MDPH 406
Medical Imaging

0.125 EFTS  
Second Semester  15 Jul 2019 - 18 Nov 2019

Course Coordinator
Dr Konstantin Pavlov

Lecturers:
Dr Konstantin Pavlov (konstantin.pavlov@canterbury.ac.nz) (R. 716 West)
Dr Darin O’Keeffe (darin.okeeffe@canterbury.ac.nz)
Office appointments by arrangement

Lectures:
Check the timetable for any room/time changes.
Monday   1:00 pm - 3:00 pm  (Erskine 121)
Tuesday  2:00 pm - 4:00 pm  (West 701)

Note this special arrangement:
on Monday 16th September  1:00 pm - 4:00 pm  (Erskine 121)
on Thursday 19th September 2:00 pm - 5:00 pm  (West 701)

Description
An introduction to radiographic practice and terminology, image perception, x-ray, fluoroscopy,  
CT, MRI, ultrasound, digital radiographic image measurement, patient dosimetry, occupational 
radiation dose factors, quality assurance.

Assessment
Assignment 1    10%
Mid-course test    15%
Assignment 2    10%
Assignment 3    10%
Final exam  55%

Note that a 50% pass in the final exam is required to pass the course, unless there are 
exceptional circumstances.

Pre-requisites
Subject to approval of the director of the programme

Recommended Textbooks

The IAEA book is a recent addition to the list of reading texts. It contains a lot of useful material supporting the education of diagnostic imaging medical physicists.


MRI from Picture to Proton, D.W. McRobbie. Cambridge University Press, 3rd edition, 2017. (available electronically via the Library website and via a link from the MDPH 406 Learn page)
Other useful reading is listed below.

**Goal of the Course**
This course will provide a background to the physical principles and practical aspects of medical imaging. The main imaging modalities considered are x-ray (including radiography, mammography, fluoroscopy, digital subtraction angiography and computed tomography), ultrasound, and magnetic resonance imaging.

**Summary of Course Content**
The general topics covered by this course are:
- Image science and image perception – an introduction
- PACS and an introduction to the DICOM standard
- Introduction to image processing
- Radiography – screen-film and digital radiography
- Fluoroscopy
- Digital subtraction angiography
- Mammography
- Computed tomography
- Magnetic resonance imaging
- Ultrasound imaging

**Learning Outcomes**
On completing this course you should be able to
- Describe basic principles underlying imaging methods
- Discuss principles of operation of medical imaging equipment
- Recognise safety aspects of imaging with ionising and non-ionising radiation
- Understand basic quality control of medical imaging equipment
- Recognise potential sources of artefacts or inaccuracy
- Discuss a range of clinical applications of imaging modalities
- Discuss radiation doses associated with medical imaging methods
- Discuss image processing used in medical imaging
- Discuss perception in relation to image display methods

**Other Useful and Reference Texts**
- Magnetic resonance imaging: physical principles and sequence design. 2nd edition, Robert W. Brown, et al., 2014. (available electronically via the Library website)
- Modern diagnostic X-ray sources: technology, manufacturing, reliability. R. Behling. 2016. (available electronically via the Library website)

Hendee’s book provides alternative explanations to the main reference texts and some interesting anecdotes, but is generally more qualitative. The MRI section of Bushberg is somewhat lacking for medical physics education (this is not the target audience), mainly because it avoids any mathematical formalism relating to Fourier transforms. McRobbie’s book on MRI is aimed at a more suitable level, with many practical examples with only the minimum required mathematics. However, if you want some more in-depth theory on MRI imaging, you can’t go past the book by Brown et al. The book by Behling is very recent and contains some useful material if you want to learn more about x-ray tubes. For this course, it is the go-to book for x-ray sources.

**Learn**
All important course information can be accessed through the UC Learn system available at [http://learn.canterbury.ac.nz/](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. It is your responsibility to check your UC email regularly or forward it to your usual email address.
General Physics and Astronomy Information
Please consult the document General Information for Physics and Astronomy Students on the Physics and Astronomy Web Page:

Late work
Late work will be accepted. However, to be fair on the efforts of other students, unless the course coordinator considers the reason for the late submission valid the work will be penalised through the deduction of marks, usually at 20% per day or part thereof.