Department of Physics and Astronomy

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Course Outline

MDPH405
Radiation Therapy

15 points

Second Semester 13 Jul 2026 – 07 Nov 2026

Course Coordinator

Bryn Currie
Location: JVH732
Office hours: Fri 13:00-14:30
Phone: 03 369 0788 ext. 90788
Mobile: 027 365 6809
Email: bryn.currie@canterbury.ac.nz

Lectures

Monday	12:00-13:00	John Britten 117
Thursday	13:00-14:00	Meremere 526
Friday	10:00-11:00	Rehua 429

A detailed timetable will be available on *Learn*.

Description

The purpose of this paper is to provide students with a general basic understanding of the practice and principles of radiotherapy physics, suitable as a background for entry into a training program in medical physics, in particular radiation oncology medical physics.

Assessment

15%	Report
10%	Presentation
15%	Mid-term test
60%	Final exam

NB: a pass in the final exam is required to pass the course.

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.

Pre-requisites

Subject to the approval of the director of the programme.

Textbooks

Required Textbooks:

- S. Dieterich et al., *Practical Radiation Oncology Physics*, Elsevier, 2016
- J. Van Dyk (Ed.), *The Modern Technology of Radiation Oncology: A Compendium for Medical Physicists and Radiation Oncologists*, Medical Physics Publishing, 1999

Recommended Reading:

- F. M. Khan, and J. P. Gibbons, *Khan's the Physics of Radiation Therapy*, Wolters Kluwer, 2014.
  ProQuest Ebook Central:
  https://ebookcentral.proquest.com/lib/canterbury/detail.action?docID=2031615
- E. B. Podgorsak (Ed.), *Radiation Oncology Physics: A Handbook for Teachers and Students*, IAEA, 2005

Additional Reading:

- J. Van Dyk (Ed.), *The Modern Technology of Radiation Oncology, Volume 2: A Compendium for Medical Physicists and Radiation Oncologists*, Medical Physics Publishing, 2005
- J. Van Dyk (Ed.), *The Modern Technology of Radiation Oncology, Volume 3: A Compendium for Medical Physicists and Radiation Oncologists*, Medical Physics Publishing, 2013

- J. Van Dyk (Ed.), *The Modern Technology of Radiation Oncology, Volume 4: A Compendium for Medical Physicists and Radiation Oncologists*, Medical Physics Publishing, 2020
- D. Greene and P. C. Williams, *Linear Accelerators for Radiation Therapy*, 2nd ed., Taylor and Francis Group, 1997
- C.J. Karzmark, R.J. Morton (eds. James Lamb et al.), *A Primer on Theory and Operation of Linear Accelerators in Radiation Therapy*, 3rd ed., Medical Physics Publishing, 2018
- *Principles and Practice of Radiation Oncology*, edited by Carlos A. Perez, et al., Lippincott Williams & Wilkins, 2003
  ProQuest Ebook Central:
  https://ebookcentral.proquest.com/lib/canterbury/detail.action?docID=3418720
- A Barrett et al., *Practical Radiotherapy Planning*, 4th ed., Hodder Arnold, 2009
- Khan, Faiz M., and Bruce J. Gerbi, *Treatment Planning in Radiation Oncology*, Wolters Kluwer Health, 2011.
  ProQuest Ebook Central:
  https://ebookcentral.proquest.com/lib/canterbury/detail.action?docID=2031860
- A Gerbaulet (Ed.) et al., *The GEC ESTRO Handbook of Brachytherapy*, ESTRO, 2002
- G Knoll, *Radiation Detection and Measurement*, 4th ed., John Wiley & Sons Ltd, 2010

Learning Outcomes

On completion of this course, students should be able to:

- Describe the basic principles underlying radiotherapy methods
- Understand the principles of radiotherapy equipment
- Understand the characteristics of clinical beams and their measurements
- Describe and understand basic quality control procedures for equipment in radiotherapy
- Understand dosimetry measurements used in radiotherapy
- Understand basic treatment planning in radiotherapy
- Discuss a range of clinical applications

Summary of Course Content

The general topics coved by this course are:

- Introduction to clinical radiation therapy
- History and development of radiation therapy
- Treatment machines – physical and clinical aspects
- Treatment machines – technical aspects

- Commissioning of radiotherapy equipment
- Phantoms used in radiotherapy
- Quality assurance
- Clinical dosimetry – photons and electrons
- Dosimetry protocols
- Instrumentation for dosimetry
- Primary standards and traceability for dosimetry
- Introduction to brachytherapy
- Treatment techniques in radiation therapy
- Treatment simulation
- Patient positioning
- Treatment planning

Course information will be accessible 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 from the **Dashboard** or **My courses** sections. 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.

General Course Information

Please consult the document General Course Information that contains information applicable to all courses administered by the School of Physical and Chemical Sciences relating to Physics and Astronomy.