DALHOUSIE UNIVERSITY

Faculty of Medicine Course Syllabus (Section A)

Department of Pathology

PATH5040/MICI5040/BIOC5503

"Pathobiology of Cancer"

Winter/2025

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.

We acknowledge the histories, contributions, and legacies of the African Nova Scotian people and communities who have been here for over 400 years.

Instructor(s): *Dr. Graham Dellaire; dellaire@dal.ca - Virtual Office hours by appointment on TEAMS*

Lectures: Tuesday and Thursdays 2-4 pm

Laboratories: N/A

Tutorials: N/A

Course delivery: *In-person and/or Online (synchronous or asynchronous), Blended*

Lectures are not recorded unless provided as a video by the instructor

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Course Description : This course will outline the pathobiology of neoplasia. It will discuss both normal and abnormal mechanisms of cell growth and differentiation since cancer is ultimately a disease of these processes. The course was updated in 2012 to include animal tumour models, drug discovery, pediatric cancers, cancer initiating stem cell theory, viral carcinogenesis, inflammation and cancer, and a broader discussion of the role of DNA repair pathways in cancer development and treatment. The basic biology of carcinogenesis and behaviour of tumours will be highlighted as well as the clinical aspects of cancer management, including the use of biological markers and gene expression profiling to diagnose, stage and personalize cancer treatment. Objective: To provide graduate students and residents with an overview of the molecular events that give rise to cancer but with a strong emphasis on the clinical aspects of cancer diagnosis and treatment through expert lectures by both clinicians and cancer researchers. Format: This is a 12 week course. For weeks 1-11, class will meet twice a week for 1.5 hours, where the first hour is a lecture followed by a 20 min student seminar presentation (with 10 min for questions) for a total of 3h contact time per week. The course concludes with a 2 hour final exam in week 12. (21 lectures total).

Basis of Evaluation: Previously this course relied on a single 33 question multiple choice final exam. Evaluation of the revised course will be more balanced between one written term paper (20 pages double spaced, excluding references)(30%), two 20 min journal-club style presentations on a research article (30%), and a 2 hour final exam of 20 multiple choice/matching questions, 6 short-answer written questions (selected from 8 possible) and 2 short essay questions (selected from 4 topics)(40%).

Course Prerequisites

B.Sc. or equivalent degree

Course Exclusion

N/A

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Learning Objectives

To provide graduate students and residents with an overview of the molecular events that give rise to cancer but with a strong emphasis on the clinical aspects of cancer diagnosis and treatment through expert lectures by both clinicians and cancer researchers. Upon completion of the course, students will:

- Be able to critically assess the scientific literature and present a robust summary of a scientific paper
- Be able to write a critical review on a topic of their choosing related to cancer
- Understand the key concepts of cancer development, progression and treatment from molecular and genetic aspects to surgical, chemotherapy and radiological therapies.

Course Materials

- **Readings are taken from the following text books:**
  - **Cancer Genomics: From Bench to Personalized Medicine**. Ed. Dellaire, Berman, Arceci., 2014 Elsevier Inc, London
  - **DNA Repair and Mutagenesis** 2nd Ed. Ed. Frieberg et al., 2006 ASM Press, Washington
  - **The Biology of Cancer**, Ed. Weinberg, 2007 Garland Science, Taylor & Francis Group, LLC, New York.
- ***Course Brightspace page*: https://dal.brightspace.com/d2l/home/397698**
- **Individual guest lecturers will also provide readings for seminar presentations**

For online/blended course delivery:

- Min. Technology: laptop equipped with a web cam and microphone, MS EAMS software
- If there is an issue with TEAMS, slides of the lecture will be provided as a PDF
- Lectures will be delivered synchronously, and students are encouraged to attend, if they miss a lecture only a PDF of the slides will be provided
- A room has been booked (BA3 in the Tupper Basement), should the students prefer to attend in person, but lectures may be given on TEAMS at the choice of the individual lecturers.

Course Assessment

Assessment	Weight (% of final grade)	Date
Seminar Assignments[1]	min of two seminar assignments on scientific papers (30%)	TBA on BrightSpace
Term Paper/Review Article[2]	one term paper/scientific review (30%)	Nov . 6, 2025
Final exam[3] ***–*** *format:*	Multiple choice and short answer exam (40%)	Dec. 4, 2025

Notes

1. *Students seminar mark (30%) will take into account attendance and participation in all seminars and lectures. Students should be prepared to ask at minimum two questions for each seminar paper.Due dates will be assigned during the first week of class.*

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2. *The review should be written in the style of Nature Reviews in Cancer, and are 20 pages double spaced (1 inch margins all around, 12 point font) excluding references and must contain at least 1 figure. Only the first figure counts as part of the 20 pages.*
3. *The Final exam will be 90 min and will be written in-person in Rm BA3 on Dec. 4 from 2 pm until 3:30 pm.*

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 on Missed or Late Academic Requirements

Policies on missed or late academic requirements, including late or missed assignments or exams.

- ***Students should inform the instructor (G. Dellaire) if they will miss an assignment or lecture and provide the reasons as to why***. *At the discredtion of the instructor the student will be allowed to "make up" the seminar or to provide a late assignment at a future date.*

- ***Late assignments*** *(the 20 page review article) will incur a 20% penalty per day late if an adequate reason is not provided for the delay.*

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Course Policies related to Academic Integrity

Students are expected to adhere to academic standards with respect to plagiarism, and if suspected, plagiarism software (e.g., URKUND) will be used to evaluate written assignments.

Course Content

See attached Course Outline/Timetable.

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

Fall/Winter 2025-26

PATH5040/MICI5040/BIOC5503 "Pathobiology of Cancer"

Please ensure that the following information on University Policies is available to all students in your course. This document should be sent to students in your course along with your Course Syllabus, Section A, or may be copied into your **Course Syllabus (Section A).**

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

DALHOUSIE UNIVERSITY

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

Fall/Winter 2025-26

PATH5040/MICI5040/BIOC5503 "Pathobiology of Cancer"

Please ensure that the following information on Student Resources is available to all students in your course. This document should be made available to students on the course Brightspace page, or elements may be copied into your **Course Syllabus.**

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

Dalhousie University, PATH5040/MICI5040/BIOC5503, Pathobiology of Cancer Course Outline/Schedule 2025				
DATE	TIME	TOPIC	LECTURER	Room (or Online)
Thu Sept 4	2-4PM	**Lecture 1**: Introduction to Pathobiology of Cancer (Course over-view) assignment of papers for – Advances in Cancer Biology – student presentations	Graham Dellaire	Tupper, BA3
Tues Sept 9	2-4PM	**Lecture 2**: Cancer, Genome Instability, DNA Damage and Repair	Graham Dellaire	Tupper, BA3
Thu Sept 11	2-4PM	**Lecture 3** Molecular Mechanisms of Cancer, A: Cell Cycle Control and Checkpoints I	Jayme Salsman	Tupper, BA3
Tues Sept 16	2-4PM	**Lecture 4**: Neoplasia in the Pathology Laboratory (incl. microscopy session)	Offman/Bethune	**Room 728, Mackenzie Building, NSH**
Thu Sept 18	2-4PM	**Lecture 5**: Molecular Mechanisms of Cancer, A: Cell Cycle Control and Checkpoints II	Jayme Salsman	Tupper, BA3
Tues Sept 23	2-4PM	**Lecture 6:** Molecular Mechanisms of Cancer, E Viral Oncogenesis	Jayme Salsman	Tupper, BA3
Thu Sept 25	2-4PM	**Lecture 7**: Molecular Mechanisms of Cancer, C: Oncogenes and Tumour Suppressors I	Greg Fairn	Tupper, BA3
Tues Sept 30	2-4PM	No Class: Truth and Reconciliation Day		Note: Lecture 8 cancelled
Thu Oct 2	2-4PM	**Lecture 9**: Molecular Mechanisms of Cancer, B: Oncogenes and Tumour Suppressors II	Sandhya Chipurupalli Mathieu Deschênes	Tupper, BA3
Tues Oct 7	2-4PM	**Lecture 10** Molecular Mechanisms of Cancer, D: Angiogenesis and Autophagy	Stephen Lewis	Tupper, BA3
Thu Oct 9	2-4PM	**Lecture 11** Clinical Management of Neoplasia, A: Radiation Oncology	Mal Rajaraman	Tupper, BA3
Tues Oct 14	2-4PM	**Lecture 12**: Molecular Mechanisms of Cancer, D: Stem Cell Biology and Cancer II Hematopoietic Malignancies	Amy Trottier	Tupper, BA3
Thu Oct 16	2-4PM	**Lecture 13**: Clinical Management of Neoplasia, B: Surgery	Carman Giacomantonio	Tupper, BA3
Tues Oct 21	2-4PM	**Lecture 14**: Cancer Genomics and Biomarker Use and Discovery	Graham Dellaire	Tupper, BA3
Thu Oct 23	2-4PM	**Lecture 15**: Cancer Epigenetics	Graham Dellaire Paola Marcato	Tupper, BA3
Tues Oct 28	2-4PM	**Lecture 16:** Molecular Mechanisms of Cancer, B: Stem Cell Biology and Cancer I Solid Tumours	Paola Marcato	Tupper, BA3
Thu Oct 30	2-4PM	**Lecture 17**: Clinical Management of Neoplasia C: Chemotherapy	Alison Wallace	Tupper, BA3
Tues Nov 4		**No Class – CCRA Cancer Meeting**		
Thu Nov 6	2-4PM	**Lecture 18**: Immunopathology of Cancer B: Inflammation and Metastasis **Review Article Due**	David Waisman	Tupper, BA3
Nov 11-13		**Reading Break - No Classes**		
Tues Nov 18	2-4PM	**Lecture 19:** Medicinal Chemistry and Anti-Cancer Drug Discovery	Stephen Bearne	Tupper, BA3
Thu Nov 20	2-4PM	**Lecture 20**: Mechanisms of Radiation and Chemotherapy Resistance	Shane Harding (U of T)	MS TEAMS
Tues Nov 25	2-4PM	**Lecture 21**: Neoplasia in the Pathology Ethics	Christy Simpson	Tupper, BA3
Thu Dec 4	2-4PM	**Final Exam**		Tupper, BA3 – Timed 90 min
Course Evaluation: Paper 30%, Presentations 30%, Final Exam 40%				