

<b>Course ID:</b>	<b>Course Title:</b>	<b>Fall 2020</b>
<b>BIO 211</b>	<b>Principles of Genetics</b>	<b>Prerequisite: BIO 131</b>
		<b>Credits: 3</b>

Class Information		Instructor Information		Important Dates	
<b>Delivery:</b>	In class	<b>Instructor:</b>	Dr. Matthew Morris, PhD, MSc, BSc (Hnrs Co-op), BRE	<b>First day of classes:</b>	Wed, Sept 9
<b>Days:</b>	Wed/Fri	<b>Email:</b>	<a href="mailto:Matthew.Morris@ambrose.edu">Matthew.Morris@ambrose.edu</a>	<b>Last day to add/drop, or change to audit:</b>	Sun, Sept 20
<b>Time:</b>	11:45-1:00	<b>Phone:</b>	403-410-2000 ext 6932	<b>Last day to request revised final exam:</b>	Mon, Nov 2
<b>Room:</b>	A2133	<b>Office:</b>	A2158	<b>Last day to withdraw from course:</b>	Fri, Nov 20
<b>Lab/ Tutorial:</b>	3 hrs/week Lab 1: Wed 3-6 pm, A2151  Lab 2: Fri, 1:30-4:30, A2145	<b>Office Hours:</b>		<b>Last day to apply for coursework extension:</b>	Mon, Nov 23
<b>Final Exam:</b>	No, but two midterms during lab times			<b>Last day of classes:</b>	Mon, Dec 14

### 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 molecular characteristics of DNA and its relationship to the phenotype through the Central Dogma (e.g. DNA replication, transcription, translation, and gene expression).
2. Compare and contrast the genomes of prokaryotes, eukaryotes, mitochondria, and viruses, and demonstrate real-world applications that take advantage of these differences.

3. Draw and interpret the structure of a eukaryotic gene, and critique gene definitions.
4. 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.
5. Formulate an extended Central Dogma in light of epigenetics.
6. Demonstrate competence in basic lab skills, including sample preservation, pipetting, electrophoresis, and PCR.

## Textbooks

**Required.** Pierce BA (2017) *Genetics: A Conceptual Approach, 7th ed.* W.H. Freeman and Co.: NY. **Sapling Plus version.**

There are two ways to access this textbook.

1. Purchase it from the Lions store at Ambrose. This comes with a physical copy of the book that you can keep, along with access to Sapling Plus that gives access to some homework assignments as well as an ebook rental. **The hard copy is yours; the ebook expires.**
2. Go to the Macmillan website at <https://store.macmillanlearning.com/ca/product/Genetics-A-Conceptual-Approach/p/1319216803> and click on **Sapling Plus**. Make sure it is in Canadian dollars. Here you can purchase a 6-month (\$99.99) or 12-month (\$114.99) subscription to Sapling Plus with the ebook. This is the cheapest option, but the textbook is a rental only and is not yours to keep.

Older versions of the textbook will not work for this class.

Once logged in to Sapling Plus, you will see that each chapter comes quizzes, videos, and/or interactive tutorials to help you learn course content. Some of these will be assigned throughout the semester (see below).

## 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 closed for the semester and the course and its labs move completely online.

Temporary closures (e.g. the lab must be quarantined for two weeks, or the instructor is self-isolating for two weeks) could result in less extreme modifications to the syllabus, particularly with regard to lab scheduling. The key this semester will be flexibility.

## Attendance and covid

Students are required to do the AHS self-examination before entering Ambrose. The expectation is that students will attend all in-person classes and labs. Due to AHS guidelines, we are required to take attendance for all in-person arrivals to class or lab. If you are self-isolating due to suspected or confirmed covid infections, **all lectures will be live over Zoom**. They will not be recorded, so if you are self-isolating be sure to access the Zoom links that will be provided for each lecture on the Moodle course page, and log in during normal class times.

Zoom is more difficult to do for labs as the instructor has to move around the room, but opportunities will be granted to make up missed labs due to illness.

Doctor's notes are **not required**. However, be sure to stay in constant touch with the instructor regarding absences.

### Lab Schedule

Week	Topic	Lecture based on	Due date	Value (%)
Sept 9/11	NO LABS			
Sept 16/18	Chi-square tests and Mendelian inheritance in corn	Mendelian genetics	End of lab	2 Chi-square 2 Fish sample 4 corn
Sept 23/25	Meiosis	Chromosomal theory	Sept 30/Oct 2	4
Sept 30/Oct 2	PCR	DNA and Methods I	Oct 9 (in class)	4
Oct 7/9	<b>No labs</b>			
Oct 14/16	Gel electrophoresis	DNA and Methods I	Oct 21/23	4
Oct 21/23	Sex-linked traits	Sex-linked inheritance	Oct 28/30	3
Oct 28/30	<b>Midterm I – content up to and including translation</b>			20
Nov 4/6	DNA barcoding simulation		End of lab (Part 1), Dec 2/4 (Part 2)	2
Nov 11/13	<b>Reading break</b>			
Nov 18/20	Gene mapping	Linkage/DNA fingerprinting	Nov 25/27	5
Nov 25/27	Human genome	Mutations, Eukaryotic genome	End of lab	4
Dec 2/4	Fish fraud	Mitochondrial genome	Presentations in lab	6
Dec 9/11	<b>Midterm II – content from mutations up to and including polyploidy</b>			20

## Course Schedule

RQ = Reading Quiz, SH = Sapling Homework, AA = Animation Activity, I = Interactive

Week	Topic	Ch: pg	Sapling due (11:59 pm Saturdays)
Sept 9	Phenotypes	1: all	Sept 12 (Ch 1) RQ
Sept 11	Mitosis and Meiosis	2: all	Sept 12 (Ch 2) SH, 2 AA
Sept 16	Classic Mendelian genetics	3: all	Sept 19 (Ch 3) SH, AA
Sept 18	Chromosomal theory of inheritance		
Sept 23	DNA	10: all	Sept 26 (Ch 10) RQ
Sept 25	DNA replication	12: all but 12.4	Sept 26 (Ch 12) 3 AA
Sept 30	Using replication: PCR and electrophoresis <b>Homework 1 due start of class</b>	19: 569-581	Oct 3 (Ch 19) AA
Oct 2	Sex-linked inheritance and pedigree analysis	4: all 6: 149-158	Oct 3 (Ch 4) RQ Oct 3 (Ch 6) RQ, AA
Oct 7	<b>Deeper Life – No Daytime Classes</b>		
Oct 9	Linkage <b>PCR lab due in class</b>	7: 179-205	Oct 10 (Ch 7) RQ, AA
Oct 14	Allelic and genic interactions	5: all (esp 111-127)	Oct 17 (Ch 5) RQ, AA
Oct 16	RNA, the central dogma, and transcription	13: 377-391	Oct 17 (Ch 13) RQ, AA
Oct 21	Translation <b>Homework 2 due start of class</b>	15: all	Oct 24 (Ch 15) RQ, AA, I
Oct 23	Mutations	18: 525-544	Oct 24 (Ch 18) RQ, AA, I
Oct 28	Chromosomal rearrangements <b>In lab: Midterm I (Lab section 1)</b>	8: 222-234 18: 554-559	Oct 31 (Ch 8) 2 AA
Oct 30	Population genetics <b>In lab: Midterm 1 (Lab section 2)</b>	25: 765-773	Oct 31 (Ch 25) AA
Nov 4	Prokaryotic genome	9: 257-270	Nov 7 (Ch 9) AA
Nov 6	Gene expression in prokaryotes	16: all	Nov 7 (Ch 16) AA
Nov 11	<b>Reading break</b>		
Nov 13	<b>Reading break</b>		
Nov 18	DNA sequencing	19: 19.2 and 19.5	
Nov 20	Eukaryotic genome	11: 317-328 12: 12.4 13: 13.4 14: all	Nov 21 (Ch 11) RQ Nov 21 (Ch 14) 2 AA
Nov 25	Epigenetics	17: all 21: all	Nov 28 (Ch 17) RQ Nov 28 (Ch 21)
Nov 27	Mitochondrial genome <b>Homework 3 due start of class</b>	5: 5.3 11: 11.4	
Dec 2	Transposable elements	18: 18.4	

Dec 4	Changes to ploidy	8: 8.3 and 8.4	
Dec 9	Transgenics <b>In lab: Midterm II (lab section 1)</b>		
Dec 11	What is a gene? <b>In lab: Midterm II (lab section 2)</b>		
Dec 14	<b>Homework 4 due, based on final two lectures</b>		

## Requirements:

### Mark distribution:

Homework assignments: 2.5% each, to 10%

Homework 1 (Mendelian genetics, chromosomes, DNA): → Due Sept 30

Homework 2 (Advanced Mendelian genetics, transcription) → Due Oct 21

Homework 3 (Mutations, Population genetics, Epigenetics) → Due Nov 27

Homework 4 (Final two lectures) → Due Dec 14

Sapling Assignments: 10%

Midterm I: 20%

Midterm II: 20%

Lab: 40%

Chi-squared tests: 2%

Mendelian genetics of corn: 4%

Meiosis: 4%

DNA extraction and PCR: 4%

Gel electrophoresis: 4%

Sex-linked inheritance: 3%

Fish fraud data collection: 2%

DNA barcoding simulation: 2%

Gene mapping: 5%

Human genome: 4%

Fish fraud final report: 6%

## Sapling assignments

The purchase of your textbook comes with a SaplingPlus account. You should have access to a variety of chapter-specific resources. Sapling 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, usually 30 questions
- Animation assignments, which involve 3-10 minute video with 5-10 accompanying questions
- Interactives, which are not graded but which give you hands-on learning opportunities

For some chapter readings you will be requested to do multiple exercises. They are listed in the course schedule above. Your Sapling account will also tell you what is due during that particular week of classes.

Collectively, these exercises sum to 10% of your overall grade.

They will be made available starting the Sunday prior to the appropriate lecture, and end by 11:59 pm the Saturday after the lecture. Consult the lecture schedule above.

- They can be completed any time within that week-long space.
- If you did not attempt the assignment by the deadlines shown above, you get 0% on that assignment = 0 marks
- If you attempted only a portion of the questions on that assignment, you get 0% on that assignment = 0 marks
- If you successfully completed the assignment but gave up on 30% or more of the questions, you get 50% = 0.5 marks.
- If you successfully complete >70% of the questions, you get 100% on that particular assignment = 1 mark. The number of attempts you take to successfully complete a question will not be factored into your grade.
- Each reading quiz, Sapling homework, or animated activity will be graded with equal weight, irrespective of the number of questions involved.
- You will be given grace on **three exercises** – that is, getting a 0 on three assignments will not be counted against you.

### Other assignments

Homework assignments separate from Sapling will occur throughout the semester. They will be **due the beginning of class or at a specified time**. See the schedule above. These are intended to give you practice with equations and concepts leading up to the midterm.

Midterms will be completed during lab sessions 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. If covid strikes, midterms will be moved to Moodle.

Lab content is fair game for midterms.

### Grade Summary:

The available letters for course grades are as follows:

Grad	Percent	Grade Point Value	Description
A+	96-100	4.00	Outstanding
A	92-96	4.00	Excellent - superior performance, showing comprehensive understanding of subject matter.
A-	88-92	3.70	

B+	83-88	3.30	
B	78-83	3.00	Good-clearly above average performance with knowledge of subject matter generally complete.
B-	73-78	2.70	
C+	68-73	2.30	
C	64-68	2.00	Satisfactory – basic understanding of the subject matter. Grade point average below 2.00 is not sufficient for promotion.
C-	60-64	1.70	Minimum grade required if needed as a prerequisite course
D+	55-60	1.30	
D	50-55	1.00	Minimal pass – marginal performance; generally insufficient preparation for subsequent courses in the same subject.
F	<50	0	Fail – unsatisfactory performance or failure to meet course requirements.

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. The only acceptable reason for missing an exam is illness, for which a doctor's note will be required, or death of an immediate family member. Give yourself plenty of time to get to school on exam days. Traffic or weather is no reason for missing an exam.

### Plagiarism policy

Some lab assignments will be submitted as a single copy per lab group. It is expected that all members of the group contribute equally to the assignment. This is a good opportunity to help your fellow students understand concepts they

may be struggling with. Please ensure all members of the group are named on such assignments. **Group members whose names are not on the submitted assignment will receive a grade of zero.**

All other assignments will be submitted as one original piece of work per person. If you submit an assignment with only your name on it, it is assumed that you are the sole contributor of the work.

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**

For a first offense in any one of my classes, a zero on the assignment with no chance of rewriting it, and a note in your academic file.

For a second offense in any one of my classes, a zero in the class, and recommendation for a note on your transcript.

For a third offense in any one of my classes, a zero in the class and a recommendation for expulsion from the university.

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).

### **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](http://ambrose.edu/counselling)
- Peer Supportive Listening: One-to-one support in Student Life office. Hours posted at [ambrose.edu/wellness](http://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](http://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](http://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

## Ambrose University Academic Policies:

### 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. If students do not wish to use their Ambrose accounts, they will need to forward all messages from the Ambrose account to another personal account.

### Registration

During the **Registration Revision Period** students may enter a course without permission, change the designation of any class from credit to audit and/or voluntary withdraw from a course without financial or academic penalty or record. Courses should be added or dropped on the student portal by the deadline date; please consult the List of Important Dates. After that date, the original status remains and the student is responsible for related fees.

Students intending to withdraw from a course after the Registration Revision Period must apply to the Office of the Registrar by submitting a "Request to Withdraw from a Course" form or by sending an email to the Registrar's Office by the **Withdrawal Deadline**; please consult the List of Important Dates on the my.ambrose.edu website. Students will not receive a tuition refund for courses from which they withdraw after the Registration Revision period. A grade of "W" will appear on their transcript.

Students wishing to withdraw from a course, but who fail to do so by the applicable date, will receive the grade earned in accordance with the course syllabus. A student obliged to withdraw from a course after the Withdrawal Deadline because of health or other reasons may apply to the Registrar for special consideration.

### 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 List of Important Dates. 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.

### Electronic Etiquette

Students are expected to treat their instructor, guest speakers, and fellow students with respect. It is disruptive to the learning goals of a course or seminar and disrespectful to fellow students and the instructor to use electronics for purposes unrelated to the course during a class session. Turn off all cell phones and other electronic devices during class. Laptops should be used for class-related purposes only. Do not use iPods, MP3 players, or headphones. Do not text, read, or send personal emails, go on Facebook or other social networks, search the internet, or play computer games during class. Some professors will not allow the use of any electronic devices in class. The professor has the right to disallow the student to use a

laptop in future lectures and/or to ask a student to withdraw from the session if s/he does not comply with this policy. Repeat offenders will be directed to the Dean. If you are expecting communication due to an emergency, please speak with the professor before the class begins.

### Academic Policies

It is the responsibility of all students to become familiar with and adhere to academic policies as stated in the Academic Calendar. 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](mailto:privacy@ambrose.edu).

### Extensions

Although extensions to coursework in the semester are at the discretion of the instructor, students may not turn in coursework for evaluation after the last day of the scheduled final examination period unless they have received permission for a course Extension from the Registrar's Office. Requests for course extensions or alternative examination time must be submitted to the Registrar's Office by the deadline date; please consult the List of Important Dates. Course extensions are only granted for serious issues that arise "due to circumstances beyond the student's control."

### Appeal of Grade

An appeal for change of grade on any course work must be made to the course instructor within one week of receiving notification of the grade. An appeal for change of final grade must be submitted to the Registrar's Office in writing and providing the basis for appeal within 30 days of receiving notification of the final grade, providing the basis for appeal. A review fee of \$50.00 must accompany the appeal. If the appeal is sustained, the fee will be refunded.

### 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.

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