

Department of Biology Course Outline

SC/BIOL 2071 3.0
Research Methods in Cell and Molecular Biology
Fall 2020

Expanded Course Description

This course explores the contemporary practice and skills required for basic research in biochemistry, cell, and molecular biology. Students will learn about some of the equipment, protocols, and theory that is required for rudimentary work in a professional molecular biology research lab. The application of this knowledge to solve various modern and historic problems in biology is discussed.

Topics may include scientific writing, nucleic acid manipulation and sequencing, data analysis/interpretation, electrophoresis and blotting, microscopy, and various common preparative and analytical methods used in molecular biology.

Skills will be developed using a combination of online instruction, problem-based learning, and exposure to active faculty research projects.

Prerequisites

(1) Both SC/BIOL 1000 3.00 and SC/BIOL 1001 3.00, or SC/ISCI 1110 6.00, or both SC/ISCI 1101 3.00 and SC/ISCI 1102 3.00

(2) both SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00, or both SC/ISCI 1201 3.00 and SC/ISCI 1202 3.00, or SC/ISCI 1210 6.00

Students are expected to be broadly familiar with content covered in these prerequisite courses.

Exclusions

(1) SC/BIOL 2070 3.00

Course Instructor(s) and Contact Information

Course Director: Dr. Christopher Jang (jangc@yorku.ca)

Schedule & Organization

This is an online course, sorted into biweekly modules that contain various tasks and other pertinent resources. These modules **usually** start on Monday and end on Sunday at midnight. All supporting information for each module can be found on the course website.

It is expected that students log in to the course website regularly throughout the duration of the course to keep up to date with coursework. A few things we recommend include:

- Reading the instructions for each learning task thoroughly and carefully
- Noting all due dates in the course schedule and planning your work accordingly
- Planning to perform online tasks and submission of assignments at least several hours before the due time to take into account possible technological failures

For a detailed course schedule, please consult the course Moodle page.

Grading & Assessment

The final grade for the course will be based on the items indicated below. Your understanding of the material will be assessed by quizzes, reading assignments, and written assignments. Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles.

- Activity Grade (30%, 4-6 per module, weighted evenly)
- Written Assignments (55%, 1 per module, weighted evenly)
- Final Examination (15%)

Participation & Student Conduct

In the biweekly modules, you will be asked to access the course materials, attend synchronous sessions for workshops and short lectures, and interact with your peers during the social annotation of assigned readings in Perusall. It is expected that students:

- Plan and do not wait until the last minute to annotate and respond to your peers' posts
- Annotate frequently to engage with your peers
- Avoid annotations that are limited to "I agree" or "great idea", and other similar comments
- Provide questions, rationale, and examples that relate to your prior knowledge/experience
- Keep the discussion on topic
- Use proper language, spelling, and grammar
- Behave in a civil fashion and treat others with respect

Your active engagement and participation are crucial to both your and your peers' learning. Please keep in mind that everyone needs to contribute and engage to make this a valuable and successful experience.

Important Dates

Drop Deadline: November 6, 2020
Withdrawal Deadline: December 8, 2020

Resources & Requirements

Students do not need to purchase any textbook for this course. All required resources will be accessible through the course Moodle website at <https://moodle.yorku.ca>

Students must use Crowdmark for written assignment submission, and Perusall for reading assignments. **Submissions will not be accepted through email or any other medium, unless students are explicitly told otherwise.** There are no exceptions. These resources must be accessed through Moodle, and students must learn how to use these tools. Zoom will be used for synchronous activities, and official York credentials must be used for all online authentication. Please consult the course website for further details.

Course Content & Learning Outcomes

This course provides students with knowledge about the methods, equipment, and theory required in the practice of contemporary cell and molecular biology research. Individual topics/examples may be updated periodically to reflect advances in the field. Some of the things students will be able to do upon completion of this course include:

- Develop a testable hypothesis
- Identify/develop pertinent control experiments
- Articulate how common preparative techniques in biochemistry, cell, and molecular biology work, and how to conduct them (e.g. PCR)
- Articulate how common analytical techniques in biochemistry, cell, and molecular biology work, and how to conduct them (e.g. electrophoresis, blotting, protein-protein interaction assays)
- Describe how these basic techniques have been modified to solve methodological problems in biology (e.g. nucleic acid sequencing, site-directed mutagenesis)
- Design a sequence of experiments to answer a biological question
- Describe two basic methods of imaging used in cell and molecular biology
- Conduct basic calculations used in molecular biology
- Interpret and interpolate from different forms of experimental data correctly
- Use biological terminology appropriately in the context of scientific writing
- Write, recognize, and successfully identify a scientific citation
- Successfully utilize common reference databases for both literature and datasets
- Predict experimental results
- Communicate findings effectively within the conventions of scientific writing
- Acquire, assess, and critique scientific articles relevant to course topics
- Plan a genetic engineering experiment from conception to vector delivery using both conventional enzymatic methods and contemporary methods using recombination
- Compare and contrast selected cell and molecular technology techniques, considering purpose, advantages/disadvantages, resources, etc.
- Troubleshoot problems with biochemical, cell, and molecular biology techniques

Course Policies

Late Assignment Policy

There is a 10% penalty for late assignments. An additional 10% penalty will be levied for every additional 24 hours late, to a maximum of 72 hours past the deadline. After this point, a zero will automatically be awarded for the assignment.

Grade Reappraisals

All reappraisal requests must be submitted to the Course Coordinator or Course Director within 7 days of the graded work being made available to you. This must be done by submitting a completed reappraisal request form. **All requests must be accompanied by academic grounds for reappraisal, based in logical reasoning regarding course content.** The only exception to this is when there is an error in grade tabulation.

If these guidelines are not met, reappraisal requests will be denied.

If approved, the reappraisal will be done by a blinded member of the teaching staff with no knowledge of the previous grade. A student's grade may be raised, lowered, or remain the same after this process. Perusall reading assignments may not be reappraised.

Academic Accommodations (e.g. extensions, deferrals, official accommodations)

Any request for academic accommodations must be accompanied by at least one form of official documentation, defined at the following URL:

<https://accessibility.students.yorku.ca/types-of-letters>

Requests for academic accommodation without official documentation will be denied. These policies are in place to maintain consistency and fairness for all students enrolled in the course. There are no exceptions.

Student Conduct Policy

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. **Student conduct that is disruptive will not be tolerated.** The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at the following URL:

<http://secretariat-policies.info.yorku.ca/policies/disruptive-andor-harassing-behaviour-in-academic-situations-senate-policy/>

E-mail Policy

We will try to respond to email within two working days, but this is not always possible. To ensure a prompt answer please follow the following guidelines. Email messages not meeting these guidelines may not be answered.

- Use your York email address when emailing us. Email from other sources may be filtered out and not reach the intended recipient
- Include the course code and brief indication of topic in the subject line so that we can route your e-mail effectively
- Include your name and student number at the end of each e-mail so we can access your information internally
- Before mailing us, please ensure that you've looked through and consulted other resources first, such as the course website
- Please keep your e-mail correspondence with us concise, proper, and professional

University Policies

Academic Honesty and Integrity

York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty. The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards. Students are expected to be familiar with this document, which can be found at the URL below:

<http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students' research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at the following URL:

<http://www.yorku.ca/academicintegrity/>

Note that numerous students in Faculty of Science courses have been charged with academic misconduct when materials they upload to third-party repository sites (e.g. Course Hero, One Class, etc.) were taken and used by unknown students in later offerings of the course. The Faculty's Committee on Examinations and Academic Standards (CEAS) found in these cases that the burden of proof in a charge of aiding and abetting had been met, since the uploading students had been found in all cases to be willfully blind to the reasonable likelihood of supporting plagiarism in this manner. Accordingly, to avoid this risk, students are urged not to upload their work to these sites. Whenever a student submits work obtained through a third-party site, the submitting student will be charged with plagiarism and the uploading student will be charged with aiding and abetting.

Copyright

Note that exams, tests, and other assignments are the copyrighted works of the professor assigning them, whether copyright is overtly claimed or not (i.e. whether the © is used or not). Scanning these documents constitutes copying, which is a breach of Canadian copyright law and may result in legal exposure, civil/criminal penalties, and/or academic sanction. This breach is aggravated when scans are shared or uploaded to third-party repository sites.

Access & Disability

York University is committed to principles of respect, inclusion, and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning, and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Students in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

Additional information is available at the following websites:

Counselling & Disability Services - <http://cds.info.yorku.ca/>

Counselling & Disability Services at Glendon - <https://www.glendon.yorku.ca/counselling/>

York Accessibility Hub - <http://accessibilityhub.info.yorku.ca/>

Religious Observance Accommodation

York University is committed to respecting the religious beliefs and practices of all members of the community and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete and submit an Examination Accommodation Form at least 3 weeks before the exam period begins. The form can be obtained from Student Client Services, Student Services Centre or online at the following URL:

<https://registrar.yorku.ca/pdf/exam-accommodation.pdf>