

Faculty of Science Course Syllabus
Department of Biochemistry & Molecular Biology
BIOC 4403/5403 GENES AND GENOMES
Winter Term, 2025

Instructor(s): Dr. Claudio Slamovits (coordinator), Dept. of Biochemistry & Molecular Biology
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Lectures: In person on Mon
- Wed - Fri 11:35-12:25 Room 3H01 Tupper Building

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

Course Materials

- Lectures, suggested and required reading and practice materials provided on the course's website. The book Genomics: A Very Short Introduction by Dr. John Archibald is recommended.
- Course website: Brightspace

Course Assessment

This course assumes an intermediate level of molecular biology (BIOC 3400 or equivalent). The material is provided through lectures as well as original research and review articles and assignments. The final grade (for 4403) will be based on a mid-term exam (20%), two assignments (10% each) and the final exam (60%). For 5403, in addition, each student is required to give an in-class presentation on a special topic (arranged with the Coordinator) that accounts for 10% of the final grade. The final presentation or assignment is graded on a 1-to-10 scale. Since the marks of the three exams and the presentation can add up to 110, the final mark is multiplied by 0.91 to obtain the final grade for the course on a 100 scale (**Grad students only!**). **Grad students need to achieve a grade of 65 or more (C+) to PASS.**

Midterm I	20 (% of final grade)	Feb. 10th 2025
Assignment I	10 %	due Feb. 28th 2025
Assignment II	10%	due March 28th 2025
<i>Final exam</i>	60 %	<i>(Scheduled by Registrar)</i>

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

Course Content - 2025

LECTURE LIST

DATE	DAY	TOPIC
Jan. 6M		1. Introduction — diversity of genes and genomes
8W		2. Origins of genes and genomes I
10F		3. Origins of genes and genomes II
13M		4. Mobile introns and inteins
15W		5. Prokaryotic genomes I
17F		6. Prokaryotic genomes II
20M		7. Endosymbiotic theory and genomes (Dr. John Archibald)
22W		8. Symbiosis and genomes
24F		9. Organelles and their genomes I
27M		10. Organelles and their genomes II
29W		11. Organelles and their genomes III
31F		12. Viral genomes
Feb. 3M		13. Synthetic Biology
5W		14. Origin of the nuclear genomes I
7F		<i>Munro Day – No classes</i>
10M		MID-TERM EXAM
12W		15. Nuclear genomes Composition and structure I
14F		16. Computer Lab I
17-21		<i>Study break – no classes</i>
24M		17. Nuclear genomes Composition and structure II
26W		18. Nuclear genomes Composition and structure III
28F		20. Genome annotation and analysis I
Mar. 3M		21. Genome annotation and analysis II
5W		22. Computer Lab II
7F		23. The human genome
10M		24. Genome evolution I
12W		25. Genome evolution II
14F		26. Transcriptomics
17M		27. Metagenomics
19W		28. Guest Lecture (TBD)

21F	29. Guest Lecture (TBD)
24M	30. Proteomics
26W	31. Single-cell genomics
28F	32. Pathogenomics
31M	Special Presentations Day 1
Apr. 2W	Special Presentations Day 2
4F	Buffer Day (<i>snowcheck</i>)
7M	Review and Q&A

Faculty of Science Course Syllabus (Section B) (revised April-2022)

Genes and Genomes – BIOC4403/5403

University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of 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.

Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

Information: https://www.dal.ca/campus_life/academic-support/accessibility.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.

Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

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

Statement: <http://www.dal.ca/cultureofrespect.html>

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 (1321 Edward St) (elders@dal.ca).

Information: https://www.dal.ca/campus_life/communities/indigenous.html

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

<https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=117&chapterid=-1&topicgroupid=31821&loaduseredits=False>

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Faculty of Science Course Syllabus (Section C) (revised April-2022)

Student Resources and Support

Advising

General Advising https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: <https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html>

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

Library: <https://libraries.dal.ca/>

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

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

Fair Dealing Guidelines <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

Other supports and services

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness.html

Student Advocacy: <https://dsu.ca/dsas>

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Safety

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



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

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

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

Dalhousie COVID-19 information and updates: <https://www.dal.ca/covid-19-information-and-updates.html>