

Course ID:	Course Title:	Fall 2021
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 Classes:	September 8, 2021
Days:	Tues/Thurs	Email:	Matthew.Morris@ambrose.edu	Last Day to Add/Drop:	September 19, 2021
Time:	10:00-11:15	Phone:	403-410-2000 ext 6932	Last Day to Withdraw:	November 22, 2021
Room:	A2131 (lectures) A2151 (labs)	Office:	A2158	Last Day to Apply for Extension:	November 23, 2021
Lab/Tutorial:	Lab 1: Thurs 13:30-16:30 Lab 2: Fri 9:00-12:00	Office Hours:	Wed 9:00 am - 12:00 pm	Last Day of Classes:	December 13, 2021
Final Exam:	Monday, Dec 20 A2210, 9:00 am – 12:00 pm				

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.

Expected Learning Outcomes

This course will cover classical (Mendelian) and modern (molecular) genetics. Students should come out of this course being able to:

1. Describe the history of the field of genetics, including key experiments and their implications.
2. Relate Mendelian patterns of inheritance to the molecular structure of DNA and the movement of chromosomes during meiosis and mitosis.
3. Assess Mendelian patterns of inheritance for particular traits using Punnett squares, pedigrees, and associated statistics (e.g. chi-square tests), and assess the likelihood that offspring will express a genetic disorder by incorporating knowledge from population genetics.
4. Describe the molecular characteristics of DNA and its relationship to the phenotype through the Central Dogma (e.g. DNA replication, transcription, translation, and gene expression).
5. Compare and contrast the genomes of prokaryotes, eukaryotes, mitochondria, and viruses, and demonstrate real-world applications that take advantage of these differences.
6. Use online tools to explore the human genome, including identifying the location and size of introns, exons, and 5' and 3' UTRs, and identify and categorize mutations associated with genetic disorders.
7. Formulate an extended Central Dogma in light of epigenetics.
8. Demonstrate competence in basic lab skills, including pipetting, DNA extraction, Polymerase Chain Reaction, and gel electrophoresis – and use these techniques to determine their own genotype for a particular gene.

Textbooks

Required. Pierce BA (2017, 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. You can purchase Achieve with the ebook through <https://store.macmillanlearning.com/ca/product/Genetics-A-Conceptual-Approach/p/1319216803> and course code **uh3reo** or the hardcopy with the ebook + Achieve at the Ambrose bookstore.

Covid and the syllabus

This syllabus, including the schedule and grading scheme, must be considered tentative. Updated syllabi will be made available as needed – particularly if the university gets temporarily moved online due to Covid.

BIO 213 lectures and labs are currently designated as “in-class”, meaning that students are expected to be physically present for lecture, lab, and exam times. This could change as Covid circumstances change. The professor will post over Moodle mail whether a particular lecture/lab or the remainder of the semester will be moving to an online format. Be in constant communication with your professor, and be sure to check both your Ambrose email address and your Moodle course announcements page. The lecture Moodle page will be the primary location for announcements pertaining to lecture or lab changes; the lab Moodle page will only be used to post lab assignments.

Course Schedule – tentative and subject to change

Week	Topic	Ch: pg	Due
Sep 9	Phenotypes	1: all	
Sep 14	Cell cycle	2: all	
Sep 16	Classic Mendelian genetics	3: all	
Sep 21	Chromosomal theory of inheritance		
Sep 23	DNA	10: all	
Sep 28	DNA replication	12: 12.1, 12.2, 12.3	Homework 1
Sep 30	Sex-linked inheritance and pedigree analysis	4: all 6: 6.1, 6.2	
Oct 5	Linkage	7: 7.1, 7.2, 7.3	
Oct 7	Allelic and genic interactions	5: all	
Oct 12	RNA and transcription	13: 13.1, 13.2, 13.3	Homework 2
Oct 14	Translation	15: all	
Oct 19	Using replication: PCR and electrophoresis	19: 19.3	
Oct 21	DNA sequencing	19: 19.2, 19.5	
Oct 26	Mutations and DNA repair	18: all but 18.4	
Oct 28	Recombination	12: 12.5 7: 7.5	Homework 3
Nov 2	Chromosomal rearrangements and polyploidy	8: all	
Nov 4	Population genetics	25: 25.1, 25.2	
Nov 9	Reading break		
Nov 11	Reading break		
Nov 16	Prokaryotic genome	9: 9.1, 9.2, 9.3	
Nov 18	Eukaryotic genome	11: 11.1, 11.2, 11.3 12: 12.4 13: 13.4 14: all	Homework 4
Nov 23	Introduction to gene expression	16: all	
Nov 25	Epigenetics	17: all 21: all	
Nov 30	Mitochondrial genome	5: 5.3 11: 11.4	
Dec 2	Transposable elements	18: 18.4	Homework 5
Dec 7	Transgenics	19: 19.7	
Dec 9	What is a gene?		

Lab Schedule – tentative and subject to change

Week	Topic	Lecture based on	Due date	Value (%)
Sept 9/10	Chi-square tests		End of lab (Sept 9/10)	3
Sept 16/17	Mendelian inheritance in corn	Mendelian genetics	End of lab (Sept 16/17)	3
Sept 23/24	Meiosis	Chromosomal theory	Sept 30/Oct 1	4
Sept 30/Oct 1	Fruit flies I	Sex-linked traits	Sept 30/Oct 1	3
Oct 7/8	Fruit flies II/Complications to Patterns of Mendelian Inheritance	Linkage, sex-linkage, interactions	Oct 7/8	3
Oct 14/15	Fruit flies III	Sex-linked traits	Oct 21/22	3
Oct 21/22	Midterm			20
Oct 28/29	PCR	DNA replication and PCR	Nov 4/5	3
Nov 4/5	Gel electrophoresis	DNA replication and PCR	Nov 18/19	4
Nov 11/12	Reading break			
Nov 18/19	Gene mapping	Linkage	Nov 25/26	4
Nov 25/26	Human genome		Dec 2/3 Mini Lecture	
Dec 2/3	Mini Lecture			5
Dec 9/10	Review			

Requirements:

Mark distribution:

Homework assignments: 3% each, to 15%

Homework 1

Homework 2

Homework 3

Homework 4

Homework 5

Midterm: 20%

Final: 30%

Lab: 35%

Chi-squared tests: 3%
Mendelian genetics of corn: 3%
Meiosis: 4%
Fruit flies: 6% (3% for part I, 3% for part III)
Complications to patterns of Mendelian inheritance: 3%
DNA extraction and PCR: 3%
Gel electrophoresis: 4%
Gene mapping: 4%
Mini-lectures on human genome: 5%

Homework assignments

The purchase of your textbook comes with an Achieve account. You should have access to a variety of chapter-specific resources. Achieve provides assignments in different formats:

- Reading quizzes, which directly test your knowledge of the chapter contents. These are usually between 10-15 questions
- Homework, which requires more application of the chapter content
- Animation assignments, which involve 3-10 minute video with 5-10 accompanying questions
- Interactives, which give you hands-on learning opportunities

These are packaged into your homework assignments. Each of the five homework assignments has a Part 1 – Achieve and a Part 2 – Problems. The first part lists the Achieve activities associated with the lectures covered by that homework assignment. These can be accessed under Course Content. Each question is typically worth 1 mark and is automatically graded on the Achieve gradebook. You have an unlimited number of attempts and are not penalized for incorrect answers. Occasionally some extra credit assignments will be listed, or some not worth credit but which are still good to do. These assignments must be done by the start of class on the day the homework assignment is due.

Part 2 involves practice problems that you are to work out on your own and submit at the start of class.

Lab assignments

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

Midterms

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.

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.

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.

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

- 5%/day for late assignments that have been communicated to the professor ahead of time.
- 10%/day for late assignments if the professor has to track you down to find out what is going on.
- 0% on any assignments passed in one week after the due date, unless otherwise stated by the instructor. *These assignments will still be “graded” so that you can have feedback before the exam, even if your official grade is 0.*

If your name is not on the assignment, it will not be graded and you will receive a grade of 0 for failing to submit an assignment.

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

Plagiarism policy

See below for Ambrose’s statement defining plagiarism and outlining 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.

Penalties for plagiarism

Offence	Consequence
First	0% on paper, on chance to redo; report on plagiarism filed with the registrar
Second	F in course
Third	F in course and recommendation to registrar for expulsion

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.

Classroom Etiquette:

It is expected that students will take an active role in the learning process. This includes: (a) regular class and lab attendance, (b) reading course material in advance of class or labs, and (c) engaging in discussions during class or labs.

In respect to the professor and to your fellow students, we ask that you:

- a) Turn your phone off during class and that you don't use it for texting during lecture or lab;
- b) Not have conversations with the people beside you during lecture – it is very distracting to the people around you;
- c) Use your laptops for lecture material and assignments only – that you are not using the internet or Facebook during class time;
- d) Arrive to lecture and lab on time;
- e) Don't listen to music in class or lab.

These will help to maximize the learning experience for you and your fellow students (and will keep your professor in a good mood).

Ambrose University Important Information:

Communication

All students have received an Ambrose e-mail account upon registration. It is the student's responsibility to check this account regularly as the Ambrose email system will be the professor's instrument for notifying students of important matters (cancelled class sessions, extensions, requested appointments, etc.) between class sessions.

Exam Scheduling

Students who find a conflict in their exam schedule must submit a Revised Examination Request form to the Registrar's Office by the deadline date; please consult the Academic Calendar. Requests will be considered for the following reasons only: 1) the scheduled final examination slot conflicts with another exam; 2) the student has three final exams within three consecutive exam time blocks; 3) the scheduled final exam slot conflicts with an exam at another institution; 4) extenuating circumstances. Travel is not considered a valid excuse for re-scheduling or missing a final exam.

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. Please refer to your professor regarding their electronic etiquette expectations.

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/content/academic-calendar-2>

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.

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 are normally granted for 30 days beyond the last day of the term.

Normally, Course Extension Applications will be considered only when all of the following conditions are met:

- the quality of prior course work has been satisfactory;
- circumstances beyond your control, such as an extended illness or death of a family member, make it impossible for you to complete the course work on time; and
- you submit *Coursework Extension Application* to the Office of the Registrar on or before the deadline specified in the Academic Schedule.

If granted, time extensions do not excuse you from a final examination where one has been scheduled for the course.

A temporary grade of TX will be assigned until a final grade is submitted in accordance with the new deadline. A final grade of F will apply to:

- all course work submitted after the end of the semester unless a coursework extension has been granted; and all course work submitted after the revised due date provided by an approved extension to coursework.

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/writingcentre>

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
- Peer Supportive Listening: One-to-one support in Student Life office. Hours posted at ambrose.edu/wellness.
- For immediate crisis support, there are staff on campus who are trained in Suicide Intervention and Mental Health First Aid. See ambrose.edu/crisissupport for a list of staff members.

Off Campus:

- Distress Centre - 403-266-4357
- Sheldon Chumir Health Care Centre - 403-955-6200
- Emergency - 911

Sexual Violence Support

All staff, faculty, and Residence student leaders have received *Sexual Violence Response to Disclosure* training. We will support you and help you find the resources you need. There is a website with on and off campus supports – ambrose.edu/sexual-violence-response-and-awareness.

Off Campus:

- Clinic: Sheldon Chumir Health Centre - 403-955-6200
- Calgary Communities Against Sexual Abuse - 403-237-5888

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