

<b>Course ID:</b>	<b>Course Title:</b>	<b>Winter 2022</b>
<b>BIO 329</b>	<b>Molecular Genetics</b>	<b>Prerequisite: BIO 211 and BIO 231</b>
		<b>Credits: 3</b>

Class Information		Instructor Information		Important Dates	
<b>Delivery:</b>	in-person	<b>Instructor:</b>	Dr. Chris Wang	<b>First Day of Classes:</b>	January 10, 2022
<b>Days:</b>	Tuesday and Thursday	<b>Email:</b>	chris.wang@ambrose.edu	<b>Last Day to Add/Drop:</b>	January 23, 2022
<b>Time:</b>	5:00 – 6:15	<b>Phone:</b>	(403) 410-2000 ext. 6910	<b>Last Day to Withdraw:</b>	March 18, 2022
<b>Room:</b>	A2212	<b>Office:</b>	L2113	<b>Last Day to Apply for Extension:</b>	March 28, 2022
<b>Lab/Tutorial:</b>	Date: Monday Time: 8:15 – 11:00 Room: A2145/Online	<b>Office Hours:</b>	by appointment (open door policy)	<b>Last Day of Classes:</b>	April 14, 2022
<b>Final Exam:</b>	Time: 1 – 4 PM	Date: Friday, April 22	Location: 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> .

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, 7<sup>th</sup> 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, 3<sup>rd</sup> Edition. Mark Ptashne. 2004. Cold Spring Harbor Laboratory Press.
  - Figure can be downloaded at <http://www.cshteaching.org/AGeneticSwitch.php>
  - A Genetic Switch Lecture Series can be viewed at:  
<https://www.mskcc.org/research/ski/labs/mark-ptashne/genetic-switch-lecture-series>

### **Laboratory Bioinformatic Software:**

- free sign up for Benchling at <https://www.benchling.com/academic/>

## 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 <sup>th</sup> Ed)
Jan. 11	Introduction to BIO 329	
Jan. 13	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. 20	Topic 1 - Genetic Regulation: A Genetic Switch	798 – 802; 636 - 652 Ptashne: Intro; Ch. 1-2
Jan. 25	Topic 1 - Genetic Regulation: A Genetic Switch	798 – 802; 636 - 652 Ptashne: Intro; Ch. 1-2
Jan. 27	Topic 2 - Protein-DNA Interaction and Gene Control	121 - 129; 134 - 135; 137 - 139; 615 - 620
Feb. 01	Topic 2 - Protein-DNA Interaction and Gene Control	121 - 129; 134 - 135; 137 - 139; 615 - 620
Feb. 03	Topic 3 - DNA Structure and Topology	77-105 (Chapter 4)
Feb. 08	Topic 3 - DNA Structure and Topology	77-105 (Chapter 4)
Feb. 10	Topic 3 - DNA Structure and Topology	77-105 (Chapter 4)
Feb. 15	Topic 4 - RNA Structure and Variety	107-120 (Chapter 5)
Feb. 17	Topic 4 - RNA Structure and Variety	107-120 (Chapter 5)
Feb. 22	<i>Winter Reading Week (No Class)</i>	
Feb. 24	<i>Winter Reading Week (No Class)</i>	
Mar. 01	<b><i>In-Class Midterm Exam</i></b>	
Mar. 03	Topic 5 – Molecular Biology Techniques (Student-led Lecture)	147-190 (Chapter 7)
Mar. 08	Topic 5 – Molecular Biology Techniques (Student-led Lecture)	147-190 (Chapter 7)
Mar. 10	Topic 6 - Genomic Structure, Chromatin, and the Nucleosome	199-256 (Chapter 8)
Mar. 15	Topic 6 - Genomic Structure, Chromatin, and the Nucleosome	199-256 (Chapter 8)
Mar. 17	Topic 7 – Eukaryotic DNA Replication	257-312 (Chapter 9)
Mar. 22	Topic 8 – Eukaryotic Transcription	429-466 (Chapter 13) 657-700 (Chapter 19)
Mar. 24	Topic 8 – Eukaryotic Transcription	429-466 (Chapter 13) 657-700 (Chapter 19)

<b>Mar. 29</b>	Topic 9 – RNA Splicing	467-507 (Chapter 14)
<b>Mar. 31</b>	Topic 9 – RNA Splicing	467-507 (Chapter 14)
<b>Apr. 05</b>	Topic 10 – Translation	509-571 (Chapter 15)
<b>Apr. 07</b>	Topic 10 – Translation	509-571 (Chapter 15)
<b>Apr. 12</b>	Topic 11 – Regulatory RNAs	701-731 (Chapter 20)
<b>Apr. 14</b>	Topic 12 – Genomics and Proteomics	

**B. Tentative Lab Schedule:**

Date	Tutorial Objective
Jan. 17	Introduction to BIO 329 lab
Jan. 24	Lab 1 – Miniprep Paper Selection
Jan. 31	Lab 2 – PCR and Restriction Digest of <i>pL4440</i> plasmid How to summarize papers for presentation?
Feb. 07	Lab 3 – Check for PCR Products and Gel Purification of <i>pL4440</i> How to write a proposal and review article
Feb. 14	Lab 4 – Gel Purification of PCR Product, T-tailing of <i>pL4440</i> , and Ligation
Feb. 21	<i>Winter Reading Week (No Tutorial)</i>
Feb. 28	Lab 5 – Make Competent Cells and Transformation
Mar. 07	Lab 6 – PCR Colony Screening
Mar. 14	Lab 7 – Determining Positive Clones and Preparation Sample for DNA Sequencing
Mar. 21	Lab 8 – Transformation and Set Up of RNAi plates
Mar. 28	Lab 9 – RNAi Experiment
Apr. 04	Lab 10 – Phenotypic Analysis (timing can be flexible due to ARC on Mar. 25 <sup>th</sup> )
Apr. 11	Lab 11 – Topical Presentation

**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-tutorial assignments

**Evaluation Methods:**

Evaluation Methods	Due Date	Weighting
Assignments	multiple	10%
Topical Presentation	Apr. 11 <sup>th</sup>	10%
Research Proposal on Current Advances in the Topic	paper selection is pending on approval	10%
Lab Report Summary	<ul style="list-style-type: none"><li>▪ draft copy of “Introduction” due on <b>Feb. 4<sup>th</sup></b> (2 of 10%)</li><li>▪ final report is due on <b>Apr. 10<sup>th</sup></b></li></ul>	10%
Midterm Exam	Mar. 1 <sup>st</sup>	25%
Final Exam (cumulative)		35%
Total		100%

**Midterm Exam: (30%)**

- focus on understanding the biological concepts rather than detail memorization
- 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.

**Other:**

**Classroom Etiquette:**

**Electronic Devices**

Although computers and tablets can be used in the class for taking lecture notes, cell phone usage is not permitted. Please turn cellular phones off - it is very distracting to hear someone's phone go off in class. Texting and movie watching are prohibited in class.

**Attend every class**

You will find that students who attend every class, listen to the instructor and take good notes will be more likely to pass (with a higher grade). If you have an emergency or illness, please contact me ahead of time to let me know that you will be absent.

Important note: if you miss a class it is your responsibility to meet with the instructor, outside of regular class time, to determine a plan to make up the missed work.

**Get to Class On Time**

Students, who walk into the classroom late or leave early, distract other students and disrupt the learning environment.

**Do Not Have Private Conversations**

The noise is distracting to other students. Also, talking to classmates during lecture and presentations disrupts the normal learning environment.

**Do Not Get Up and Walk Out Halfway Through the Class**

It disturbs people and gives the unmistakable impression that you don't respect the class, the other students or the instructor. The instructor has the right to finish his or her thought at the end of the class period and conclude the class in an orderly fashion without people standing up and walking out

**Your Classmates Deserve Your Respect and Support**

Others may have different ideas and opinions from yours, they may ask questions you perceive to be "stupid," but they deserve the same level of respect from you as you wish from them.



### **Plagiarism:**

Plagiarism is a very serious academic offence that involves presenting work in a course as if it were the result of one's own study and investigation when, in fact, it is the work of someone else. Plagiarism takes place when:

- an essay or other work is copied from another source, including your peer's work, and submitted as one's own
- parts of a work, including words, ideas, images or data, are taken from a source without acknowledgement of the originator
- work presented for one course is also submitted for another course without prior agreement of the instructors involved
- another person prepares the work that is submitted as one's own
- substantial editorial or compositional assistance from another person is received on work that is submitted as one's own

### **Cheating:**

Cheating is also a very serious academic offence. Cheating on examinations, assignments and/or labs may take a number of forms, including:

- tampering or attempting to tamper with examination scripts, class work, grades or class records
- obtaining unauthorized assistance from anyone during the course of an examination
- impersonating another student during examinations
- falsifying or fabricating lab reports
- communicating with other students during an examination
- bringing unauthorized written material or electronic devices to an examination
- possessing, distributing, or attempting to possess or distribute unauthorized material in respect to examinations
- attempting to read the examination papers of other students
- deliberately exposing one's own examination papers to another student

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