

# GENES AND GENOMES Syllabus

## Department of Biochemistry & Molecular Biology

### BIOC 4403/5403 Winter 2026

*Dalhousie University operates in the unceded territories of the Mi'kmaw, Wolastoqey, and Peskotomuhkati Peoples. These sovereign nations hold inherent rights as the original peoples of these lands, and we each carry collective obligations under the Peace and Friendship Treaties. Section 35 of the Constitution Act, 1982, recognizes and affirms Aboriginal and Treaty rights in Canada.*

*We recognize that African Nova Scotians are a distinct people whose histories, legacies, and contributions have enriched the part of Mi'kma'ki known as Nova Scotia for over 400 years.*

**Instructor(s):** Dr. Claudio Slamovits (coordinator), Dept. of Biochemistry & Molecular Biology  
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### Course Description

This course discusses the organization of genes into genomes. It deals with (i) the compartmentalization of genetic material in nuclear and organellar genomes, (ii) the structure, behaviour and origins of components of both nuclear and organellar genomes which are not genes (transposable and other repetitive elements, introns), (iii) methods for sequencing and analyzing genomes, and (iv) the significance of genetic organization and higher order chromosomal structure and function. The methodologies and prospects of genomics are discussed at some length.

### Course Prerequisites

BIOC 3400.03 or BIOL 3046.03 or Instructor's consent

### Crosslistings

BIOC5403

### Course Objectives/Learning Outcomes

Appreciation of genomic diversity; understanding of the characteristics of, and differences between, nuclear, prokaryotic, organellar and viral genomes; understanding of the evolutionary processes that shape the coding capacity and architecture of genomes in different organisms and sub-cellular compartments; knowledge of current methods and technologies available to generate and analyze sequence data

**Lectures:** In person on Mon - Wed - Fri 11:35-12:25 Room 3H01 (Tupper Building)

**Workshops:** *Some lectures (see tentative schedule) will be replaced with workshops in Tupper 8J*

### Course Materials

- All required materials, including lecture slides, handouts and readings will be posted on Brightspace.

- Textbook: No required book. The book “Genomics: A Very Short Introduction” by Dr. John Archibald is recommended.

### Course Assessment

This course assumes an intermediate level of molecular biology (BIOC 3400 or equivalent). The course content is provided through lectures, workshops, assignments as well as original research articles. The final grade (for 4403) will be based on two tests (15% each), 4 or 5 assignments (40% in total) and the final exam (30%). **For 5403**, the weights are shown below. Additionally, graduate students will conduct a research project and present the results in a special seminar and a report at the end of the term. This assignment is worth 30% of the final grade. The details of the project will be agreed with the coordinator at the beginning of the term. In accordance with **FoGS** regulations, **graduate students need to achieve a grade of 65 or more (C+) to PASS.**

#### Course Assessment – BIOC 4403

Component	Weight (% of final grade)	Date
Tests (2x50 min)	2x15%	Feb. 4 <sup>th</sup> and Mar. 20 <sup>th</sup> (Scheduled by Registrar)
Final exam (2 h)	30%	Throughout term
Assignments	40%	

#### Course Assessment – BIOC 5403

Component	Weight (% of final grade)	Date
Tests (2x50 min)	2x12.5%	Feb. 4 <sup>th</sup> and Mar. 20 <sup>th</sup> (Scheduled by Registrar)
Final exam (2 h)	25%	Throughout term
Assignments	20%	
Research project (report and presentation)	30%	Apr. 6 <sup>th</sup> and 8 <sup>th</sup>

#### Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)
A- (80-84)	B- (70-72)	C- (55-59)		

### Course Policies

#### Short-term Absence/Missed exams, midterms, or assignments, etc.

A student who misses an evaluation component of a course (midterm test, assignment, presentation, lab, etc.) due to illness should, if possible, notify the instructor, course coordinator, or department office either prior to, or within 48 hrs of the scheduled time or due date for that component. The student must also submit a Student Declaration of Absence Form (through the course Brightspace page or to their instructor via e-mail) within three (3) calendar days following the last day of absence. Special ‘make-up’ tests (if offered) will normally be written within 7 calendar days after the missed test. Absence for non-medical reasons is not ordinarily acceptable unless prearranged with the instructor. A missed evaluation component for which no satisfactory arrangement has been made will be given a mark of zero. The Student Declaration of Absence form can only be submitted up to two (2) separate times per course during a term. Students who exceed this limit must inform their course instructor(s) and will be required

to register with an Advisor at Student Academic Success (SAS). If students have recurring short-term absences and do not register with SAS, it is at the instructor(s)' discretion to disallow any further Student Declarations and deny alternate coursework arrangements.

### Missed Final exam:

A student who misses the final examination due to illness must notify the course coordinator or department office within 48 hours to provide a medical certificate (see Dalhousie Calendar, section 16.8). Absence for non-medical reasons is not acceptable.

If necessary, a make-up final examination will be held shortly after the end of the official exam period, and typically before May 1. Students who need to write a makeup exam for medical or other reasons are expected to be available during this period.

**Please refer to the link below for further information on the University policy regarding Long-term absence.**

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html](https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html)

### Course Content - 2026

**CLASS SCHEDULE (SUBJECT TO REVISION, CHANGES MAY OCCUR)**

Class	Date	Topic
1	Wed 07-Jan-2026	Syllabus review and diversity of genes and genomes
2	Fri 09-Jan-2026	Origins of genes and genomes
3	Mon 12-Jan-2026	Prokaryotic genomes I
4	Wed 14-Jan-2026	Prokaryotic genomes II
5	Fri 16-Jan-2026	Workshop 1 (Tupper 8J): Having a blast with sequence search - Assig. 1
6	Mon 19-Jan-2026	Prokaryotic genomes III
7	Wed 21-Jan-2026	Endosymbiotic theory and the origin of organelles
8	Fri 23-Jan-2026	Endosymbiosis and genomes
9	Mon 26-Jan-2026	Organellar genomes I
10	Wed 28-Jan-2026	Organellar genomes II - Assig. 2 available
11	Fri 30-Jan-2026	Organellar genomes III
12	Mon 02-Feb-2026	Viral genomes
13	Wed 04-Feb-2026	Test 1 - Classes 2 to 4 + 6 to 11
	Fri 06-Feb-2026	Munro Day - No classes
14	Mon 09-Feb-2026	DNA sequencing technologies
15	Wed 11-Feb-2026	Genome assembly
16	Fri 13-Feb-2026	Workshop 2 (Tupper 8J): Working with genome sequencing data - Assig. 3
	Mon 16-Feb-2026	Heritage Day - No classes
	Wed 18-Feb-2026	Study week - No classes
	Fri 20-Feb-2026	Study week - No classes

17	Mon 23-Feb-2026	Origin of nuclear genomes
18	Wed 25-Feb-2026	Nuclear genomes - composition and structure I
19	Fri 27-Feb-2026	Nuclear genomes - composition and structure II
20	Mon 02-Mar-2026	Nuclear genomes - composition and structure III
21	Wed 04-Mar-2026	Whole genome annotation and analysis I
22	Fri 06-Mar-2026	Whole genome annotation and analysis II
23	Mon 09-Mar-2026	Transcriptomics
24	Wed 11-Mar-2026	Metagenomics
25	Fri 13-Mar-2026	Workshop 3 (Tupper 8J): Functional annotation and inferences - BioCYC - Assig. 4
26	Mon 16-Mar-2026	Genome evolution I
27	Wed 18-Mar-2026	Genome evolution II
28	Fri 20-Mar-2026	Test 2 - Classes 12, 14-15, 17-24
29	Mon 23-Mar-2026	The human genome
30	Wed 25-Mar-2026	Proteomics
31	Fri 27-Mar-2026	Hot topics in genomics
32	Mon 30-Mar-2026	Guest lecture II
33	Wed 01-Apr-2026	Guest lecture III
	Fri 03-Apr-2026	Good Friday - No classes
34	Mon 06-Apr-2026	BIOC5403 Special presentations (must be attended by all students)
35	Wed 08-Apr-2026	Special presentations
36	Thu 09-Apr-2026	Review, Q&A
	Date TBD by Dal	FINAL EXAM Cumulative

#### Colour codes

Lecture
Workshop
Test
Guest lecture
Day off

#### Course Policies related to Academic Integrity

Students are encouraged to work collaboratively with others to complete workshops and assignments. However, students are still expected to complete and submit their own work. The use of generative language artificial intelligence (e.g., Chat GPT) is *not* permitted in this course.

#### Department of Biochemistry & Molecular Biology Statement on Plagiarism

##### What is plagiarism?

“Dalhousie University defines plagiarism as the submission or presentation of the work of another as if it were one’s own†.” The Department of Biochemistry & Molecular Biology is committed to protecting honest students against the devaluation of their work by students who resort to plagiarism.

Some examples of plagiarism include (but are not restricted to):

> Submitting as your own work any material created, in whole or in part, by someone else, including **material created in collaboration with other students**, unless specifically allowed by the class instructor and credited appropriately.

- > Paraphrasing extensively or copying from sources such as the Internet, journal articles, or books (including textbooks) without crediting the original author or source.
- > Using another student's laboratory data, unless specifically allowed by the lab instructor and credited appropriately.
- > Submitting, in whole or in part, any work that has been submitted in another class, or re-submitting the same work in different years of the same class.

#### **How can plagiarism be detected?**

If required by the Instructor, work submitted for credit must be submitted in electronic as well as hard copy form. Submissions may be screened by one or both of the following methods:

- > A pattern recognition program that compares all submissions with one another as well as submissions from previous years. Every individual has a unique pattern of writing. This program will detect submissions that are derived from a common source, even if words or phrases have been changed.
- > A third-party computer-based assessment system that compares submissions against a large database including previous submissions and Internet sources.

#### **What are the consequences of plagiarism?**

"Plagiarism is considered a serious academic offence that may lead to the assignment of a failing grade, suspension or expulsion from the University. If a penalty results in a student no longer meeting the requirements of a degree that has been awarded, the University may rescind that degree.<sup>†</sup>" At Dalhousie University, the Department is obligated to refer any cases of suspected plagiarism to an Academic Integrity Officer, who will then conduct a hearing to evaluate the innocence or guilt of students alleged to have committed an act of plagiarism.

#### **How can accusations of plagiarism be avoided?**

You can avoid accusations of plagiarism by:

- > Preparing all submissions independently and ensuring that they are expressed in your own unique writing style.
- > Never sharing any written or electronic material with other students. You may not work with another student while preparing materials you are planning to hand in, except when group assignments are allowed or required.
- > Acknowledging any material paraphrased extensively or copied from sources such as the Internet, journal articles or textbooks. Paraphrasing of short phrases from the class textbook need not be acknowledged.
- > Guarding all your work, both drafts and final submissions, to ensure that no one else can copy it. If you provide access to your work and someone (including a student taking the same class in a future year) copies it, then you may be aiding in the commission of an academic offence. If you suspect that someone has taken any of your work, notify your class instructor immediately.
- > Using only laboratory data that you actually collected in the lab. Altering laboratory data is not permitted. If your data are unusable, you must still report your own data along with any explanation as to why the data are unusable. You may then use data supplied by the lab instructor for analysis, but you must acknowledge such use.

<sup>†</sup> Dalhousie University Undergraduate Calendar, 2022/2023, University Regulations, Intellectual Honesty.

Outline your policies on missed or late academic requirements, including late or missed assignments, labs, tests, or exams. Indicate what students should do if they miss or are late with an assessment (e.g., exam, assignment, lab), and the consequence(s) of missing or being late (e.g., late penalties, alternate evaluation schemes). Indicate if students are expected to use the Student Declaration of Absence form for late or missed requirements during the term, and if so, how many times they may use the form in your course.

## University Policies and Statements

### Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit or e-mail the Indigenous Student Centre at 1321 Edward St or [elders@dal.ca](mailto:elders@dal.ca). Additional information regarding Mi'kmaq and Indigenous Relations (including the Elders in Residence program, Land Acknowledgements, Understanding Our Roots, and much more) can be found at: <https://www.dal.ca/about/mission-vision-values/mikmaq-indigenous-relations.html>

### Internationalization

At Dalhousie, 'thinking and acting globally' enhances the quality and impact of education, supporting learning that is "interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders." Additional internationalization information can be found at: <https://www.dal.ca/about/mission-vision-values/global-relations.html>

### Academic Integrity

At Dalhousie University, we are guided in all our work by the values of academic integrity: honesty, trust, fairness, responsibility, and respect. As a student, you are required to demonstrate these values in all the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. Additional academic integrity information can be found at: [https://www.dal.ca/dept/university\\_secretariat/academic-integrity.html](https://www.dal.ca/dept/university_secretariat/academic-integrity.html)

### Accessibility

The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. If there are aspects of the design, instruction, and/or experiences within this course (online or in-person) that result in barriers to your inclusion, please contact the Student Accessibility Centre ([https://www.dal.ca/campus\\_life/academic-support/accessibility.html](https://www.dal.ca/campus_life/academic-support/accessibility.html)) for all courses offered by Dalhousie with the exception of Truro. For courses offered by the Faculty of Agriculture, please contact the Student Success Centre in Truro ([https://www.dal.ca/campus\\_life/ssc.html](https://www.dal.ca/campus_life/ssc.html)).

### Conduct in the Classroom – Culture of Respect

Substantial and constructive dialogue on challenging issues is an important part of academic inquiry and exchange. It requires willingness to listen and tolerance of opposing points of view. Consideration of individual differences and alternative viewpoints is required of all class members, towards each other, towards instructors, and towards guest speakers. While expressions of differing

perspectives are welcome and encouraged, the words and language used should remain within acceptable bounds of civility and respect.

### **Diversity and Inclusion – Culture of Respect**

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). Additional diversity and inclusion information can be found at: <https://www.dal.ca/about/mission-vision-values/equity-diversity-inclusion-and-accessibility/about-office-equity-inclusion.html>

### **Student Code of Conduct**

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner - perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. The full Code of Student Conduct can be found at:

<https://www.dal.ca/content/dam/www/about/leadership-and-governance/governing-bodies/code-student-conduct.pdf>

### **Fair Dealing Policy**

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie. Additional information regarding the Fair Dealing Policy can be found at:

<https://www.dal.ca/content/dam/www/about/leadership-and-governance/university-policies/fair-dealing-policy.pdf>

### **Student Use of Course Materials**

Course materials are designed for use as part of this course at Dalhousie University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as books, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this course material for distribution (e.g. uploading to a commercial third-party website) may lead to a violation of Copyright law.

# Student Resources and Support

## University Policies and Programs

Important Dates in the Academic Year (including add/drop dates):

[http://www.dal.ca/academics/important\\_dates.html](http://www.dal.ca/academics/important_dates.html)

Classroom Recording Protocol: <https://www.dal.ca/content/dam/www/about/leadership-and-governance/university-policies/class-recording-protocol.pdf>

Dalhousie Grading Practices Policies:

<https://www.dal.ca/content/dam/www/about/leadership-and-governance/university-policies/grading-practices-policy.pdf>

Grade Appeal Process: [https://www.dal.ca/campus\\_life/academic-support/grades-and-student-records/appealing-a-grade.html](https://www.dal.ca/campus_life/academic-support/grades-and-student-records/appealing-a-grade.html)

Sexualized Violence Policy: <https://www.dal.ca/content/dam/www/about/leadership-and-governance/university-policies/sexualized-violence-policy.pdf>

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>

## Learning and Support Resources

General Academic Support – Advising (Halifax):

[https://www.dal.ca/campus\\_life/academic-support/advising.html](https://www.dal.ca/campus_life/academic-support/advising.html)

General Academic Support – Advising (Truro):

[https://www.dal.ca/campus\\_life/ssc.html](https://www.dal.ca/campus_life/ssc.html)

Student Health & Wellness Centre: [https://www.dal.ca/campus\\_life/health-and-wellness.html](https://www.dal.ca/campus_life/health-and-wellness.html)

On Track (helps you transition into university, and supports you through your first year at Dalhousie and beyond): [https://www.dal.ca/campus\\_life/academic-support/On-track.html](https://www.dal.ca/campus_life/academic-support/On-track.html)

Indigenous Student Centre:

[https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

Mi'kmaq and Indigenous Relations: <https://www.dal.ca/about/mission-vision-values/mikmaq-indigenous-relations.html>

Elders-in-Residence (The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit the office in the Indigenous Student Centre or contact the program at [elders@dal.ca](mailto:elders@dal.ca) or 902-494-6803: <https://www.dal.ca/about/mission-vision-values/mikmaq-indigenous-relations/elders-in-residence-and-traditional-knowledge-keepers.html>

Black Student Advising Centre:

[https://www.dal.ca/campus\\_life/communities/black-student-advising.html](https://www.dal.ca/campus_life/communities/black-student-advising.html)

International Centre: [https://www.dal.ca/campus\\_life/international-centre.html](https://www.dal.ca/campus_life/international-centre.html)

LGBTQ2SIA+ Collaborative: <https://www.dal.ca/about/mission-vision-values/equity-diversity-inclusion-and-accessibility/about-office-equity-inclusion/community-specific-groups/lgbtq2sia-collaborative.html>

Dalhousie Libraries: <http://libraries.dal.ca/>

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

Dalhousie Student Advocacy Services:

<https://www.dsu.ca/dsas?rq=student%20advocacy>

Dalhousie Ombudsperson: [https://www.dal.ca/campus\\_life/safety-respect/ombudsperson.html](https://www.dal.ca/campus_life/safety-respect/ombudsperson.html)

Human Rights and Equity Services: <https://www.dal.ca/about/mission-vision-values/equity-diversity-inclusion-and-accessibility/about-office-equity-inclusion/human-rights-and-equity-services.html>

Writing Centre: [https://www.dal.ca/campus\\_life/academic-support/writing-and-study-skills.html](https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html)

Study Skills/Tutoring: [http://www.dal.ca/campus\\_life/academic-support/study-skills-and-tutoring.html](http://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html)

Faculty of Science Advising Support: <https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html>

## **Safety**

Biosafety: <http://www.dal.ca/dept/safety/programs-services/biosafety.html>

Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

Radiation Safety: <http://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

Laser Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety/laser-safety.html>