

PHYS 5207 for Winter 2025

Radiobiology

Course Instructors:

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Class Location: HP 3349

Class Times: Tuesday, Thursday, 4:35-5:55pm

Prerequisites: PHYS 5203

Department/Unit: Physics

Topics Covered

Detailed list of topics to be covered

Week #	Lecture dates	Topics (lecturer)
1	Jan 7 th	Basic concepts, sources, epidemiology (RW)
	Jan 9 th	Physics and chemistry of radiation interactions (RW)
2	Jan 14 th	Cell biology, DNA replication, DNA damage (RW)
	Jan 16 th	DNA repair, cell cycle (RW)
3	Jan 21 st	Chromosome biology, damage and repair, cytogenetic assays (RW)
	Jan 23 rd	Biodosimetry, radiosensitivity syndromes cell survival curves (RW)
4	Jan 29 th	Classical radiobiology, survival curves, cell death (RW)
	Jan 31 st	Tour of laboratory at Radiation Protection Bureau (RW)
5	Feb 4 th	Repair at the cellular level (SLDR, PLDR, dose rate effects, fractionation) (RW)
	Feb 6 th	Factors affecting survival, non-targeted effects, predictive assays (RW)
6	Feb 11 th	RBE and LET, OER, reoxygenation. (GN)
	Feb 13 th	Therapeutic Ratio, QUANTEC (GN)
		Reading week
7	Feb 25 th	Normal tissue effects (early and chronic), carcinogenesis (RW)
	Feb 27 th	Total body irradiation, Acute radiation syndrome, heritable effects, embryo and fetal effects (RW)
8	March 4 th	Cataracts, cardiovascular effects, tumor biology (RW)
	March 6 th	

		Tumor growth, solid tumor assay systems, growth fraction, cell loss, growth kinetics, morphological changes, hypoxia, tumor sensitivity predictive assays (RW)
9	March 11 th March 13 th	Seminar week
10	March 18 th March 20 th	Time, dose and fractionation effects. (GN) Practical fractionation calculations (GN)
11	March 25 th March 27 th	Modifiers of radiation response part 1 – chemotherapy agents, radiosensitizers (GN) Modifiers of radiation response part 2 – hyperthermia, radioprotectors (GN)
12	April 1 st April 3 rd	Brachytherapy, alternate modalities (GN) Clinical trials, Radiation protection (GN)

Important dates and deadlines can be found here:

<https://carleton.ca/registrar/registration/dates/academic-dates/>, including class suspension for fall, winter breaks, and statutory holidays.

Assessments

Grade Breakdown

COMPONENT	GRADE VALUE	DATE
SEMINAR	20 %	March 11th
ASSIGNMENT 1	10 %	January 29th
ASSIGNMENT 2	10 %	February 25th
ASSIGNMENT 3	10 %	March 25th
FINAL EXAM	50 %	TBD

Learning Material(s) and Other Course/Lab-Related Resources

Learning Material	Options for Purchasing (e.g. Bookstore, Used, etc.)	Approximate Cost
Radiobiology Textbook	Radiobiology Textbook SpringerLink	Free online
Radiobiology for the Radiologist, Hall and Giaccia, 8th Edition.	Not required, second hand older versions are adequate	\$250

Students are not required to purchase textbooks or other learning materials for this course.

Academic Accommodations and Regulations

Statement on Chat GPT/Generative AI usage

As our understanding of the uses of AI and its relationship to student work and academic integrity continue to evolve, students are required to discuss their use of AI in any circumstance with the course instructor to ensure it supports the learning goals for the course.

Statement on Academic Integrity

Students are expected to uphold the values of academic integrity, which include fairness, honesty, trust, and responsibility. Examples of actions that compromise these values include but are not limited to plagiarism, accessing unauthorized sites for assignments or tests, unauthorized collaboration on assignments or exams, and using artificial intelligence tools such as ChatGPT when your assessment instructions say it is not permitted.

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in [Carleton University's Academic Integrity Policy](#). A list of standard sanctions in the Faculty of Science can be found [here](#).

Additional details about this process can be found on [the Faculty of Science Academic Integrity website](#).

Students are expected to familiarize themselves with and abide by [Carleton University's Academic Integrity Policy](#).

Student Rights & Responsibilities

Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the [7 Rights and](#)

Responsibilities Policy for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.