



**BIOL 367/BL: Molecular Biology**

**3 credits**

**Winter 2022 (Mon/Wed 11:45-13:00) HB-130**

**Tutorials: 0101 (Mon 2:45-4pm) 0102 (Tues 2:45-4pm) CC-214**

**Location: Blended format**

**Instructor: Dr. Andrew Wieczorek**

Email: [Andrew.wieczorek@concordia.ca](mailto:Andrew.wieczorek@concordia.ca)

Office: SP375.35

Tel: 848-2424 ext. 3395

Office hours: TBA in first week of class

**Pre-requisites: Biol261 and Chem 271**

### **COURSE DESCRIPTION**

DNA structure, recombination, gene structure, gene expression, and its regulation. The experimental evidence that supports these concepts is also discussed. The course includes lectures and tutorials.

Molecular biology is the study of biological systems at the molecular level. The learning objectives of this course include; familiarization of students with the experimental approaches used in molecular biology, and the development of an understanding of gene expression and gene regulation. The topics covered include; DNA cloning methods, molecular tools for studying gene expression, the structure of DNA, the replication of DNA, DNA recombination, the transcription of DNA into RNA, mRNA translation and the regulatory mechanisms controlling gene expression. Emphasis will be placed on developing an understanding of basic concepts. Reflecting this, the mid term and final exams will be open book.

### **COURSE OBJECTIVES**

This course is designed to provide students with a background in molecular genetics. The two main learning objectives of this course are: the development of an understanding of gene expression and gene regulation, and the familiarization of students with the experimental approaches used in molecular biology.

### **TOPICS COVERED**

#### **Introduction to DNA and genes**

The molecular nature of genes (Chapter 2)

An introduction to gene function (Chapter 3)

#### **DNA replication and recombination**

DNA replication: Mechanism and enzymology

#### **Translation**

Overview of translation and translation control

#### **Methods in molecular biology**

Molecular cloning methods (Chapter 4)

Molecular tools for studying gene expression (Chapter 5)

#### **Transcription in prokaryotes**

Transcription in prokaryotes (Chapter 6)

Operons (Chapter 7)

Major shifts in prokaryotic transcription (Chapter 8)

DNA protein interactions (Chapter 9)

#### **Transcription in eukaryotes**

RNA polymerases and their promoters (Chapter 10)

General transcription factors (Chapter 11)

Transcription activators (Chapter 12)

Chromatin structure and transcription (Chapter 13)

### **Post-transcriptional events**

Splicing (Chapter 14)

Capping and polyadenylation (Chapter 15)

Post-transcriptional control of gene expression (Chapter 16)

### **COURSE RESOURCES**

Course notes, tutorials, and Powerpoint presentations will be available on MOODLE. For online content, pre-recorded zoom presentations of the material will be available at the start of each online session on Yuja (see link on the course MOODLE page). Students are expected to watch the presentations, take notes, write down questions, and participate in a discussion and question & answer period.

### **Recommended Textbook:**

Robert F. Weaver, Molecular Biology, 5th edition. This textbook is available at the bookstore in paper and e-book format.

**In addition, students should have access to recent textbooks in genetics, biochemistry and cell biology. Access to internet during scheduled assessments is obligatory.**

Attendance at all lectures is **very strongly** encouraged, and students are expected to **participate fully** in all activities. Students who miss in-class evaluations or assignments will receive a grade of zero for that assessment. Please inform the instructor **at the beginning of the term** of any difficulties, physical or learning disabilities that you may have or as soon as possible in the case of an injury, so that you can be accommodated.

A discussion forum will be made available for students to post questions and answers and will remain open for the duration of the semester.

### **WEEKLY SCHEDULE:**

In person sessions begin during the second week of class and will be held on the following days:

(All Wednesdays)

Jan 12, 19, 26

Feb 2, 9, 16, 23

March 9, 23, 30

April 6, 13

### **Lectures**

At the start of the Monday lecture sessions, the entire week content will be posted and accompanied by a pre-recorded presentation by the instructor.

Wednesday sessions will be held in person and will involve learning activities, discussions, question and answer periods, quizzes and midterm exams.

### **TUTORIALS**

Sample problems, questions arising from lectures and some supplementary materials will be covered in the tutorials. Students should take advantage of the lectures, tutorials and office hours. It is recommended that students attend all classes, and read the associated content in the textbook.

**Teacher's Assistant:** Farhan Rahman Chowdhury

**Email:** TBD

**Office Hours:** TBD

**Email and office hours will be made available in an announcement on MOODLE.**

## GRADING

Midterm 35% (tentative date Feb 23rd)

Quizzes 15%

Final 45%

Mini-Research Project 5%

Grading scheme: A+=90-; A=85-89; A-=80-84; B+=77-79; B=74-76; B-=70-73; C+=67-69; C=64-66; C-=60-63; D+=57-59; D=54-56; D-=50-53; F=<50

The mid-term test and the final exam will comprise multiple choice answer questions and questions requiring short essay type answers.

## DISCLAIMER (UNIVERSITY)

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

## PLAGIARISM

The most common offense under the Academic Code of Conduct is plagiarism which the Code defines as "the presentation of the work of another person as one's own or without proper acknowledgement." This could be material copied word for word from books, journals, internet sites, professor's course notes, etc. It could be material that is paraphrased but closely resembles the original source. It could be the work of a fellow student, for example, an answer on a quiz, data for a lab report, a paper or assignment completed by another student. It might be a paper purchased through one of the many available sources. Plagiarism does not refer to words alone -it can also refer to copying images, graphs, tables, and ideas. "Presentation" is not limited to written work. It also includes oral presentations, computer assignments and artistic works. Finally, if you translate the work of another person into French or English and do not cite the source, this is also plagiarism. In Simple Words: **Do not copy, paraphrase or translate anything from anywhere without saying where you obtained it!** (Source: The Academic Integrity Website: <http://provost.concordia.ca/academicintegrity/plagiarism/>)

## STUDENT RESOURCES

-Biology Department Academic Advisors are Dr. Ian Ferguson and Dr. Gray Stirling

-Concordia Counselling and Development offers career services, psychological services, student learning services, etc.

<http://cdev.concordia.ca/>

-Concordia Library Citation & Style Guides <http://library.concordia.ca/help/howto/citations.html>

-Advocacy and Support Services <http://supportservices.concordia.ca/>

-Student Transition Centre <http://stc.concordia.ca/>

-New Student Program <http://newstudent.concordia.ca/>

-Access Centre for Students with Disabilities <http://supportservices.concordia.ca/disabilities/>

-Student Success Centre <http://studentsuccess.concordia.ca/>

-The Academic Integrity Website <http://provost.concordia.ca/academicintegrity/>

-Financial Aid & Awards <http://web2.concordia.ca/financialaid/>

-Health Services <http://www-health.concordia.ca/>