

General Course Information

MDPH 404 Radiation Biology and Radiation Protection

0.125 EFTS 15 Points
First Semester 17 Feb 2025 - 30 May 2025

Course Coordinator

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Lectures:

Tuesday	1pm – 2pm	Rehua 530
Thursday	9 am – 11am	Meremere 105 lecture theatre

Description

An introduction to the ICRP system of radiation protection, radiation safety, radiation measurement, radiation biology and carcinogenesis.

Assessment

Written report	15%
Presentation of report	10%
Mid-term test	15%
Final exam	60%

 **Note that a pass in the final exam is required to pass the course.**

Pre-requisites

Subject to approval of the director of the programme

Textbooks

- Radiobiology for the Radiologist (6th edition), E Hall, (2006).
- Radiation Oncology Physics: A handbook for teachers and students, E Podgorsak, (2005)

Learning Outcomes

On completing this course you should be able to

- Use appropriate units to quantify radiation exposure
- Describe the principles underlying risk reduction
- Discuss relevant regulations pertaining to radiation safety
- Suggest procedures to minimise risk of radiation exposure
- Perform basic procedures that involve use of radiation
- Describe approaches for monitoring staff and work areas
- Understand cell survival curves
- Understand the effects of different types of radiation and biological materials
- Understand dose response curves
- Understand the use of radiation for treatment of cancer
- Understand mathematical modelling in radiobiology

Summary of Course Content

The general topics covered by this course are:

- The development of radiation protection
- Radiation protection organisations
- ICRP system of radiological protection
- Effects of ionising radiation
- Quantities and units of radiation protection
- Basic principles for dose reduction technical aspects
- Basic principles for dose reduction – external and internal hazards
- Safety of the radioactive patient
- Effects of total body irradiation
- Natural and man-made radiation
- Organisation of radiation protection
- Transport, storage and disposal of radioactive material
- Basic radiation biology
- Structural shielding
- Radiation detection and measurement
- Radiation biology – survival curves
- Radiation biology – Fractionation, accelerated RT, Oxygen effect
- Radiation biology – Normal tissue tolerance
- Radiation biology – Heritable and foetal effects

Learn

All important course information can be accessed through the UC *Learn* system available at <http://learn.canterbury.ac.nz/>. You need to login with your UC login and password and then select the course code on the left hand side. Make sure you check the *Learn* page regularly for relevant information and course updates. Note that all course related emails will be sent to your UC email address. No other email addresses will be accepted. It is your responsibility to check your UC email regularly.

Lecture timetable

A detailed timetable can be found on *Learn*.

General Physics and Astronomy Information

Please consult the document General Information for Physics and Astronomy Students on the Physics and Astronomy Web Page: [Department of Science \(canterbury.ac.nz\)](http://www.canterbury.ac.nz/department-of-science/)
Or <https://apps.canterbury.ac.nz/1/science/phys-chem/PHYS%20-%20Course%20Outlines/General.PDF>

UC Position of the use of AI for assessments

The following shall apply for **all assessments in this course**, except where a lecturer has specifically stated otherwise **in written instructions for an assessment**.

Use Prohibited for Specified Reasons: Generative AI tools must not be used within this assessment due to specific considerations, which will be clearly communicated to students.

Generative AI Tools Cannot Be Used for This Assessment

In this assessment, you are strictly prohibited from using generative artificial intelligence (AI) to generate any materials or content related to the assessment. This is because *students are expected to solve problems and demonstrate knowledge and understanding without the assistance of AI*. The use of AI-generated content is not permitted and may be considered a breach of academic integrity. Please ensure that all work submitted is the result of your own human knowledge, skills, and efforts.