

**Gene Expression in Health and Disease
BIOM*6800**

Winter Semester 2019

Instructors

Coordinator

Dr. Gordon Kirby
Department of Biomedical Sciences
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Participating faculty

Dr. Shaimaa Abdelmegid, Biomedical Sciences
Dr. Dorothee Bienzle, Pathobiology
Dr. Byram Bridle, Pathobiology
Dr. Stefan Keller, Pathobiology
Dr. Gordon Kirby, Biomedical Sciences
Dr. Thomas Koch, Biomedical Sciences
Dr. Jonathan LaMarre, Biomedical Sciences
Dr. Brandon Lillie, Pathobiology
Dr. Pavneesh Madan, Biomedical Sciences
Dr. Roger Moorehead, Biomedical Sciences
Dr. Jim Petrik, Biomedical Sciences
Dr. Alicia Vilorio-Petit, Biomedical Sciences

Description

This course presents the basic molecular concepts of gene expression and the consequences of abnormal expression of genes in various pathological conditions. Discussions on methodologies include those used to (a) assess levels of gene expression, (b) investigate mechanisms of gene regulation and (c) manipulate gene expression to understand function. The conceptual, methodological, applied and ethical aspects of gene expression in normal physiology and disease will be illustrated through student and faculty seminars, written reports, group discussions and a debate.

Lecture Times & Location

Tuesday and Thursday 9-10:20 a.m., 3648 Biomedical Sciences, OVC

Recommended Reading Material:

Lecture notes will be available on CourseLink before lectures.

Supplemental Reading Material:

Molecular Biology of the Cell, 6th edition, (Ed. Alberts, Bruce) New York: Garland Science, 2015; McLaughlin Library, QH581.2 .M64 2015

CALCULATION OF COURSE GRADES

Student Evaluation:

Students will be evaluated as follows:

- A written report consisting of a review of studies examining a specific disease or process resulting from abnormal gene expression. Students will choose topics from a list that will be provided. This report is due March 23th (35%).
- A ten-minute oral presentation on the above clinical condition, disease or process presented as a scientific paper at a mini-symposium (20%). Student presentation dates are indicated in the outline and, along with topics, can be booked on a first-come-first-served basis.
- Debate on a controversial issue related to gene expression [done as a group effort] (20%). The debate is presented in the last lecture period.
- Student participation based on contributions to group discussions and evaluation of seminars by student peers (5%).
- A final examination (20%) will take place during the exam period on a date to be announced.

N.B. Seminar and report topics must be approved by the course coordinator if they are not included in the topic list.

Note: The University of Guelph takes a very serious view of Academic Misconduct. Included in this category are such activities as cheating on examinations, plagiarism, misrepresentation, and submitting the same material in two different courses without written permission. Students are expected to be familiar with the section on Academic Misconduct in the Undergraduate Calendar and should be aware that expulsion from the University is a possible penalty.

COURSE EVALUATION

Students will be asked to complete a questionnaire on instructors' teaching competence during the last two weeks of classes. This is part of information required by the University to evaluate faculty performance for purposes of Tenure, Promotion and Selective Increases. Administered by a third party rather than the instructors, these evaluations will be delivered to the respective instructors ONLY after the final grades have been submitted to the Registrar's Office. Note: only the numerical ratings from the form will be made available to the Chair for administrative purposes – the Chair will NOT see any comments that are written on the evaluation forms unless signed by the student.

LECTURE OUTLINE

All lectures are in 3648, Biomedical Sciences

<i>LECTURE</i>	<i>DATE</i>	<i>SUBJECT</i>	<i>INSTRUCTOR</i>
1	Jan 8	Introductory Lecture	Kirby
<u>Concepts of Gene Regulation</u>			
2	Jan 10	Signalling Pathways and Activation of Gene Expression <ul style="list-style-type: none"> • Receptors and ligands • Signal Transduction 	Petrik Petrik
3	Jan 15	Levels of Gene Regulatory Control <ul style="list-style-type: none"> • Transcriptional • Post-transcriptional • Post-translational • Epigenetic 	LaMarre LaMarre
4	Jan 17		Kirby Madan
<u>Techniques Used in Gene Expression Studies</u>			
5	Jan 22	Analysis of Gene Expression Levels <ul style="list-style-type: none"> • DNA • RNA 	Madan Kirby
6	Jan 24	<ul style="list-style-type: none"> • Protein Assessing Mechanisms of Altered Gene Expression <ul style="list-style-type: none"> • Signal Transduction 	Kirby Petrik
7	Jan 31	<ul style="list-style-type: none"> • Transcriptional • Post-transcriptional 	Kirby Kirby
8	Feb 5	Manipulating Gene Expression to Understand Function <ul style="list-style-type: none"> • Gene Transfection/Induction in Cultured Cells • RNA Interference and Gene Silencing 	Kirby LaMarre
9	Feb 7	<ul style="list-style-type: none"> • Transgenic and Knock-out Animals 	Viloria-Petit
10	Feb 12	Student Seminars	

<u>Practical Applications of Gene Expression Studies</u>			
11	Feb 14	Student Seminars	
	Feb 19 & 21	Winter Break –no lectures	
14	Feb 26	Student Seminars	
15	Feb 28	Proteomic Identification of Biomarkers of <i>S. aureus</i> Mastitis in Dairy Cows: Role of Bioinformatics	Abdelmegid
16	Mar 5	Gene expression during preimplantation embryo development.	Madan
17	Mar 7	Genetic regulation of innate resistance to infectious disease	Lillie
18	Mar 12	Gene expression in molecular pharmacology, toxicology and diagnostics	Kirby
19	Mar 14	Chitotriosidase gene expression in inflammatory lung disease	Bienzle
20	Mar 19	Using transgenic animals to explore breast cancer	Moorehead
21	Mar 21	Gene expression analysis by Next Generation Sequencing - RNAseq & Immune Profiling	Keller
22	Mar 26	Genetic regulation of pathological angiogenesis	Petrik
23	Mar 28	Gene expression in equine stem cells lineages: implications in stem cell therapy and tissue engineering	Koch
24	Apr 2	Identification of genes encoding tumour-associated antigens and their use in cancer vaccine design	Bridle
25	Apr 4	Debate: Ethical issues concerning gene expression	All students