

**Location:**

BIOL 367 lectures will be on every Monday and Wednesday of the week at 10:15AM - 11:30AM at HB 130 Loyola campus.

**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 understand and learn about the molecular mechanisms of replication, transcription, and translation, focusing on the regulation of critical processes, experiments, and techniques. While you will rely on textbooks to understand these principles, we will also discuss some 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 how these basic principles are challenged. This course will cover the topics of DNA replication while also learning about novel genome engineering processes (like CRISPR-Cas9) involving DNA transactions like site-specific recombination. We will learn about transcription, RNA processing, translation, epigenetics, and several other critical biological processes. Finally, we discuss the current state of molecular biology in the context of genomics.

**Lecturer and Teaching Assistant:**

Aashiq H. Kachroo (Assistant Professor)

Department of Biology, Center for Applied Synthetic Biology

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Teaching Assistant: Trisha Ghosh, a graduate student

Email: [trishaghosh1497@gmail.com](mailto:trishaghosh1497@gmail.com)

**Office hours\*:** Every Monday 1:30p-2:30p at GE 110.01 at Concordia Loyola campus.

*\*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**]. Course material will be available at the following sites: [http://www.kachroolab.org/classes/BIOL367\\_fall\\_2019.html](http://www.kachroolab.org/classes/BIOL367_fall_2019.html) (most preferred). Announcements may also be posted on Moodle. Lecture slides will be posted [here](#) as \*.pdf files a few hours before the scheduled lecture. The password for all the PDF files is 'biol\_367'. 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](http://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 2019 is **198379**. **You must register before September 2, 2019.**

**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%	<i>See the schedule below</i>
Quizzes (2 of 3)	20%	<i>See the schedule below</i>
Surprise quizzes (2 of 3)	10%	<i>Surprise!!</i>
In-class quizzes & attendance	5%	<i>Every lecture day</i>
FINAL EXAM (optional)	25%	<i>Announced by the Exams Office.</i>
OVERALL	100%	

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

1. **If you need to miss a mid-semester exam** (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 come see me. You will need a letter from a physician 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. **Don't want to take the Final Exam?** You have an option. Take all three mid-semester exams, and achieve a B<sup>-</sup> or higher (> 70%). Your lowest exam score will then be counted in place of the Final Exam. Please note that if you sit for the Final Exam, I will automatically count it as 25% of your grade and drop your lowest mid-semester exam score, regardless of how you do on the Final Exam!
4. **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 Ghosh 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 Trisha. Trisha and I will then assess the merit of your answer.

### **Exams and quiz policy:**

All exams will be an open book. Avoid any unethical behavior during the entire course, particularly during exams.

### **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 ~15% 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/students/academic-integrity/offences.html>).

### **Students with Disabilities:**

All procedures outlined [here](http://www.concordia.ca/students/accessibility.html) (<http://www.concordia.ca/students/accessibility.html>) and [here](http://www.concordia.ca/content/dam/common/docs/policies/official-policies/PRVPAA-14.pdf) (<http://www.concordia.ca/content/dam/common/docs/policies/official-policies/PRVPAA-14.pdf>) will be followed in this course. Please provide the proper documentation at the beginning of the semester.

### **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. The quizzes are not meant to be as difficult as the exams, but serve to encourage preparation. 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 Trisha for permission **a week before the date of TA session.**

Tutorials are scheduled on Tuesday from 1:15PM - 2:30PM for group 1 and from 2:45PM - 4:00PM for group 2 at CC 204 Loyola campus. Tutorial problems will be provided at Monday lecture sessions.

***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 and will be updated as we explore more details. The chapters assigned in the lectures are from this book, [Molecular Biology of the Gene](#) by Watson, J. et al. (official textbook for the class).***

<u>Dates</u>	<u>Lecture</u>	<u>Topic</u>	<u>Suggested Readings</u>
Wed. Sep 04	<b>1</b>	Introduction to the course & DNA as the genetic material	Ch. 1 & 2
Mon. Sep 9	<b>2</b>	Chemical bonds, DNA, RNA & Proteins Pt.1	Ch. 3 & 4
Wed. Sep 11	<b>3</b>	Chemical bonds, DNA, RNA & Proteins Pt.2	Ch. 3-7
Mon. Sep 16	<b>4</b>	DNA Replication	Ch. 7-9
Wed. Sep 18	<b>5</b>	PCR, site-directed mutagenesis & DNA sequencing	Ch. 7-9
Mon. Sep 23	--	<b>MIDTERM-EXAM #1 (60min) [Lectures 1-5]</b>	--
Wed. Sep 25	<b>6</b>	DNA damage and Repair	Ch. 10
Mon. Sep 30	<b>7</b>	DNA Repair and Recombination (40min)	Ch. 10-12
		<b>QUIZ #1 (35 min) [Lectures 1 - 6]</b>	
Wed. Oct 2	<b>8</b>	Techniques of Mol. Biology, Restriction enzymes	Ch. 7
Mon. Oct 7	<b>9</b>	Novel cloning methods & Recombinant DNA tech.	Ch. 7
Wed. Oct 9	<b>10</b>	Prokaryotic Transcription	Ch. 13
Wed. Oct 16	<b>11</b>	Prok. transcription: Regulation Part. 1	Ch. 18
Mon. Oct 21	<b>12</b>	Prok. transcription: Regulation Part. 2	Ch. 18

Wed. Oct 23	--	<b>MIDTERM-EXAM #2 (60min) [Lectures 7-12]</b>	--
Mon. Oct 28	<b>13</b>	Eukaryotic transcription Pt. 1	Ch. 13
Wed. Oct 30	<b>14</b>	Transcription factors (40min) <b>QUIZ #2 (35 min) [Lectures 8-13]</b>	Ch. 13, 19, 21
Mon. Nov 4	<b>15</b>	Euk. Transcriptional regulation Pt.1	Ch. 19
Wed. Nov 6	<b>16</b>	<b>Special Lecture - Genome Foundries</b>	--
Mon. Nov 11	<b>17</b>	Euk. Transcription regulation Pt. 2	Ch. 19
Wed. Nov 13	<b>18</b>	Euk. Trxn.: Silencing gene expression and histone code	Ch. 20
Mon. Nov 18	<b>19</b>	Regulatory RNAs, RNA processing	Ch. 14, 20
Wed. Nov 20	--	<b>MIDTERM-EXAM #3 (60min) [Lectures 14-19]</b>	--
Mon. Nov 25	<b>20</b>	Prok. & Euk. Translation	Ch. 15, 16
Wed. Nov 27	<b>21</b>	Genomics and Systems biology	Ch. 22
Mon. Dec 2	--	<b>Revisions &amp; QUIZ #3 (35min) [16-21]</b>	--
TBA	--	FINAL EXAM (3hrs) [Lectures 1-21]	--