

PHYS 5207 for Fall 2026

Radiobiology

Physics Course Instructors:

Dr. Ruth Wilkins

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Class Location: See Brightspace Course Page

Class Times: Monday/Wednesday, 5:05-6:25pm

Prerequisites: PHYS 5203 or permission

Department/Unit: Physics

Dr. Gosia Niedbala

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Dr. Lindsay Beaton

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Lecture # and Date	Topics (Lecturer)
1. Wed. Sept 9	Basic concepts, sources of radiation, epidemiology, LNT (RW)
2. Mon. Sept 14	Split class: a. Physics for biologists (LB) b. Biology for physicists (RW)
3. Wed. Sept 16	Chemistry of radiation interactions (RW)
4. Mon. Sept 21	DNA damage, DNA repair (LB)
5. Wed. Sept 23	Chromosome biology, damage and repair, cytogenetic assays (LB)
6. Mon. Sept 28	Biodosimetry, radiosensitivity syndromes cell survival curves (RW)
7. Wed. Sept 30	Survival curves theory, mechanisms of cell death

8. Mon. Oct 5	Repair at the cellular level (SLDR, PLDR, dose rate effects, fractionation), factors affecting survival (LET, RBE, dose rate effects, Temp, OER, chemicals, cell cycle) (RW)
9. Wed. Oct 7	Non-targeted effects, predictive assays (RW)
Mon. Oct 12	No class (Thanksgiving)
10. Wed. Oct 14	Normal tissue effects (early and chronic), radiation carcinogenesis (RW)
11. Mon. Oct 19	Acute radiation syndrome, heritable effects, embryo and fetal effects (RW)
12. Wed. Oct 21	Non-cancer effects: cataracts, cardiovascular effects, tumor biology (RW)
Week of Oct 26	Reading week
13. Mon. Nov 2	Tumor growth, solid tumor assay systems, growth fraction, cell loss, growth kinetics, morphological changes, hypoxia, tumor sensitivity predictive assays (RW)
14. Wed. Nov 4	Seminars (All)
15. Mon. Nov 9	Seminars (All)
16. Wed. Nov 11	Tour of laboratory at Radiation Protection Bureau (for Ottawa students) (RW)
17. Mon. Nov 16	RBE and LET, OER, reoxygenation (GN)
18. Wed. Nov 18	Therapeutic Ratio, QUANTEC (GN)
19. Mon. Nov 23	Time, dose and fractionation effects (GN)
20. Wed. Nov 25	Practical fractionation calculations (GN)
21. Mon. Nov 30	Modifiers of radiation response part 1 – chemotherapy agents, radiosensitizers (GN)
22. Wed. Dec 2	Modifiers of radiation response part 2 – hyperthermia, radioprotectors (GN)

23. Mon. Dec 7	Brachytherapy, alternate modalities (GN)
24. Wed. Dec 9	Clinical trials, Radiation protection (GN)

Assessments

Grade Breakdown

COMPONENT	GRADE VALUE	DATE
SEMINAR	20 %	
ASSIGNMENT 1	10 %	
ASSIGNMENT 2	10 %	
ASSIGNMENT 3	10 %	
FINAL EXAM	50 %	TBD

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

Learning Material	Options for Purchasing (e.g. <i>Bookstore, Used, etc.</i>)	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.

Land Acknowledgement

We, the people of the Faculty of Science at Carleton University, acknowledge that our campus is located on the traditional, unceded territories of the Algonquin Anishinabeg people. Miigwetch for your hospitality and stewardship of this territory and the teachings that come from it. We are grateful for this land, the air that we breathe, and the water that sustains us all as well as for the animals, plants and other living beings: these enable us to research, teach, mentor, support, study, and learn. We recognize our responsibility to our natural environment and to reconciliation with Indigenous peoples.

Academic Accommodations

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the *Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances*, are outlined on the Academic Accommodations website (students.carleton.ca/course-outline).

Statement on Chat GPT/Generative AI usage

AI use in this course: Students may use AI tools for ideas, clarifying challenging concepts or getting started on projects. Some acceptable uses include:

- Sounding board (e.g. generating essay topics with ChatGPT, using Microsoft Word's Smart Lookup or Copilot to find inspiration and related topics)
- Creating outlines (e.g. using AI to structure an essay or presentation flow, using Microsoft Word's Outline View with AI suggestions)
- Providing definitions or explanations of complex concepts (e.g. using AI to explain a difficult theory or to find relevant information)

Documenting use of AI: It is necessary to document your use of AI in this course, using the following guidelines:

- Clearly identify and cite AI-generated text (e.g. "The following paragraph was generated by ChatGPT/Microsoft Word's Researcher tool/Copilot")
- Review, edit and ensure accuracy and originality of final submissions
- AI-generated content should not exceed 10 per cent of the total assignment length

Why have we adopted this policy? This policy supports the use of AI as a supplementary tool, helping students develop ideas and structure their work while emphasizing the importance of transparency and personal engagement with the content. AI can be used for inspiration and foundational support and can encourage students to critically assess and refine AI-generated material.

As our understanding of the uses of GenAI and its relationship to student work and academic integrity continue to evolve, students are required to discuss their use of GenAI in any circumstance not described here 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.