Biology 261 - Molecular and General Genetics

Course Outline -- Winter Semester 2022

Biology Department
Concordia University, Montreal, Canada

Instructor: Dr. Aida Abu-Baker

Office: SP- 375.35

Office phone: (514) 848-2424, x 3395

Office hours (by appointment):
Friday 4:30 pm- 5:30 pm
All office hours will be delivered online (zoom)
If the semester continues in person: Friday after the class 13:00-14:00 (in person).

Email address: aida.abu-baker@concordia.ca
Please write Biol 261 in the subject line

Lectures: Wednesday and Friday 11:45 am - 1:00 pm

Delivery: Lectures will be pre-recorded and uploaded on Moodle if the semester continues online.
All lecture material will be delivered asynchronously (pre-recorded lectures). There will, however be monthly virtual check-in classes via Zoom (links found on Moodle) that will occur during our scheduled class time. ***We will meet on zoom at our first class on Jan.7th.***

Lectures will be delivered in the class (in person) if the semester continues in person.
Room SP S100 LOY

Tutorials:	Tuesday 1:30 PM - 3:30 PM	CC 305 LOY
	Tuesday 3:30 PM - 5:30 PM	CC 314 LOY
	Wednesday 1:30 PM - 3:30 PM	CC 405 LOY
	Wednesday 3:30 PM - 5:30 PM	CJ 1.125 LOY
	Thursday 1:30 PM - 3:30 PM	CC 301 LOY
	Thursday 3:30 PM - 5:30 PM	CC 405 LOY

All tutorials will be in person
Tutorials will be on zoom if the semester continues online. And will be delivered (in person) if the semester continues in person.

TextBook (required): ***An Introduction to Genetic Analysis*, 12th edition**
Author: Anthony Griffiths; John Doebley; Catherine Peichel; David A. Wassarman (Macmillan Publisher).

Manual Solutions for Introduction to Genetic Analysis 12th Edition.

The textbook publisher has a web site for this book and the animations that illustrate key concepts in genetics can be viewed at the Macmillan WEB site. You can read the textbook on-line there if you haven't yet obtained your textbook. The site is:

https://achieve.macmillanlearning.com/courses/k24s8u

1. Mendel's first law – inheritance for one gene Week 1
Reading: Recommended Chapter 1. Required: Chapter 2
Mendelian inheritance for one gene with multiple alleles
Chromosomal basis of genetic inheritance
Mitosis, meiosis, Sex determination and sex linkage

2. Mendel's 2nd Law – independent assortment of genes Week 2
Reading: Chapter 3, except Chi Squared
Inheritance of alleles for 2 or more genes

3. The mapping of genes on eukaryotic chromosomes Week 3
Reading: Chapter 4, Intro and 4.1, 4.2 and 4.5
Chapter 3, Chi Squared test

4. Gene Interaction. Chapter 5 Week 4
One gene one polypeptide
Mutation of structural genes - molecular basis
Complementation
The molecular basis dominant and recessive alleles
Gene interactions
Modified inheritance ratios 3:1, 9:3:3:1

5. The Genetics of Bacteria and Their Viruses Week 5
Reading: Chapter 6 (except section Mechanisms of specialized transduction)
Auxotrophy, mapping: conjugation, transduction. Episomes

6. DNA-structure and function. Chapter 7 Week 6
DNA as genetic material, historical development:
Avery, McLeod, McCarty; Hershey-Chase
Chargaff; Watson and Crick

DNA Structure, DNA Replication

7. RNA Transcription and Processing. Chapter 8 Week 7

Gene Transcription and RNA processing

Reading: Chapter 8, up to and including section 8.3 (you are not responsible for sections 8.4 and 8.5, but you should know the intron splice site consensus sequence)

8. Proteins and their Synthesis. Chapter 9 Week 8

9. Control of gene expression. Chapter 11 Week 9

(sections 11.1, 11.2, 11.3, 11.4)

The lac operon, attenuation, eukaryotic promoters

Chapter 12 sections 12.1, 12.2

10. Recombinant DNA techniques. Chapter 10 Week 10

Restriction endonucleases, ligation DNA cloning,
plasmid vectors, DNA cloning, sequencing

Reading for material to be covered in exam

(Sections 10.1 through 10.4 but not subsection in 10.3 on Finding specific clones by using probes and Finding specific clones by functional complementation)

11. Population Genetics. Chapter 18. Week 11

Allelic frequency in populations
Hardy-Weinberg Equilibrium
Inbreeding

12. Large Scale Chromosomal Changes. Chapter 17 Week 12

Euploidy and Aneuploidy
Chromosomal rearrangements
Duplication, deletions, inversions, translocations

14 Genomics. Chapter 14 Week 13

(Section 14.1, 14.2, and 14.3)
The Genomics Revolution
Obtaining the sequences of a genome
Bioinformatics: meaning from genome sequences

Extraordinary circumstances

In the event of extraordinary circumstances and pursuant to the Academic Regulations the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the changes.

Intellectual Property

Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the Academic Code of Conduct and/or the Code of Rights and Responsibilities. As specified in the Policy on Intellectual Property, the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

Behaviour

All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the Code of Rights and Responsibilities which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

Welcome to Molecular and General Genetics

Genetics is one of the most interesting and important topics in biology. It is a fascinating subject in its own right and also become an extremely important subject for nearly every other speciality within biology. There have been very rapid advances in understanding genetics and there has been extensive development of new research and medical diagnostic tools based on recombinant DNA technology and whole genome analysis. We are studying genetics at a momentous time. Genetics and recombinant DNA technology currently have a large impact on science, medicine, agriculture, forensics and industry.

Genetic research is creating new methods of disease diagnosis and treatment, more efficient ways to create and manufacture pharmaceutical products, new ways to decontaminate polluted land, to genetically improve crops and reduce pesticide use in agriculture, and for forensic identification of victims and criminals. Development of biotechnology also creates controversies including to the possibility of discrimination in health insurance based on genetic predisposition to diseases, the loss

of personal privacy, economic competition between countries, patenting of genes and organisms as well as the globalisation of new biotechnology.

In this course we will begin with the basic concepts of genetics and develop a foundation on which your education and your public awareness will continue to grow.

Course Description from the Concordia Calendar

Basic genetic principles, including mechanisms of meiosis and mitosis, Mendelian genetics, recombination, gene mapping, and chromosome rearrangements; an introduction to molecular genetics, including nucleic acid structure and biosynthesis transcription and translation; the course also includes an introduction to recombinant DNA technology and to concepts of population genetics.

Objectives

The objectives of the course are to learn the basic concepts of transmission and molecular genetics as presented in the lectures and text book. Students are expected to master problem solving and be able to apply concepts that are learned to new situations.

ORGANIZATION

Lectures: There are two lectures per week and one tutorial section per week. You should attend all the lectures and your tutorial sessions (whether in person or online tutorials).
Lectures and tutorials will be recorded and posted on Moodle if the semester continues online.
Lectures and tutorials will be delivered in person if the semester continues in person.

Tutorials: meet for 2 hours each week. In the tutorial you will meet with a teaching assistant and will work on answering assigned problems.
You must attend the tutorial section to which you are registered and can only change section with the permission of the professor.
Problems are assigned each week. The solutions to these problems will be presented in tutorial the following week. These problems are the subject of the quiz two weeks after they are assigned (and one week after the answers are demonstrated in tutorial). The weekly practice and application of genetic analysis will help you to learn this subject and help you to perform well on the midterm and final exams.
TAs will also be available for office hours by appointment.

MOODLE: You have access to the WEB site for Biology 261, Molecular and General Genetics on the university's Moodle system. Access the course Moodle/WEB site at:
https://www.myconcordia.ca/ , log on and go to Course Websites and then Biol 261. You can

log on to the site with your name and student ID. The site will have the slides for the lectures, the list of practice problems for the course, the class schedule and announcements.

Confirm that your email address is updated, so you can receive announcements for the course. If you haven't yet accessed MyConcordia, information about your netname and access can be found at:
https://www.concordia.ca/it/services/netname-account-management.htm

GRADING SCHEME

The grading scheme used in Biol 261 is based on marks from the weekly quizzes/videos, take home assignments, the midterm exam and the final exam as follows:

20 % Weekly quizzes (online) Achieve
10% Weekly videos (online) Achieve
25 % Midterm exam
10 % Take home assignments: total 4 (online)
35 % Final exam

Midterm and Final Exams will be on Moodle if the semester continues online, but will be in person if the semester continues in person.

All components must be completed in order to successfully complete the course.
There will be no make-up exams or assignments.

Quizzes *and* ***Videos*** will start in the third week of the semester and are given every week thereafter except during the midterm week.

Approximately 10 quizzes will be given. Your 8 best quiz grades will be taken.
Approximately 10 videos will be given. Your 8 best videos grades will be taken.
They will be assigned each week, and will be posted on Achieve. You will have 1 week to submit your answer on Achieve.
Once you open the quiz/video, you will have only one attempt to answer and a limited time to answer it.

Take home assignments (online) will be assigned each month, and will be posted on Moodle. You will have 1 week to submit your answer on Moodle.

Midterm Exam Feb.25th 11:45 am -13:00 pm
The midterm will cover all material covered in lecture up to the date of the midterm.
It consists of MCQs, genetic problems and short answer questions.

Final Exam: The date and time will be announced by Concordia University.
The final will cover material from the entire course, with approximately 40% of the questions coming from material covered before the midterm and 60% from after the midterm.

MAKE-UP FINAL EXAM

The university allows make-up exams for students who miss the FINAL EXAM for a medical reason with documentation from a physician, you apply directly to the Birks Student Service Centre, LB-185, (instructions are at http://www.concordia.ca/students/exams/accommodations/def-note.html). However, the make-up exams are given 3 to 9 months after the end of the semester and the delay alone adds difficulty to the exam. You are strongly urged to stay healthy and take the final exam.

There are no make-up exams for midterm exams or quizzes or videos assignments.

The grade scale used for this course will be:

A+	> 90	C+	= 67-70
A	= 85-90	C	= 64-67
A-	= 80-85	C -	= 60-64
B+	= 77-80	D+	= 57-60
B	= 74-77	D	= 54-57
B-	= 70-74	D-	= 50-54
		F	<50

Technical Support

If you are having technical problems please contact the ITS at Concordia University for assistance.

Code of Rights and Responsibilities

http://web2.concordia.ca/Legal_Counsel/policies/english/BD/BD-4.html

Code of Conduct

It is not acceptable to do the following:

· Copy from ANYWHERE without saying from where it came.
· Omit quotation marks for direct quotations.
· Let another student copy your work and then submit it as his/her own. · Hand in the same assignment in more than one class without permission.
· Have unauthorized material in an exam, such as cheat sheets, or crib notes. **YOU DON'T HAVE TO BE CAUGHT USING THEM - JUST HAVING THEM WILL GET YOU INTO TROUBLE!**

· Copy from someone else's exam.
· Communicate with another student during an exam by talking or using some form of signals. · Add or remove pages from an examination booklet or take the booklet out of an exam room.
· Get hold of or steal an exam or assignment answers or questions.
· Write a test or exam for someone else or have someone write it for you.
· Hand in false documents such as medical notes, transcript or record.
· Falsify data or research results.

Source: The Academic Integrity Website

http://provost.concordia.ca/academicintegrity/misconduct/

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" (Article 16 a). 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. If you translate the work of another person into French or English and do not cite the source, this is also plagiarism. If you cite your own work without the correct citation, this too is plagiarism.

In Simple Words:

NOT COPY, PARAPHRASE OR TRANSLATE ANYTHING FROM ANYWHERE WITHOUT SAYING FROM WHERE YOU GOT IT! DON'T FORGET TO USE QUOTATION MARKS!

This information is an adaptation of the material produced by the Code

Administrator of the Faculty of Arts and Science at Concordia University Source: The Academic Integrity Website: http://provost.concordia.ca/academicintegrity/plagiarism/

Concordia Services for Students

Concordia Counselling and Development offers career services, psychological services, student learning services, etc.: http://cdev.concordia.ca/

The Concordia Library Citation and 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/

Academic Integrity: http://provost.concordia.ca/academicintegrity/

Financial Aid and Awards: http://web2.concordia.ca/financialaid/

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