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# BIOL 441

## Molecular Genetics

Fall Term (2023)

### CALENDAR DESCRIPTION

Current research in molecular genetics including gene regulation, transformation, cell proliferation and the analysis of some aspects of development. Specific topics will include plant, insect and mammalian genetics.

**PREREQUISITES** BIOL 205\*; BIOL 330\* or MBIO 218\* (or MBIO 318\*).

**EXCLUSION** PATH 425\*

PREREQUISITE BIOL 302/3.0 or BIOL 303/3.0.

### SCHEDULE

**Lectures:**

**Tutorial sessions: To be arranged with the students**

<b>Instructor</b>	
<b>Instructor Contact</b>	
<b>Office Hours</b>	
<b>TA:</b>	
<b>TA Contact Information</b>	
<b>Office Hours</b>	

### Learning Objectives

The goals of Biology 441 are to allow students to develop confidence and sufficient breadth of knowledge to discuss and write about a wide range of controversial topics in the area of molecular genetics and epigenetics. Tutorial session topics vary broadly and range from synthetic biology to prions and interfering RNA, and from the ethics of GMO food aid to new forms of eugenics. Lectures provide sufficient background knowledge in molecular genetics so that self-directed learning on a topic of the students' choice can be achieved. A student's investigation will be of sufficient depth so that an oral presentation and a formal grant proposal can be developed. Topics for in-depth study include but are not limited to a variety of human diseases, circadian clocks, immunity, transposable elements, epigenetic memory, dosage compensation and resistance development in a range of microorganisms and metazoans.

### Learning Hours

<i>Teaching method</i>		<i>Average hours per week</i>	<i>Number of weeks</i>	<i>Total hours</i>
Σ	Lecture	2-3	10	30
	Seminar	4	2	8
	Laboratory			

	Tutorial			
	Practicum			
	Group learning	1	10	10
	Individual instruction			
Other	Online activity			
	Off-campus activity			
	Private study	4.8	13	63
Total hours on task				111

### Course Outline

Lectures and tutorial topics[groups] are listed below:

<b>Genome Plasticity</b>	1) introduction & principles of synthetic biology
	2) synthetic biology; euphoria and concerns [groups]
	3) heterochromatin and euchromatin
	4) chromatin proteins
	5) chromatin inactivation
	6) X-inactivation and other phenomena
	7) chromatin diminution/ gene conversion [groups]
	8) genome rearrangements
	9) gene amplification
	10) imprinting [groups]
	11) trinucleotide repeats and pathologies
	12) gene magnification
	13) prions [groups]
	14) male recombination and hybrid dysgenesis
	15) cloned mammals [groups]
	16) mitochondria and senescence
	17) longevity
	18) transposable elements [groups]
	19) circadian rhythms
	20) epigenetics and circadian rhythms
	21) strange RNAs [groups]
	22) moving DNA
	23) non-coding RNAs and chromatin
<b>Cell Biology &amp; Society</b>	1) the new agriculture [groups]
	2) chromatin and signal transduction
	3) chromatin and pathology
	4) epigenetics and cancer
	5) the business of DNA [groups]
	6) epigenetics and neuropathology
	10) eugenics [groups]
<b>Student Seminars/Research Proposals</b>	

**Textbooks/Readings** : Readings for tutorials will be assigned.

### Suggested Grading Scheme

Component	Weight (%)	Date
Participation	15%	Throughout (Sept-Nov)
Seminar	15%	Nov as scheduled
Research LOI	5%	2 <sup>nd</sup> or 3 <sup>rd</sup> week of Oct
Research proposal	30%	3 <sup>rd</sup> week of Nov
Referee Exercise	5%	First week of December
Final exam	30%	As scheduled in Dec

### Grading Method

- In this course, some components will be graded using numerical percentage marks. Other components will receive letter grades, which for purposes of calculating your course average will be translated into numerical equivalents using the Faculty of Arts and Science Letter Grade Input Scheme.

When letter grades are employed, the following scale will be employed for purposes of calculating your course average:

#### *Arts & Science Letter Grade Input Scheme*

Assignment mark	Numerical value for calculation of final mark
A+	93
A	87
A-	82
B+	78
B	75
B-	72
C+	68
C	65
C-	62
D+	58
D	55
D-	52
F48 (F+)	48
F24 (F)	24
FO (0)	0

### 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>).

Students may request a make-up or deferred exam if they have an exam conflict.

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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/hcds/ds/>*