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# BIOL 441

## Molecular Genetics

Fall Term (2025-26)

### CALENDAR DESCRIPTION

**Molecular genetics and the use of model organisms to dissect biological mechanisms at the molecular level.**

**PREREQUISITE BIOL 205; BIOL 330**

### SCHEDULE

<b>Instructor</b>	
<b>Instructor Contact</b>	The course does not communicate by email and no appointment is needed. Instructor is available for any question, concern, help, Mon-Fri 10am-6pm.
<b>Office Hours</b>	Mon-Fri 10am-6pm
<b>TA:</b>	
<b>Contact Information</b>	
<b>Office Hours</b>	Mon-Fri 10am-6pm

### LEARNING OBJECTIVES

Mendelian genetics

Chromosome structure, function and replication

Mapping genes and mutations in Eukaryotes

Genetic transfer and mapping in Prokaryotes and Phages

DNA structure and replication

Transcription

Use of molecular genetics and model organisms (topics selected by students)

**LEARNING HOURS**

<i>Teaching method</i>		<i>Average hours per week</i>	<i>Number of weeks</i>	<i>Total hours</i>
In-class hours	Lecture	3	12	36
	Seminar			
	Laboratory			
	Tutorial	1	6	6
	Practicum			
	Group learning			
	Individual instruction			
Other	Online activity			
	Off-campus activity			
	Private study	4	12	48
Total hours on task				<b>90</b>

**COURSE OUTLINE**

- Week 1: Mendelian genetics  
Basic genetics practical use
- Week 2: Basic genetics practical use  
Chromosome structure, function and replication
- Week 3: Mapping genes and mutations in Eukaryotes  
Mapping practical use
- Week 4: Quiz 1: mapping  
Genetic transfer and mapping in Prokaryotes and Phages
- Week 5: Genetic transfer and mapping in Prokaryotes and Phages  
Prokaryote/phage genetics practical use  
DNA structure and replication
- Week 6: Transcription
- Week 7: Quiz 2: Prokaryote/phage genetics  
Molecular genetics with model organisms, example
- Week 8-12: Molecular genetics with model organisms, student seminars

**TEXTBOOKS/READINGS/COURSE MATERIAL**

<http://www.seroude.com/BIOL441/blog/index.html>

**GRADING SCHEME**

<b>Component</b>	<b>Weight (%)</b>	<b>Date</b>
Quizzes (2)	25	Week 4,6 To be completed by the end of the term
Model organism database exercise	25	To be completed by the end of the term
PCR exercise	25	To be completed by the end of the term
Seminar (50min + 10min questions)	25	Student pairs, topic selected by pair

**All tests are open-book.**

**Quizzes:** Each quiz contains 5 questions. For each question, students will circle the right answer out of 5 possible answers. Each quiz takes less than 10 minutes but students are allowed up to 30 minutes. Quizzes will take place during regular class (in class assignment). If a student misses the quiz, it is the responsibility of the student to contact the course instructor to arrange to take the quiz at a date and time chosen by the student. It is the responsibility of the student to complete both quizzes by the end of the term.

**Model organism database exercise:** Student will be guided through the use of FlyBase to determine the location of a mutation and extract the molecular information of the gene that might be affected. Each student will perform the same task outside of class (take home assignment). It is the responsibility of the student to complete the task by the end of the term.

**PCR exercise:** Once a gene has been identified with the model organism database exercise, student will be provided with sequences of DNA primers in order to predict the outcome of performing a PCR using either genomic DNA or cDNA(s) (take home assignment). It is the responsibility of the student to complete the task by the end of the term.

**Seminar:** Student pairs will choose a scientist that uses molecular genetics and model organisms to address a biological problem. The students will give a 50min seminar (+ 10min questions) focused on the experimental approaches and results, and interpretation of the results. The seminar will be marked on the scientific content (explanation of experimental techniques, logic of interpretations, ability to answer questions). The aesthetics used in the presentation and the style of delivery are irrelevant to the marking. Students will choose the date of their seminar.

**GRADING METHOD**

In this course, components will be graded using numerical percentage marks.

Your course average will then be converted to a final letter grade according to Queen's Official Grade Conversion Scale:

***Queen's Official Grade Conversion Scale***

<b>Grade</b>	<b>Numerical Course Average (Range)</b>
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	49 and below

## **ACADEMIC INTEGRITY AND QUEEN'S CODE OF CONDUCT**

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments and conduct conform to the principles of academic integrity. Information is available in the Arts and Science Calendar (see Academic Regulation 1 - <http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations>), on the Arts and Science website (see <http://www.queensu.ca/artsci/academics/undergraduate/academic-integrity>), and at Biology's website (<http://www.queensu.ca/biology/undergrad/integrity.html>) and from the instructor of this course. Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulations on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

## **ACCOMMODATION POLICY, EXAM CONFLICTS, AND OTHER CONFLICTS**

Students who feel they need accommodations for disabilities or extenuating circumstances, or have a conflict between exams or other commitments should consult the Biology Department's website for details about how to proceed (<http://www.queensu.ca/biology/undergrad/integrity.html>). In general, the earlier a course coordinator is apprised of an extenuating circumstance, the more likely an accommodation can be made. Students are encouraged to be proactive in anticipating difficulties, when it is possible to do so.

Students may apply to write a make-up or deferred exam if they have an exam conflict as defined in the Academic Regulations of the Faculty (See Arts and Science Calendar Regulation 8 - <http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations>). In this case, the student should report to the Exams Office first to verify that there is a genuine exam conflict. Biology professors will not consider your situation to be a conflict unless it meets the criteria set out by the Faculty of Arts and Sciences.

Students may request a make-up or deferred exam if they have an exam conflict with off-campus travel associated with a field course (e.g BIOL-307/3.0 or 407/3.0) that is held during the fall or winter terms.

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## **ACCOMMODATION OF DISABILITIES**

*Queen's University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact the Disability Services Office (DSO) and register as early as possible. For more information, including important deadlines, please visit the DSO website at: <http://www.queensu.ca/hcnds/ds/>*