

MGY311Y Molecular Biology. 2025-26 Course Outline

Mondays, Wednesdays and Fridays, 9:00 – 10:00 A.M. (except for two term tests: see details below).

Term 1: September 3 to December 1, 2025.

1. Molecular Biology: core concepts and approaches. (Dr. Rick Collins)
Sept. 3 to Sept 26.
How science is done in molecular biology; the experimental basis of what we “know”.
Nucleic acid structure. Protein-nucleic acid interactions, experimental design and interpretation.

Mini term test Monday Sept 29 (10% of the course grade).

2. DNA Replication (Dr. Aaron Reinke)
Oct 1 – Oct. 22; except Oct. 13 (Thanksgiving: no lecture)
DNA replication in E. coli - initiation, elongation, termination; protein machines;
eukaryotic DNA replication; regulation; replicating the ends of chromosomes.

First real term test: Friday Oct 24. (10% of the course mark).

90 minutes: 8:30 am to 10:00 am. Location TBA.

Fall Study Week: Oct 27 to 31; no classes.

3. DNA Repair (Dr. Rick Collins)
Nov. 3 to Nov 12
Mutagenesis; DNA repair mechanisms
4. Recombination. (Dr. Rick Collins)
Nov 14 to Dec 1.
Homologous, site-specific, and transpositional recombination in prokaryotes and eukaryotes.

Second term test: TBA during the Christmas assessment period (20% of the course mark). Two hours.

Term 2. January 5 to April 6, 2026.

5. Transcription (Dr. Julie Claycomb)
Jan 5 to Jan 21.
Mechanisms of transcription - initiation, elongation, termination; initiation complexes in E. coli and eukaryotes; regulation of transcription.
6. RNA Processing. (Dr. Rick Collins)
Jan. 23 to Feb 13.

Processing and modification of tRNA and ribosomal RNA precursors; catalytic RNAs; processing of mRNA precursors; non-coding RNAs; RNA editing; RNA silencing; RNA localization.

Reading week: Feb. 16 - Feb. 20. No classes.

Third term test: Monday, Feb. 23. (20% of the course mark).

90 minutes: 8:30 am to 10 am. Location: TBA.

7. Translation and Post-translational processing. (Dr. Andrew Wilde)

February 25 – March 20.

Genetic code(s), tRNA and aminoacyl tRNA synthetases; structure of the ribosome; protein synthesis - initiation, elongation, termination; regulation of translation; secretion and targeting; post-translational modification.

8. Functional Genomics. (Drs. Aaron Reinke, Julie Claycomb and Rick Collins).

March 23 – April 6 (except no lecture April 3: Good Friday holiday).

Integrative approaches to identifying gene functions.

Final exam: during the April final exam period (20% of the course mark).

Grading Summary.

10% Mini term test. Monday Sept 29, 2025.

10% Term test 1. Friday Oct 24, 2025.

20% Term test 2. TBA Christmas Assessment period 2025.

20% Term test 3. Monday, Feb 23, 2026.

20% In-class quizzes and homework assignments: throughout the course.

20% Final Exam. TBA: April Final Exam period, 2026.

Learning outcomes:

The purpose of this course is to show you how science is done in the field of molecular biology. You will learn a certain amount of vocabulary and some facts, but the emphasis will be on how we come to know something, rather than just what we know. We will also discuss what we don't yet know, and how current research is attempting to answer these questions.

By the end of the course you should be able to:

1. Interpret data obtained from experiments in molecular biology, genetics and biochemistry:

- a) Read the primary literature
- b) Make your own interpretations of data.
- c) Design experiments to address specific molecular biology questions.
- d) Evaluate the strengths and limitations of techniques and experimental approaches.

- e) Explain the nature and importance of positive and negative controls.
 - f) Integrate data from multiple experimental approaches to make a stronger conclusion.
2. Explain, using examples, current models of the following topics, and the experimental evidence that supports those models:
- a) Nucleic acid structure
 - b) Interactions among proteins, DNA, RNA and small molecules
 - c) Replication
 - d) DNA Repair
 - e) Recombination
 - f) Transcription
 - g) RNA Processing
 - h) Translation

We also expect that you will be able to take your own notes during lectures, and communicate your understanding of the course material orally and in writing on assignments, quizzes, tests, and exams.

Policies & Statements

Late Assessment Submissions Policy

No late submissions will be accepted on Assignments and Quizzes.

Make-Up Quizzes/Tests

No makeup Quizzes or Assignments will be given. Any missed Assignments or Quizzes will be counted as one of your three marks that will be excluded from the calculation of your overall Assignment/Quiz mark.

Students with Disabilities or Accommodation Requirements

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting <https://studentlife.utoronto.ca/departments/accessibility-services/>. Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work. Remember that the process of accommodation is private: AS will not share details of your needs or condition with any instructor, and your instructors will not reveal that you are registered with AS.

Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the [Code of Behaviour on Academic Matters](https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019) (<https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019>). If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to me. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources. For example, to learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website at <http://www.writing.utoronto.ca>. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see [A&S Student Academic Integrity](https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity) (<https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity>) and the [University of Toronto Website on Academic Integrity](https://www.academicintegrity.utoronto.ca) (<https://www.academicintegrity.utoronto.ca>).

Specific Medical Circumstances

If you become ill and it affects your ability to do your academic work, consult me right away. Normally, I will ask you for documentation in support of your specific medical circumstances. This documentation can be an Absence Declaration (via ACORN) or the University's Verification of Student Illness or Injury (VOI) form. The VOI indicates the impact and severity of the illness, while protecting your privacy about the details of the nature of the illness. If you cannot submit a VOI due to limits on terms of use, you can submit a different form (like a letter from a doctor), as long as it is an original document, and it contains the same information as the VOI (including dates, academic impact, practitioner's signature, phone and registration number). For more information on the VOI, please see <http://www.illnessverification.utoronto.ca>. For information on Absence Declaration Tool for A&S students, please see <https://www.artsci.utoronto.ca/absence>. If you get a concussion, break your hand, or suffer some other acute injury, you should register with Accessibility Services as soon as possible.

Accommodation for Personal Reasons

There may be times when you are unable to complete course work on time due to non-medical reasons. If you have concerns, speak to me or to an advisor in your College Registrar's office; they can help you to decide if you want to request an extension or other forms of academic consideration. They may be able to email your instructors directly to provide a College Registrar's letter of support and connect you with other helpful resources on campus.

Religious Accommodations

As a student at the University of Toronto, you are part of a diverse community that welcomes and includes students and faculty from a wide range of cultural and religious traditions. For my part, I will make every reasonable effort to avoid scheduling tests, examinations, or other compulsory activities on religious holy days not captured by

statutory holidays. Further to University Policy, if you anticipate being absent from class or missing a major course activity (such as a test or in-class assignment) due to a religious observance, please let me know as early in the course as possible, and with sufficient notice (at least two to three weeks), so that we can work together to make alternate arrangements.

Quercus Info

This Course uses the University's learning management system, Quercus, to post information about the course. This includes posting readings and other materials required to complete class activities and course assignments, as well as sharing important announcements and updates. New information and resources will be posted regularly as we move through the term. To access the course website, go to the U of T Quercus log-in page at <https://q.utoronto.ca>. SPECIAL NOTE ABOUT GRADES POSTED ONLINE: Please also note that any grades posted are for your information only, so you can view and track your progress through the course. No grades are considered official, including any posted in Quercus at any point in the term, until they have been formally approved and posted on ACORN at the end of the course. Please contact me as soon as possible if you think there is an error in any grade posted on Quercus.

Recording Lectures (by Student)

Recording lectures for your personal use or the use of your classmates is permitted. Recordings are not to be posted online.