

**MGY420H1****Regulation of Gene Expression**

The participants in this course will discuss selected topics dealing mainly with regulatory mechanisms that control gene expression by RNA polymerase II in eukaryotes. Topics will include: assembly of the initiation complex; roles of transcription factors, co-activators and *cis*-acting regulatory elements; promoter escape; mechanisms that control elongation and termination of transcription; chromatin control of transcription; regulatory RNAs; and chromosome conformation. The course will be structured so as to have an introductory lecture on a specific topic in one class followed by the next class being a participatory discussion of pre-assigned research papers in which all students will have prepared themselves to present any of the individual figures from the assigned papers.

Exclusions: BIO477H5 (UTM)

Prerequisites: MGY311Y1/MGB311Y1/BCH311Y1

**Course Coordinator: Prof. Jack Greenblatt**

**Dates Offered: Mondays and Wednesdays, Sept.-Dec. 2019**

**Location: Rm 108 in the Health Sciences Building**

**Time: 11:00 am for lectures; 11:00 am or 12:00 noon for discussions.**

**See course outline.**

## REGULATION OF GENE EXPRESSION 2019

**Days and Times:** Monday and Wednesday; 11:00am for lectures; 11:00 am or 12:00 pm for discussions.

**Place:** Health Sciences Building Rm 108.

**Instructors:**

Dr. Marc Meneghini, MaRS Centre, West Tower, Rm 1532, 416-978-7578,  
[marc.meneghini@utoronto.ca](mailto:marc.meneghini@utoronto.ca)

Dr. Eric Campos, Hospital for Sick Children Peter Gilgan Centre, Rm 14-9706, 416-813-7400,  
[eric.campos@sickkids.ca](mailto:eric.campos@sickkids.ca)

Dr. Jack Greenblatt (coordinator), Donnelly CCBR, Rm 906, 416-978-4141, [jack.greenblatt@utoronto.ca](mailto:jack.greenblatt@utoronto.ca)

The participants in this course will discuss selected topics related to gene regulatory mechanisms with an emphasis on the control of transcription by RNA polymerase II in eukaryotes. Topics may include: assembly of the initiation complex; roles of transcription factors, co-activators (e.g. Mediator) and *cis*-acting regulatory elements (enhancers, insulators, LCR's, MARs); gene silencing and imprinting; promoter escape; mechanisms that control transcript elongation, termination (e.g. heat shock and HIV Tat), and translation (e.g. regulatory RNAs); and effects of chromosome conformation and chromatin modification on gene expression. The course will be structured so as to have an introductory lecture on a specific topic in one class followed by the next class being a participatory discussion of pre-assigned research papers in which all students will have prepared themselves to present any of the individual figures from the assigned papers. The focus of the course will NOT be a comprehensive coverage of transcriptional regulatory mechanisms but rather an opportunity for students to explore in greater depth a limited number of topics and acquire important skills in interpreting the scientific literature. Marks will be awarded for class participation. Participation in each of the 12 discussion sessions will be worth 2% of the final mark, with 1% for participating once, and another 1% for participating two or more times. Mid-term and final exams will also be based on pre-assigned research papers.

**Course Evaluation:**

Your grade in this course will be based on: class participation; a two-hour mid-term test; a three-hour exam to be held during the final examination period; and an essay-like assignment. The grade distribution will be as follows:

class participation	25%
mid-term test	25%
essay assignment	15%
final examination	35%

The mid-term test will be held on October 18 from 6:00 - 8:00 P.M. in MSB xxxx and will be based on two pre-assigned papers that can be brought to the test. The final examination will last 3 hours and also be based on two pre-assigned papers that can be brought to the exam.

The essay assignment will require that you read several scientific papers and discuss the ideas presented in these papers. The essay topics will be distributed at the end of October and the assignments must be handed in no later than Monday, Dec. 2, at the 11:00 am or 12 noon discussion class. There will be a penalty of 1 mark per day for lateness.

### *COURSE OUTLINE*

Sept. 9, 11*	General transcription factors, initiation complex assembly, Mediator	JG (+EC)
Sept. 16, 18*	Chromatin and transcription	EC (+MM)
Sept. 23, 25*	Chromatin modification for repression	EC (+MM)
Sept.30, Oct.2*	Enhancers	EC (+MM)
Oct. 7, 9*	Chromatin modification for activation	MM (+JG)
Oct. 16, 21*	Promoter escape and elongation of the transcript	JG (+EC)
Oct. 23, 28*	Elongation factors and effects of chromatin on elongation	EC (+JG)
Oct.30, Nov.11*	Transcriptional termination and 3' end formation	MM (+JG)
Nov. 13, 18*	Regulatory roles for non-coding transcripts: lncRNA	MM (+JG)
Nov. 20, 25*	Regulatory roles for non-coding transcripts: RNAi	MM (+EC)
Nov. 27; Dec. 2*	Heat shock regulation, HIV Tat, and poised RNA polymerase II	JG (+MM)
Dec. 4, 5*	Chromosome conformation, phase separation, and gene regulation	JG (+EC)

\*Class discussion days. Class discussions will be moderated and evaluated by Dr. Meneghini, Dr. Campos, and Dr. Greenblatt. No classes will be held on Oct. 14 (Thanksgiving) or Nov. 4 and 6 (Reading week). The classroom to be used for the discussion on Thursday, Dec. 5, will be announced later.