2017-2018 CSB Graduate Modules

Students enroll in CSB 1020H for Fall (F) 2017, Winter (S) 2018, or Summer 2018*, depending on the session the specific module is offered. This course code is used for all quarter-credit (0.25 FCE) CSB modules.
***Summer courses/modules cannot be requested on ROSI until March 19, 2018.**

Please note that each quarter-credit module has a unique teaching section, and that code must be entered when requesting a specific module on ROSI.

If you want to request two modules in the same session (e.g. Winter 2018), you will need to contact the CSB Graduate Office to arrange for enrolment in a second module.

For students in graduate programs outside of CSB, any single quarter credit module may not help complete any of your graduate program requirements.

Module: Self/Non-self-Recognition in Plants
CSB 1020H/F, Teaching Section LEC 0106
Coordinators: *Professors D. Goring and K. Yoshioka*
Offered: Fall 2017 session, for six weeks starting Thursday November 2nd until December 14th (no class on Nov. 9th).
Weight: One module (0.25 FCE)
Time: Thursdays 1 pm - 3 pm
Location: St. George campus, Earth Sciences Centre, Room 3056
Enrolment: Limited to 9 students

Schedule/Seminar topics: 2 hours/week
Week 1: Introductory lecture and reading assignments.
Weeks 2-6: Student presentations and discussion (Two presentations/week. One in week six)
Week 6: Summary Discussion

Description:
The molecular and cellular basis of self/non-self-recognition has been well-studied in the animal research field, but it is a more recent emerging topic in plant research. The molecular mechanisms of plant self/non-self-recognition is starting to be revealed in two different aspects: self-incompatibility (recognition and rejection of self-pollen) and immunity (plant resistance against micro-organisms). In this seminar course, students will investigate the current knowledge of self/non-self-recognition of plants. The course will provide a forum for an interactive discussion between the instructors and students and will be based on a selection of current high impact primary research papers.

Evaluation:
Each student will present a PowerPoint style presentation based on an assigned topic using a selection of primary research papers. A written summary on the same topic in the format of a *Science Perspective* will also be due at the end of the module. Students are expected to read all papers and participate in all discussions. However for each presentation, two students will be assigned the task of asking questions and leading the discussion.

50% Presentation (one presentation per student on a primary research paper)
25% Leading discussions/Participating in discussions
25% Written Summary in the format of a *Science Perspective*

Pre-requisites for module: undergraduate courses in molecular and cell biology
Reading materials: TBA
Website: There will be a Blackboard site for this module

Module: Environmental Stress Physiology of Plants
CSB1020H/F, Teaching Section LEC 0128
Coordinator: Professor I. Ensminger (ingo.ensminger@utoronto.ca)
Offered: Fall 2017 session (7 weeks, every second week starting September 18 and ending December 11, 2017. Coordination meeting and reading assignments on September 8, 2017, 3:00 pm, room TBA
Weight: One module (0.25 FCE)
Time: Mondays 12:00 pm – 1:00 pm
Location: UTM campus, TBA
Enrolment: Limited to 7 students

Description:
This is a seminar-based grad module that will focus on photosynthesis, the most fundamental life process on earth, and its regulation in response to biotic and abiotic stress. We will focus on photosynthesis in higher plants. Potential topics include *Cell and Molecular Biology of Chloroplasts*, *Physiology and Biochemistry of Carbon Metabolism*, *Measuring Photosynthesis, Photosynthesis in Response to Environmental Stresses and Global Change*.

Evaluation:
A powerpoint style presentation (each student) based on a primary research paper. Presentation dates and papers will be assigned at the coordination meeting and during the first week of the module; students are expected to read all papers and participate in all discussions. Students will be required to write a “news and views” paper on their presentation topic or another of their choosing.

Seminar: 30 min presentation and 30 min for discussion	40%
Participation in Discussion: 2 students assigned as discussion leaders	20%
News & Views paper:	40%

Seminar Grading:
- Verbal clarity and understanding of subject matter (10%)
- Critical thinking and ability to answer questions (10%)
- Slide quality and effectiveness (10%)
- Scientific content and appropriateness (10%)

Content and Format:
Seminars and Papers should not focus on the students own work. Critical reviews are encouraged, but comments must be accurate and well-reasoned. In general, seminar presentations and papers should have three components:
- a short overview of the background of the reviewed paper
- a critical data-based review of the key findings
- a brief summary of the significance of the paper

The seminar must offer more than a summary of what was stated in the original article. For example, it might provide a more in-depth explanation of a new technique used in the paper, important caveats or interpretations that the author did not mention, or a distinct interpretation of the results in the context of work that the author did not discuss

(e.g., important findings published in the last couple of months). Focus should be on the most important results – there is rarely reason to discuss every figure.

Seminars and papers must be concise. The length of the paper is limited to about 1500 words. References are limited to approximately 7.

Papers should be written in a style that is understandable to all participants in the course. Avoid using jargon and unnecessary abbreviations.

Titles should be informative; no word play.

The paper can use up to two schematic or explanatory figures. The figure caption must appear in the main document, after the references. Do not duplicate figures that were in the reviewed paper –links to any figures you cite can be placed in the paper. In the text, refer to the cited figures with the author's name, e.g., "(Author et al., Figure 1A)".
Include a title page in your paper and include: Course title, citation of article being reviewed, author (student) affiliation (university/research institute etc.; for graduate students, the affiliation should be listed as the Graduate Program or Department), author's contact information (address, phone, and email address), abbreviated title, keywords (a minimum of six), and acknowledgments (optional).

Course: Computational Genomics and Bioinformatics
Course Code: CSB 1472H/S, Teaching Section LEC 0101
Coordinator: *Professor N. Provart*
Offered: Winter 2018 session
Weight: Half credit (0.5 FCE)
Time: Wednesdays 10 am – 1 pm
Location: St. George campus, Ramsay Wright Building, Room 432
Enrolment: Limited to 10 graduate students (minimum 8 reserved for CSB grads)

*CSB1472H/S is a half-credit course that takes place during the full Winter session. It is the equivalent of two modules. Graduate students should NOT request the course using the undergraduate course code CSB472H1S, because it would not count toward graduate credit.

Description:
Recent technological advances have driven a revolution in genomics research that has had a direct impact on both fundamental research as well as direct application in nearly biological disciplines. These advances have made the generation of genomic data relatively straightforward and inexpensive; nevertheless, the data are meaningless if they cannot be properly analyzed. Computational genomics and bioinformatics are the tools we use to extract biological information from complex genomic data.

CSB1472 will teach you the fundamentals of analyzing genomic data. This course emphasizes understanding how core bioinformatic analyses work, the strengths and weaknesses of related methods, and the important parameters embedded in these analyses. CSB1472 is not an applied methods course, nor a course to for developing new bioinformatic tools, but rather a course designed to provide you with a basic understanding of the principles underlying genome analyses. We will examine the fundamentals of sequence alignment, phylogenetic analyses, genome annotation, gene prediction, and gene expression data analysis. Theoretical, applied, and statistical issues will be addressed.

The material is presented as an inverted course. Lectures are pre-recorded and available prior to class. Class time is devoted to review of the lecture material,

discussion of the primary literature related to the course material, and hands-on analysis laboratories.

Recommended text: Zvelebil & Baum 2008 Understanding Bioinformatics. Garland Science, New York.

Course: Methods in Genomics and Proteomics
Course Code: CSB 1025H/S, Teaching Section LEC 0101
Coordinator: *Dr. Pauline Wang*
Offered: Winter 2018 session
Weight: Half credit (0.50 FCE)
Time: Tuesdays 12-4 pm
Location: St. George campus, Earth Sciences Centre Room 4076 & Ramsay Wright 109.
Enrolment: Limited to 2 or 3 graduate students

Students who are interested in taking this course should contact Dr. Pauline Wang at pauline.wang@utoronto.ca. The course requires instructor approval, after it is requested on ROSI.

*CSB 1025H/S is a half-credit course that takes place during the full Winter session. It is the equivalent of two modules. This course is also offered to undergraduate students as CSB 474H1S. Graduate students should NOT request this course as CSB474H1S on ROSI, because it would not count toward graduate credit.

Description:
Genomics and proteomics have revolutionized biological research. It is now theoretically possible to fully characterize the structure, organization, regulation and interaction of all genes, proteins and small bioactive molecules in an organism. CSB 1025H/S is an intensive and rigorous laboratory course that will teach students how to produce and analyze data that are central to the fields of genomics and proteomics. The course is divided into three modules, the first of which focuses on genomics, the second on transcriptomics, and the third on proteomics. Each module begins with at least two wet labs where students generate data and end with computer labs where students analyze the data. In this way students will learn how to conduct an experiment from beginning to end. Techniques taught include DNA and RNA extraction, shotgun library construction, PCR, DNA sequencing, expression profiling using microarrays, 2D-gel proteome analysis, mass spectrometry and associated bioinformatics analyses such as sequence analysis and assembly, and statistical analysis of microarray and mass spectrometry data. This is an advanced laboratory and computer-based course, and assumes a strong background in molecular genetics and some prior laboratory experience.

Required Text: No required textbook. Information will be provided through lectures presented in the first wet lab and first computer lab of each module.

Evaluation: Three quizzes (15%), three lab reports (60%), lab performance (25%). Graduate students have an additional grant proposal (20%).

Prerequisite: BIO 260H1/HMB 265H1 (Genetics), BIO 255Y1/CSB 330H1/350H1 or by permission of the instructor. Recommended Preparation: BCH 311H1/CSB 349H1/MGY 311Y1

Module: Topics in Cell and Developmental Biology: Genetic strategies in the analysis of animal development.
CSB 1020H/S, Teaching Section LEC 0104
Coordinator: Professor D. Godt
Offered: Spring 2018 session. The module starts at the end of Feb 2018 with an informal meeting to discuss the course, which is followed by 6 weeks of seminars (March to April).
Weight: One module (0.25 FCE)
Time: TBA
Location: St. George campus, Ramsay Wright Building, room TBA
Enrolment: Limited to 8 students

Description:
Strategies to manipulate genes and gene activity and to detect and measure changes in gene expression have become exceedingly sophisticated and are no longer restricted to a few model organisms. In this reading course, we will discuss recent articles focusing on how genetic analysis contributes to revealing mechanistic insight into developmental processes, such as cell differentiation, stem cell activity, cell polarity, and tissue morphogenesis.

Graduate students will present and discuss primary research articles, will guide group discussions, and write a paper.

Grading:
30% Presentations (a short and long presentation)
20% Leading a discussion
20% Participation in discussions
30% Written report

Other courses that may be of interest to Cell and Systems Biology graduate students, instructed by CSB Graduate Faculty

CHM1054H/F
Topics in Bioorganic Chemistry (0.5 FCE)

Instructors:	Walid Houry	walid.houry@utoronto.ca
	Jumi Shin	jumi.shin@utoronto.ca
	Deborah Zamble	dzamble@chem.utoronto.ca

Website: On Blackboard

Topics:

Analysis of biomolecular interactions and their reaction mechanisms.

1. The ribosome - RNA interactions and amide bond formation.
2. Non-ribosomal and polyketide synthases - multi-subunit interactions and applications.
3. Detecting protein-protein interactions *in vivo*

Protein Engineering

1. De Novo Protein Design
    a. Helical structures
    b. Zinc fingers, β-sheet structures, amyloids/prions
2. Protein Evolution
    a. *In vitro* and *in vivo* methods
    b. Selection assays, library construction
    c. Rational vs. nonrational design

Reading: Items will be posted on the course web site, cited as library material, or distributed in advance in class. Announcements will be posted on Bb and mass emailed to all enrolled.
Recommended texts for background (general biochemistry textbook): "Biochemistry," Volume 1, second edition, David Metzler, Academic Press, 2001 or other biochemistry text (ie Voet&Voet).

Marking Scheme: As a core course, the emphasis will be on the application of principles and methods. There will be one final exam (35%) that relates to material in the course. Each student will do one short presentation (20%) with an associated proposal (35% each). Class participation (10%) is strongly encouraged.

Details posted on the Department of Chemistry website at:
http://www.chem.utoronto.ca/grad/course_timetable.php