms. Provision of academic accommodation does not lower the academic standards of the university nor remove the need for evaluation and the need to meet essential learning outcomes. Reasonable accommodations are tailored to the individual student, are flexible, and are determined by considering the barriers within the unique environment of a postsecondary institution. It can take time to organize academic accommodations and funding for disability-related services. Students with a disability who wish to have an academic accommodation are encouraged to contact Accessibility Services as early as possible to ensure appropriate planning for any needs that may include accommodations. Staff can then meet with students to determine areas to facilitate success, and if accommodations are required, ensure those accommodations are put in place by working with faculty.

Ambrose Writing Services

Ambrose Writing services provides academic support in the four foundational literacy skills—listening, speaking, reading, and writing. It also assists students with critical thinking and the research process. Throughout the academic year, students can meet with a writing tutor for personalized support, or they can attend a variety of workshops offered by Academic Success. These services are free to students enrolled at Ambrose University. Academic Success serves all students in all disciplines and at all levels, from history to biology and from theatre to theology. To learn more, please visit <https://ambrose.edu/sas/writing-services>

Ambrose Tutoring Services

Ambrose Tutoring Services provides support in specific disciplinary knowledge, especially in high-demand areas such as chemistry, philosophy, math and statistics, and religious studies. These tutors also coach students in general study skills, including listening and note-taking. During the academic year, Ambrose Tutoring Services

offers drop-in tutoring for courses with high demand; for other courses, students can book a one-to-one appointment with a tutor in their discipline. These services are free to students enrolled at Ambrose University. To learn more, please visit <https://ambrose.edu/tutoring>.

Mental Health Support

All of us need a support system. We encourage students to build mental health supports and to reach out when help is needed.

On Campus:

- Counselling Services: ambrose.edu/counselling
- For immediate crisis support, there are staff on campus who are trained in Suicide Intervention Skills and can help you access mental health support. See <https://ambrose.edu/student-life/crisissupport> for a list of staff members.
- For additional wellness resources go to the Ambrose wellness page: <https://ambrose.edu/wellness>

Off Campus:

- Distress Centre - 403-266-4357
- Alberta Mental Health Helpline - 1-877-303-2642 (Toll free)
- Sheldon Chumir Health Care Centre - 403-955-6200
- Emergency - 911

Sexual Violence Support

We are committed to supporting students who have experienced gender based sexual violence in the past or while at Ambrose. Many of the staff, faculty, and student leaders have received Sexual Violence Response to Disclosure training. We will support you and help you find the resources you need and you can access information about reporting. Information about the Sexual Violence policy and on and off campus supports can be found on our website— ambrose.edu/sexual-violence-response-and-awareness.

Off Campus:

- Alberta's Oneline for Sexual Violence - 1-866-403-8000 call or text
- Clinic: Sheldon Chumir Health Centre - 403-955-6200
- Calgary Communities Against Sexual Abuse - 403-237-5888
- Chat: www.calgarycasa.com

Note: Students are strongly advised to retain this syllabus for their records.