

HGEN 698 Advanced Readings in Human Genetics – Epigenetics and Chromatin

Course coordinators:

Dr. Vahab D. Soleimani and Dr. Hamed S. Najafabadi

Lecturers:

Drs. Vahab Soleimani, Stéphane Richard, Michael Witcher, William Pastor and Hamed Najafabadi.

Schedule:

This course will be offered in 3-hour weekly blocks for 13 classes during the Winter 2019 semester.

Time and Location:

Time: Wednesdays 1:00-4:00PM

Location: Strathcona Anatomy & Dentistry Building, Room W315-F

Aims:

This course aims to familiarize students with the evolving field of epigenetics and chromatin biology and the role of epigenetics in development and disease.

Scope:

The course will introduce students to the wide range of mechanisms that regulate the epigenetic and chromatin state, including DNA methylation, histone modifications, and transcription factors that modulate these modifications. It will also introduce students to the epigenetic mechanisms in pathophysiology of human diseases such as cancer. Finally, the scientific methods and techniques that represent recent advances in the field of epigenetics and chromatin biology will be explored.

Enrolment:

The course will be limited to a maximum of 15 students to facilitate discussion sessions. The course is open to all graduate students. However, priority will be given to the graduate students enrolled in the Department of Human Genetics and the Faculty of Medicine.

Course Type:

This is a Lecture and Reading course held over a 13-week period (3hrs/week) **worth 3 credits.**

Each session will start with a one-hour lecture given by the instructor followed by discussion of 1 or 2 peer-reviewed published papers pertinent to the topic of the seminar by 1 or 2 students, depending on the number of students enrolled in the class. The lecturer will assign the papers to the students 2 weeks prior to each class.

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Papers will be selected based on their relevance to the topic of the lecture and must be relatively recent publications (generally within the past 2 years). Due to copyright restrictions, the selected papers will be those that are freely available through McGill's online library resources. There will be a ~15 minutes break between the lecture and the discussion of papers. One session will be practical, with the students exploring epigenetics data on their laptops using available tools.

Course Evaluation:

This is a graded course.

Methods of evaluation:

Presentation of assigned papers (40%) – two 40-minute sessions per student, which includes presentation of the assigned papers and questions. A copy of the slides for the presentation must be submitted to the course coordinator and will be evaluated for organization and clarity. The oral presentation should include background information, a discussion of the methodology used in the paper, the results, conclusions, and critique of the work.

Written assignment #1 (25%). Students will be evaluated for a written preview of a published paper or a subject. The preview will be up to a maximum of 1000 words (main text) with the option of including a single diagram that summarizes the subject (graphical abstract) and a maximum of 10 references. The assignment is due 2 weeks after the students choose the subject/paper during the first half of the sessions.

Written assignment #2 (25%). Students will be evaluated for a graduate student fellowship proposal based on NSERC or FRQS style. The subject of the proposal can be proposed by the student but will require the approval of the course coordinators. This will be a 2-page proposal (12 point Time New Roman font, 1.5 cm margin) excluding references and must include a clear hypothesis, research objectives, methods and feasibility. The assignment is due on the day of the last lecture.

Class participation (10%). Participation in all classes is mandatory, with the exception of illness or other eligible absences, as per McGill University guidelines. The participation mark will be assigned based on the level of engagement of students in scientific discussions.

Lectures:

Dr. Vahab Soleimani

January 9: Epigenetics and chromatin: DNA methylation, histone modifications and regulation of chromatin structure

January 16: Histone code and Epigenetic/cellular memory

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January 23: Transcriptional regulation (cis-regulatory elements)

January 30: Transcriptional regulation by Trithorax and polycomb complexes

February 6: Epigenetic regulation of stem cell differentiation

Dr. Michael Witcher

February 13: Chromatin regulatory elements: The role of the insulator in gene regulation and diseases.

Dr. William Pastor:

February 20: Establishment of heterochromatin during development and lineage specification.

Dr. Stéphane Richard

February 27: Epigenetic dysregulation in cancer

March 6: Study break

Dr. Hamed Najafabadi

March 13: Methods for studying gene expression

March 20: Methods for profiling the epigenetic state of the cell

March 27: Computational approaches for studying gene regulation

April 3: Computational approaches for studying gene regulation: practical session

April 10: The interplay between genetic and epigenetic variations

Contact:

Course coordinators:

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McGill Policy Statements

The following two statements **must** be included in all course outlines, in keeping with various Senate resolutions:

1. *"McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/students/srr/honest/ for more information).(approved by Senate on 29 January 2003)*

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"L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site www.mcgill.ca/students/srr/honest/)."

2. ***"In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded."*** (approved by Senate on 21 January 2009 - see also the section in this document on Assignments and evaluation.)

"Conformément à la Charte des droits de l'étudiant de l'Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté (sauf dans le cas des cours dont l'un des objets est la maîtrise d'une langue)."