
BIOL 441

Molecular Genetics

Fall Term (2019-20)

CALENDAR DESCRIPTION

Research in eukaryotic molecular genetics with an emphasis on epigenetics. Epigenetic phenomena will be examined in a range of models from single-celled organisms to metazoans, with student discussions on topics as diverse as bioethics, disease controls, and eugenics.

LEARNING HOURS 125 (30L;8S;12Lb;10G;65P)

PREREQUISITE (BCHM 218/3.0 or BIOL 330/3.0) and a minimum GPA of 2.0 in the Biological Foundations List.

EXCLUSION(S) PATH 425/3.0.

SCHEDULE

See SOLUS for scheduling details.

Instructor	Dr. V.K. Walker
Instructor Contact	walkervk@queensu.ca; Phone: 613-533-6394
Office Hours	Anytime or see posted on office door (2522)
TA:	None
TA Contact Information	Not applicable; see V. Walker
Office Hours	Not applicable; see V. Walker

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>
In-class hours	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 are listed below:

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

Textbooks/Readings

A course book is available for purchase prior to the 1st week of classes from P&CC (purchase price covers the cost of production and copyright charges).

Suggested Grading Scheme

Component	Weight (%)	Date
Participation	12%	Throughout (Sept-Nov)
Seminar	18%	Nov as scheduled
Research LOI	5%	2 nd or 3 rd week of Oct
Research proposal	30%	3 rd week of Nov
Referee Exercise	5%	Last week of Nov
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
F0 (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>). 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/hcds/ds/>