

Course ID:	Course Title:	Winter 2024
BIO 329	Molecular Genetics	Prerequisite: BIO 211 and BIO 231
		Credits: 3

Class Information		Instructor Information		Important Dates	
Delivery:	in-person	Instructor:	Drs. Xiao Li (Lectures) and Ryan Smit (Lab)	First Day of Classes:	January 9, 2024
Days:	Tue, Thurs	Email:	Xiao.Li@ambrose.edu Ryan.Smit@ambrose.edu	Last Day to Add/Drop:	January 21, 2024
Time:	5:30 pm - 6:45 pm	Phone:		Last Day to Withdraw:	March 28, 2024
Room:	RE104	Office:	TBA	Last Day to Apply for Extension:	April 2, 2024
Lab:	Wed 1:00 pm - 3:45 pm A2145	Office Hours:	By appointment	Last Day of Classes:	April 12, 2024
Final Exam:	April 18 6:30 - 9:30 RE104				

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>.

This course will study the structure of genes and the molecular mechanisms that regulate gene expression in prokaryotes and eukaryotes. Topics include gene and chromosome structures, DNA recombination and mechanisms of DNA replication and repair, transcription, post-transcriptional RNA processing, translation, and posttranslational modifications. Students in this lecture-based course also learn the theory of basic molecular techniques, such as quantitative PCR and gene silencing.

Expected Learning Outcomes

Students who successfully completed the course will be able to:

1. explain the processes of DNA replication, repair, and recombination
2. explain the processes and regulation of RNA transcription
3. describe the genetic code, and the processes and regulation of translation
4. explain the role of regulatory RNAs
5. describe and explain typical molecular laboratory techniques
6. develop strategies to address molecular genetics problems experimentally

Textbooks (Required):

- Molecular Biology of the Gene, 7th Edition. James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine, and Richard Losick. 2014. Cold Spring Harbor Laboratory Press. (ISBN: 9780321906991)

Textbooks (Recommended):

- A Genetic Switch, 3rd Edition. Mark Ptashne. 2004. Cold Spring Harbor Laboratory Press.

Course Schedules:

The following schedules provide a general guideline and timetable for topics and tests. It may change depending on progress through the semester and the development of COVID-19 pandemic.

A. Tentative Lecture Schedule:

Date	Lecture Topic	Readings (Watson et al. 7 th Ed)
Jan. 9	Introduction to BIO 329	
Jan. 11	Topic 1 - Genetic Regulation: A Genetic Switch	Appendix 1: p. 798 – 802 Ch. 18 p. 636 – 652 Ptashne: Intro; Ch. 1-2
Jan. 16	Topic 1 - Genetic Regulation: A Genetic Switch	798 – 802; 636 - 652 Ptashne: Intro; Ch. 1-2
Jan. 18	Topic 1 - Genetic Regulation: A Genetic Switch	798 – 802; 636 - 652 Ptashne: Intro; Ch. 1-2
Jan. 23	Topic 2 - Protein-DNA Interaction and Gene Control	Ch. 6 p. 121 - 129; 134 - 135; 137 – 139; Ch. 18 p. 615 – 620
Jan. 25	Topic 2 - Protein-DNA Interaction and Gene Control	121 - 129; 134 - 135; 137 - 139; 615 - 620
Jan. 30	Topic 3 - DNA Structure and Topology	Ch. 4 p. 77 - 105
Feb. 01	Topic 3 - DNA Structure and Topology	Ch. 4 p. 77 - 105
Feb. 06	Topic 3 - DNA Structure and Topology	Ch. 4 p. 77 - 105
Feb. 08	Topic 5 - RNA Structure and Variety	Ch. 5 p. 107 - 120
Feb. 13	Topic 5 - RNA Structure and Variety	Ch. 5 p. 107 - 120
Feb. 15	Topic 6 - Genomic Structure, Chromatin, and the Nucleosome	Ch. 8 p. 199 - 256
Feb. 20	<i>Winter Reading Week (No Class)</i>	
Feb. 22	<i>Winter Reading Week (No Class)</i>	
Feb. 27	Topic 6 - Genomic Structure, Chromatin, and the Nucleosome	Ch. 8 p. 199 - 256
Feb. 29	Topic 7 –DNA Replication	Ch. 9 p. 257-312
Mar. 05	Topic 7 –DNA Replication	Ch. 9 p. 257-312
Mar. 07	<i>In-Class Midterm Exam</i>	
Mar. 12	Topic 8 - DNA Damage Mutation and Repair Mechanisms	Ch. 10 p. 313 – 340; Ch. 11 p. 341 -376
Mar. 14	Topic 8 - DNA Damage Mutation and Repair Mechanisms	Ch. 10 p. 313 – 340; Ch. 11 p. 341 -376

Mar. 19	Topic 9 - Transcription	Ch. 13 p. 429-466 Ch. 19 p. 657-700
Mar. 21	Topic 9 - Transcription	Ch. 13 p. 429-466 Ch. 19 p. 657-700
Mar. 26	Topic 10 - Post-transcriptional Processing	Ch. 14 p. 467 - 507
Mar. 28	Topic 10 - Post-transcriptional Processing	Ch. 14 p. 467 - 507
Apr. 02	Topic 10 – Translation	Ch. 15 p. 509 - 571
Apr. 04	Topic 10 – Translation	Ch. 15 p. 509 - 571
Apr. 09	Topic 11 – Regulatory RNAs	Ch. 20 p. 701 - 732
Apr. 11	Topic 11 – Regulatory RNAs	Ch. 20 p. 701 - 732

B. Tentative Lab Schedule:

Date	Tutorial Objective
Jan. 17	Introduction to BIO 329 Lab
Jan. 24	Lab 1 – Miniprep of Unknowns Paper Selection Discussion
Jan. 31	Lab 2 – Cloning I: PCR and Restriction Digest How to Write a Lab Report
Feb. 07	Lab 3 – Cloning II: Gel Electrophoresis and DNA Purification
Feb. 14	Lab 4 – Cloning III: T-tailing, DNA Purification and Ligation – <i>Draft Report Due (Labs 1-2)</i>
Feb. 21	<i>Winter Reading Week (No Lab)</i>
Feb. 28	Lab 5 – Competent Cells and Transformation
Mar. 06	Lab 6 – PCR Colony Screening I – <i>Draft Report Due (Labs 3-4)</i> How to Summarize a Paper for Presentation
Mar. 13	Lab 7 – PCR Colony Screening II
Mar. 20	Lab 8 – RNAi by Feeding in <i>C. elegans</i> Sample Paper Presentation
Mar. 27	Lab 9 – RNAi Results – <i>Draft Report Due (Labs 5-8)</i>
Apr. 03	<i>Student Paper Presentations</i>
Apr. 10	No Lab – <i>Final Lab Report Due</i>

Attendance:

- “on time” lab attendance is mandatory - student, who missed more than 2 lab sessions, would automatically fail the course
- attendance is required to obtain marks for in-lab assignments

Evaluation Methods:

Evaluation Methods	Due Date	Weighting
Paper Presentation	Apr. 03 rd	10%
Lab Assignments	The end of most labs	5%
Lab Report	▪ drafts due Feb. 14 th , Mar. 06 th , Mar. 27 th (5%) ▪ final report is due on Apr. 10 th (10%)	15%
Lecture Assignments	multiple	10%
Midterm Exam	Mar. 7 th	25%
Final Exam (cumulative)	April 18 th	35%
Total		100%

Midterm Exam: (25%)

- NO make-up or deferred exam unless evidence of legitimate excuse, such as doctor’s notes, is presented

Final Exam: (35%)

- final exam is *comprehensive (i.e. cumulative)*

Grade Summary:

The available letters for course grades are as follows:

Percent (%) to Letter Grade Conversion	Grade	Grade Point	Description
92.00% - 100%	A+	4.0	Excellent
85.00% - 91.99%	A	4.0	
80.00% - 84.99%	A-	3.7	
77.00% - 79.99%	B+	3.3	Good
73.00% - 76.99%	B	3.0	
70.00% - 72.99%	B-	2.7	
67.00% - 69.99%	C+	2.3	Satisfactory
63.00% - 66.99%	C	2.0	
60.00% - 62.99%	C-	1.7	
55.00% - 59.99%	D+	1.3	Minimal Pass
50.00% - 54.99%	D	1.0	
00.00% - 49.99%	F	0	
			Fail

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.

Classroom Etiquette:

Use of Electronic Devices:

To foster a conducive learning environment, the use of computers and tablets is encouraged for taking lecture notes. However, the use of cell phones for non-academic purposes is strictly prohibited during class time. Please ensure your cell phones are either turned off or on silent mode to avoid distractions. Activities such as texting and watching movies in class are not permitted.

Attendance:

Regular attendance is highly encouraged. Students who consistently attend classes tend to perform better academically. If you are unable to attend a class due to an emergency or illness, please inform me in advance. Keep in mind that if you miss a class, it is your responsibility to consult with me outside of class hours to discuss how to make up for the missed session.

Classroom Conduct:

Please respect the learning atmosphere by focusing on the class activities.

Respect for Peers:

A respectful and supportive classroom environment is key. You may encounter diverse viewpoints and questions from classmates. It is important to maintain a respectful attitude towards everyone's contributions.

Academic Integrity:

Plagiarism:

Plagiarism is a serious violation of academic integrity. It involves presenting someone else's work as your own. This includes:

- Submitting copied work from any source, including peers, without proper attribution.
- Using parts of a work (words, ideas, images, data) without acknowledging the source.
- Submitting the same work for multiple courses without the consent of the instructors involved.
- Having someone else prepare your work.
- Receiving extensive help from others without proper acknowledgment.

Cheating:

Cheating undermines the integrity of our academic community. It includes, but is not limited to:

- Tampering with or attempting to tamper with grades, class records, or coursework.
- Unauthorized assistance during exams.
- Impersonating another student in examinations.
- Falsifying or fabricating lab reports.
- Communication with others during an examination.
- Unauthorized materials or electronic devices in examinations.
- Possession or distribution of unauthorized exam materials.
- Attempting to view another student's exam answers.

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.
