lHGEN670: Advances in Human Genetics 1 :
Neurogenetics; current topics in genetics of neurological disorders
(3 credits)

GENERAL INFORMATION

Course Coordinator
Dr. Ziv Gan-Or
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Instructors
Dr. Ziv Gan-Or
Dr. Geneviève Bernard
Dr. Thomas Durcan
Dr. Austen Milnerwood
Dr. Jean-Baptiste Rivière

Maximum Preferred Class Size:	20
Day and Time:	Wednesdays 1:00 – 4:00 PM, **FALL2017**
Place:	Stewart Biology Building, Room S4/106

Calendar Course Description: This course will deal with recent progress in genetics of neurological disorders, and its applications to health care. A specific focus will be given to current controversies and issues related to proper implementation of genetics research, concepts and methodologies.

Academic Integrity: McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of scientific misconduct, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (www.mcgill.ca/students/srr/academicrights)

LEARNING OUTCOMES

The goal of the course is for the students to gain detailed knowledge about the design, analysis and interpretation of genetic studies of neurological disorders. By the end of the

course students should be able to synthesize and critically read scientific publications, and to develop scientific writing skills.

COURSE CONTENT

This course will cover various, current topics in neuro-genetics, focusing on the genetics of diseases such as Parkinson's disease, dementias, amyotrophic lateral sclerosis, and other common and rare neurological disorders. Through covering controversial topics, the students will develop critical analysis of published genetic studies, and will be able to design their own experiments in the most appropriate way for their needs. Methodological issues related to genome wide association studies, whole exome/genome studies, CRISPR experiments, genetic animal models and others will be discussed. The students will get experience in critically presenting data, performing peer review, and basic writing skills.

The course is comprised of 13 sessions. There are 12 sessions of 3 hours/week given by the 5 instructors, where each instructor is responsible for various numbers of sessions (see detailed schedule). Typically, with the exception of the first two sessions that will include lectures by the course instructors, each session comprises of a 1.5-hour lecture and a 1.5-hour class discussion of a selected scientific paper. The 13th session is a 1-hour seminar given by guest speaker. Following the seminar the students and the instructor will get an opportunity to meet (~1h) in person with the speaker and discuss various topics from the course.

INSTRUCTIONAL METHOD

The general format for the course will be an introductory presentation by the instructor followed by student presentations, for example, a critical analysis of one or two papers. Student participation during each session is required. Assignments are generally due one week after the last class of each instructor and deadlines will be made available from the instructors of each subtheme. Failure to meet a deadline will result in a failing grade. Extensions may be granted for reasons of health or family circumstances. However, students must submit a written request by email to the course coordinator for an extension prior to the deadline for the assignment.

COURSE MATERIALS

The course instructor will select research papers from scientific journals to be discussed each week. Links to the papers and other suggested readings will be published under your account at myCourses at least 2 weeks prior to the session. The presentation by the instructor will be uploaded to myCourses and accessible following the completion of the session.

ASSIGNMENTS AND EVALUATIONS

*Grade is PASS/FAIL:

50% based on evaluation of presentation and participation in class

50% based on assignments.

*** In PASS/FAIL courses a final grade is assigned to students but only a PASS or FAIL appears in their academic record**

Student assignments include 1-2 presentations of scientific papers, 1-2 written commentary on a subtheme, OR critique of the papers discussed in the subtheme.

Date	Theme	Topic	Instructor
Sep 6	Introduction to Neurogenetics	The uniqueness of brain disorders and the need for unique study approaches, or – "where are the medications?"	Ziv Gan-Or
Sep 13	Introduction to Neurogenetics	The various genetic methodologies used for studying neurological disorders.	Ziv Gan-Or
Sep 20	Genome-wide association studies in complex neurological disorders	The advantages and limitations of genome wide association studies in neurological diseases – Parkinson's disease as a case study	Ziv Gan-Or
Sep 27	From genes to mechanism – Parkinson's disease	Understanding Parkinson's disease through genetics	Thomas Durcan
Oct 4	From genes to mechanism – Huntington's & Parkinson's disease	Does identification of disease causing mutations produce useful rodent models or treatment strategies emerging from them?	Austen Milnerwood
Oct 11	Whole exome /genome sequencing in rare neurological disorders	The advantages, limitations and pitfalls of next generation sequencing for rare neurological diseases	Genevieve Bernard
Oct 18	Targeted next generation sequencing – methodology and uses	The applications, advantages and limitations of targeted next-generation sequencing for rare diseases	Jean-Baptiste Riviere
Oct 25	ALS	Understanding ALS through the discovery of new genes	Thomas Durcan
Nov 1	From genes to mechanism – Dementias	Can one mutation cause multiple diseases or does genetic data force a reappraisal of diagnoses? ALS, FTD and the curious	Austen Milnerwood

		case of C9orf72	
Nov 8	CRISPR editing	The good and bad sides of CRISPR genome editing	Thomas Durcan
Nov 15	Genetic mosaicism in brain disorders	Genetic mosaicism, mechanisms, methods of detection, and implications for neurological diseases.	Jean-Baptiste Riviere
Nov 22	Genetic models of neurological diseases	Different genetic models and the advantages and disadvantages in neurological diseases.	Ziv Gan-Or
Nov 29	TBD	TBD	TBD