Department of Biology Course Outline

SC/BIOL 2070 3.0
Research Methods in Cell and Molecular Biology
Fall 2025

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 the equipment, protocols, and theory that is required for basic work in a molecular biology research lab. The application of this knowledge to solve problems in biology is discussed.

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

Skills will be developed using a combination of online instruction, process-oriented guided inquiry learning, laboratory benchwork, 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.

Course Instructor and Contact Information

Course Director: Sejal Dave
Course Email: biol2070@yorku.ca

Schedule & Organization

Six laboratory/practical hours per week, and one 1-hour lecture.

The course is divided into weekly modules, each starting on Monday and ending on Sunday. During each week, students will be responsible for the completion of various types of weekly work, quizzes, and in-lab activities. Information for each week can be found on the course website.

Due dates are consistent throughout the course: weekly work and quizzes are due at the end of every week (Sunday midnight), unless otherwise indicated.

All due dates are indicated in the schedule, which can be found on the course website.

Grading & Assessment

The final grade for the course can be divided into three components: an activity component which consists of weekly homework activities and quizzes administered online, an in-lab component, and an in-person final examination. **Both the activity and lab component must be passed independently to pass the course.** Final course grades may be adjusted to conform to Program or Faculty grades distribution profiles.

		Percentage of Final Grade
Activity Component	Weekly Work	10
	iClicker Lecture Work	5
	Weekly Quizzes	20
Lab Component	In-Lab Work and Performance	15
	Individual Practical Tests	2
	In-Lab Pop Quizzes	8
	Team Competitions/Lab Olympics	6, bonus on final grade only
Public Final Examination		40

The Activity Component consists of:

- Short online lessons (Weekly Work, weighted evenly)
- Short online videos with embedded questions (Weekly Work, weighted evenly)
- Online assignments through Perusall (Weekly Work, weighted evenly)
- iClicker lecture participation (at least 75% of the questions for a given session must be answered, either correctly or incorrectly, to receive credit for the session)
- Online quizzes on practical laboratory tasks with one attempt (weighted evenly)
- An additional 1% will be added to your **activity component grade** at the end of the course to account for technical issues, absences, and unexpected personal matters that arise during the course
- Note that there are many individual activities that comprise the weekly work expected of students throughout term. Thus, any individual activity is worth less than 1% of your final grade

The Lab Component consists of:

- Satisfactory attendance, participation, and completion of team worksheets, with each session graded out of 3 points (rubric below)

- Individual laboratory skills tests, graded satisfactory/unsatisfactory
- Pop quizzes based on laboratory principles (in lab)
- In-lab team competitions (Lab Olympics), which can only add to your final grade in the course

Score	Criteria
3	Fully Present and Professional: Arrives on time, participates fully, follows all safety protocols, completes tasks, and demonstrates respectful, collaborative behavior.
2	Minor Concern: Late arrival OR minor issue such as incomplete work, minor safety lapse, or disregard for lab etiquette or social norms (e.g., distracted, not engaging with group).
1	Major Concern: Present but with a significant issue—e.g., major safety concern, disruptive or disrespectful behavior, poor group participation, or incomplete work.
0	Absent or Unacceptable: Absent without valid reason, leaves early without permission, or engages in behavior (including serious safety or conduct violations) that prevents meaningful participation.

Grades are assigned at the discretion of the lab instructor based on their professional judgement of a student's overall conduct, engagement, and compliance with expectations. These evaluations are not eligible for reassessment.

In the team competitions and Lab Olympics held at the end of term:

- Student teams will use lab techniques that they've learned to determine an unknown or confirm an analytical standard
- Student teams in each section will be ranked according to how close their team is to the known value, and assigned points
- Students on the first place team will receive 10 points, second place will receive 8 points, third place will receive 6 points, fourth place will receive 5, fifth place will receive 4 points, and sixth place will receive 3 points
- Points for each student will be tallied at the end of term and used to place students into 6 groups according to point totals
- Students with point totals that do not clearly place them into a group will be rounded down
- Students in the first place group will receive a 6% bonus, second place will receive 5%, third place will receive 4%, and so forth
- Students who are absent to a session where an evaluation is held will receive no points for that session

Both the activity and lab component must be passed independently to pass the course. Since the lab exercises build upon one another, any student who misses more than one lab session will not be able to pass the laboratory component of the course.

Participation & Student Conduct

Throughout the course, you will access and complete weekly work and quizzes, attend in-lab sessions, and attend lectures. Some of these activities will require you to interact with your peers in different ways. 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.

All students at York are governed by York's Code of Student Rights and Responsibilities (https://oscr.students.yorku.ca/student-conduct). This code allows all students the right to pursue all academic activities without "harassment, intimidation, discrimination (or) disruption." Students who engage in any type of abuse (e.g. threats, harassment, inappropriate behaviours, and racist and/or sexist language) against their instructor and/or other students may be subject to prosecution under York's Code of Conduct, the rules of the appropriate Department/Faculty, Ontario Law, and/or the Canadian Human Rights Code as deemed fit.

Resources & Requirements

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

Students must use 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 the course website.

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 things students will be able to do upon completion of this course include:

- Carry out biological laboratory activities, in-person, with safety and reliability in a laboratory setting
- Develop a testable hypothesis with guidance
- Identify/develop pertinent control experiments
- Articulate how common preparative techniques in biochemistry, cell, and molecular biology work, and conduct them (e.g. PCR, nucleic acid purification)
- Articulate how common analytical techniques in biochemistry, cell, and molecular biology work, and conduct them (e.g. electrophoresis, protein interaction assays)
- Describe how basic techniques have been modified to solve methodological problems in biology (e.g. nucleic acid sequencing, site-directed mutagenesis)
- Design and explain the purpose of a sequence of experiments used to answer a biological question
- Use basic imaging methods used in cell and molecular biology
- Conduct basic calculations used in cell and molecular biology
- Interpret and interpolate from 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
- Search for and evaluate scientific articles relevant to course topics
- Design a genetic engineering experiment using traditional 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

Personal Protective Equipment

You must bring a laboratory coat and safety eyewear to each lab session. These can be obtained at the York University Bookstore. If you lack one or more of these items, you will not be permitted to remain in the labs and no makeup lab will be granted.

Lab Admission and Late Policies

Since students are expected to work in teams, students must be on-time for their scheduled lab session. If a student does not show up on time to complete in-lab activities in their entirety, they are effectively taking advantage of their teammates, creating an unfair environment for all students enrolled, and not meeting the outcomes of the course. Thus, if a student is more than 15 minutes late, they may not be granted entry into the lab by the instructor and will be considered absent for that session.

Missed Labs

BIOL 2070 is a formal laboratory course. Since course outcomes include practical work conducted in labs, in-person attendance and completion of all labs is mandatory, even if repeating the course. If you are absent or know you will be absent for a valid reason, notify the lab coordinator immediately so that a potential makeup lab may be scheduled.

Since equipment and reagent requirements change with each lab, each session is only run for a short period of time, it may not be possible to offer a makeup lab in all cases due to logistical reasons. Same-day makeup labs will not be provided, as Day 1 and Day 2 labs are each offered only once per week on separate days. Therefore, students who miss their scheduled lab cannot attend a makeup session on the same day. For these reasons, if a student notifies us after their scheduled lab session, it is more likely that we will not be able to provide a makeup lab.

Note that makeup labs are not granted for many situations including, but not limited to logistic reasons, schedule confusion, busy lives, or attendance to personal events. If a student is absent for a lab session and a makeup lab cannot be scheduled, no credit will be granted for that lab session. If you know in advance that will miss a lab, you must notify us at least 48 hours beforehand, otherwise, a makeup lab is not guaranteed. **Any student who misses more than one lab will not pass the laboratory component of the course.**

Late Work Policy

If relevant, there is a 10% penalty for late formal written 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

If relevant, all reappraisal requests must be submitted to the Course Coordinator or Course Director by email 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. Regrades are final.

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. This is to ensure that students who request accommodation are put into contact with proper institutional supports, and to ensure that all students are treated equitably.

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.

Deferred Exams

If you miss the final examination, you must petition for deferred standing. The decision to grant deferred standing will be made by the Faculty of Science Petitions Committee and not the course director to maintain consistency for students. Details for this process can be found at the URL below:

https://myacademicrecord.students.yorku.ca/academic-petitions

The format of the deferred final examination may be different from the final examination administered during the course.

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 business 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 and Research Misconduct

York students are required to adhere 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 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