

**Location:**

BIOL 367 lectures will be on every Monday and Wednesday of the week at 10:15AM - 11:30AM

Wednesday lecture will be In-Person at HB130 at the Loyola Campus.

Monday lecture will be at zoom ([link](#)).

However, I will let you know if the delivery of lecture changes any time. If the Classes are suspended due to COVID19 restrictions. All the remaining lectures will be over zoom.

Description:

Molecular biology is broadly defined as the field that focuses on studying biology at the molecular level in a living cell primarily aiming to understand DNA, RNA, and proteins, their synthesis and regulation. The purpose of this course is to explore the fundamentals of molecular biology. My aim, throughout the semester, will be to make you comprehend the molecular mechanisms of replication, transcription, and translation while focusing on the regulation of critical processes, experiments, and techniques. The textbook should reinforce the concepts learned in the class. Besides, we will discuss important recent publications in molecular biology so that you may gain an appreciation of current areas of research and how these fundamental principles are further verified, new processes discovered, and basic principles are challenged. This course will also cover novel genome engineering tools like CRISPR-Cas9 and other genome modifications involving DNA transactions such as site-specific DNA recombination. We will learn how several crucial processes work in unison in a living cell - from decoding DNA to making functional entities such as proteins. Finally, we will discuss the current state of molecular biology in the context of genomics.

Lecturer:

Aashiq H. Kachroo (Assistant Professor)

Department of Biology, Center for Applied Synthetic Biology

Office: L-GE 330.11 Tel: 514-848-2424 Ext. 2493

Email: aashiq.kachroo@concordia.ca (preferred way of communication).

Office hours*: Every Wednesday 12:30p-1:30p at zoom ([link](#)).

**Note that my office hours are meeting as a 'group'. Please send an email ahead of time if you would want to meet at the office hours. If you prefer to talk to me one-one about a grade or any personal issues concerning the course, email me, and we can schedule a date for the meeting.*

About me:

I am a faculty member in the Department of Biology and Center for Applied Synthetic Biology at Concordia University. I have a broad background in genetics and evolution with specific training and expertise in systems biology approaches and technology development. The long-term goal of my research program is to understand the evolutionary principles governing the conservation of gene function across deeply diverged organisms like humans and yeast. Yeast is the most well-studied organism on the planet. We systematically humanize yeast to discover principles that allow swappability and simultaneously engineer yeast with critical human processes involved in disease such that yeast are more human-like at the molecular level.

Textbook and course material:

Textbook for the course - **Molecular Biology of the Gene** by James D. Watson, *et al.* [**The chapters assigned in the lectures are from this book**]. However, the concepts taught in the class will be acquired from multiple sources. The textbook, thus, serves as a reference for key concepts only and also to avoid memorization. Course material will be available at the following sites: http://www.kachroolab.org/classes/BIOL367_fall_2021.html (most preferred). Announcements may also be posted on Moodle. Lecture slides will be posted [here](#) as a *.pdf files a few hours before the scheduled lecture. The password for all the PDF files is 'XXX'. You will also find assignments, grades, and additional announcements on Moodle or [here](#) throughout the semester.

TOP HAT:

We will be using the **Top Hat** (www.tophat.com) classroom response system in class for lectures, quizzes, and attendance. You will be able to submit answers to in-class questions, and I will take attendance via Apple or Android smartphones and tablets, laptops, or via text message (SMS). You can register for **Top Hat** [here](https://app.tophat.com/register/) (<https://app.tophat.com/register/>). **Top Hat** will require a single course price or a subscription. There are multiple options and it costs ~\$26 CAD for 1 term subscription (4 months). There may be an additional fee for the Top Hat Test as well. The course code for BIOL367-Fall 2021 is **310689**. **You must register before September 5, 2021.**

Grading:

Your course grade will be based on exams, quizzes, surprise in-class quizzes and participation throughout the course. Grades will be calculated as the following:

EXAM TYPE	Grade %	DATE
Midterm exams (2 of 3)	40%	See the schedule below
Quizzes (2 of 3)	30%	See the schedule below

Take home assignments (2 of 2)	20%	Surprise!!
In-class quizzes & attendance	10%	Every lecture day
FINAL EXAM	X	No Final Exam
OVERALL	100%	

Grades will be assigned as follows: A⁺ = 90-100%, A = 85-89%, A⁻ = 80-84%, B⁺ = 77-79%, B = 73-76%, B⁻ = 70-72%, C⁺ = 67-69%, C = 63-66%, C⁻ = 60-62%, D⁺ = 57-59%, D = 53-56%, D⁻ = 50-52%, F = < 50. **Final grades are rounded up, for example, 74.4 = 74 and 74.5 = 75.**

1. **If you need to miss a mid-semester exam** or a **quiz** (due to sickness, athletic commitments, or other personal reasons) your missed exam automatically becomes the dropped score, and no excuse is needed. **If you miss another exam**, please contact me ASAP before the exam. You will need a letter from a physician clearly stating that you are not in a position to write an exam (on zoom) and/or a compelling reason to receive consideration.
2. Students who arrive late to an exam will not be given additional time, and anyone arriving after another student has already finished the exam will not be permitted to take the exam and will be assigned a grade 0.
3. **Re-grade policy:** You are responsible for ensuring that your grades reflect the scores that you have secured on your exam paper, and that the points on your exam have been added correctly. If you find a mistake, please see **Trisha Gosh** immediately. If you take issue with how a short answer question was graded, **please submit your exam paper with an attached sheet explaining why your answer deserves more points by comparing your answer with the exam key and/or lecture material**. You must have written your exam in ink (non-erasable) and submit your exam for review **within ONE WEEK** after it has been returned to you. Please submit re-grade requests to **Ms. Trisha Ghosh** and I will then assess the merit of your answer.
4. **THERE IS NO FINAL EXAM.**
5. **ALL EXAMS, QUIZZES and SURPRISE tests ARE ON TOP HAT.**

Exams and quiz policy:

All exams will be an open book. Unethical behavior during the entire course, particularly during exams, will not be tolerated. Students are not allowed to take the online exams or quizzes together as a group.

Class Attendance:

Attendance at lecture and TA sessions is **strongly encouraged**, particularly if you would like to do well in the course. I will use Top Hat to mark your attendance. Remember attendance along with several surprise in-class quizzes correspond to **10% of your grade**. **In order to achieve 100% of your attendance grade, you must have attended >90% of the lectures.**

Academic Integrity:

Ethical conduct is expected at all times. Unethical behavior (cheating on exams, quizzes, etc.) may result in an automatic failing grade in the course and academic probation. Please see the Concordia U policy here (<https://www.concordia.ca/conduct/academic-integrity.html>).

Students with Disabilities:

All procedures outlined [here](http://www.concordia.ca/students/accessibility.html) (<http://www.concordia.ca/students/accessibility.html>) will be followed in this course. Please provide the proper documentation at the beginning of the semester.

Course material copyright: No one can share the lecture slides & videos, exams, quizzes, and other material provided via TA sessions on any websites or social media. Anyone who fails to abide by the rule will face severe repercussions like elimination from the course.

Software:

We will use [benchling](https://www.benchling.com) (<https://www.benchling.com>) to learn about DNA, RNA and protein sequences. Our online benching project is active (BIOL367, Concordia University, Montreal, Canada) and I will send an email to access benchling soon.

Tutorials:

Tutorial sessions are designed to review and enhance material. You will have problems, quizzes and/or other activities to prepare you for the exam. Attendance for the duration of the Tutorial section class is expected for quizzes and problem-solving activities since they directly impact your grades. If you wish to change your tutorial section, please see Hashim for permission **a week before the date of TA session. TA session slides and problem set will be updated every week at provided here** (http://www.kachroolab.org/classes/BIOL367_fall_2021.html) or at TOPHAT.

Tutorials are scheduled on Tuesday from 1:15PM - 2:30PM for group 1 and Wednesday 1:15PM - 2:30PM for group 2 In-person at CC214 at Loyola. Tutorial problems will be provided either at Wednesday lecture sessions or on Friday's of every week. In the case of COVID19 related restrictions, Ms. Trisha will provide TA sessions over zoom. Link will be provided later.

Lectures:

The following are the topics that will be covered during the course. Dates of the topics are subjected to change depending on whether the topics were covered during a previous lecture. Chapters are provided as reference. The chapters assigned in the lectures are from, [Molecular Biology of the Gene](#) by Watson, J. et al.

<u>Dates</u>	<u>Lecture</u>	<u>Topic</u>	<u>Suggested Readings</u>
Wed. Sep 08	1	Introduction to the course & DNA as the genetic material	Ch. 1 & 2
Mon. Sep 13	2	DNA to RNA to Proteins	Ch. 1 & 2

Wed. Sep 15	3	Chemical bonds, DNA, RNA & Proteins	Ch. 3-7
Mon. Sep 20	4	DNA Replication	Ch. 7-9
Wed. Sep 22	5	PCR, site-directed mutagenesis & DNA sequencing	Ch. 7-9
Mon. Sep 27	6	DNA damage and Repair	Ch. 10
Wed. Sep 29	--	MIDTERM-EXAM #1 (60min) [Lectures 1-6]	--
Mon. Oct 04	7	DNA Repair and Recombination	Ch. 10-12
Wed. Oct 06	8	Techniques of Mol. Biol., Restriction enzymes (45 min) QUIZ #1 (30 min) [Lectures 1 - 7]	Ch. 7
Mon. Oct 11		HOLIDAY	HOLIDAY
Mon. Oct 13	9	Novel cloning methods & Recombinant DNA tech.	Ch. 7
Wed. Oct 18	10	Prokaryotic Transcription	Ch. 13
Wed. Oct 20	11	Prok. transcription: Regulation Part. 1	Ch. 18
Mon. Oct 25	12	Prok. transcription: Regulation Part. 2	Ch. 18
Wed. Oct 27	--	MIDTERM-EXAM #2 (60min) [Lectures 7-12]	--
Mon. Nov 01	13	Eukaryotic transcription Pt. 1	Ch. 13
Wed. Nov 03	14	Transcription factors (45min) QUIZ #2 (30 min) [Lectures 8-13]	Ch. 13, 19, 21
Mon. Nov 08	15	Euk. Transcriptional regulation Pt.1	Ch. 19
Wed. Nov 10	16	Special Invited Lecture - Genome Foundries or Euk. Transcription continued	Ch. 19
Mon. Nov 15	17	Euk. Transcription regulation Pt. 2	Ch. 19
Wed. Nov 17	18	Euk. Trxn.: Silencing gene expression and histone code	Ch. 20
Mon. Nov 22	19	Regulatory RNAs, RNA processing	Ch. 14, 20
Wed. Nov 24	--	MIDTERM-EXAM #3 (60min) [Lectures 14-19]	--
Mon. Nov 29	20	Prok. & Euk. Translation Genomics and Molecular Systems Biology	Ch. 15, 16, 22
Wed. Dec 01	--	Revisions & QUIZ #3 (30min) [16-20]	