



# HLTH3140

## Radiographic Physics, Practice and Protection

Session 1, Weekday attendance, North Ryde 2020

*Department of Chiropractic*

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## General Information

Unit convenor and teaching staff

Convenor

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Lecturer

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Credit points

10

Prerequisites

130cp at 1000 level or above including 40cp at 2000 level

Corequisites

Co-badged status

Unit description

This unit is conducted to develop students' knowledge in the underlying physical principles of medical radiation science. The unit is presented in three distinct modules: - Module 1 is the study of Radiation Physics, its principles and current technology of imaging equipment. - Module 2 is the study of the principles and practice of image production and image processing techniques. - Module 3 describes the biological effects of radiation as well as current radiation protection techniques.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

- ULO1:** Identify the properties of x-rays and explain how they interact with matter, and influence image quality and patient safety
- ULO2:** Summarise the working principles of x-ray tubes and how these influence their operation and performance
- ULO3:** Contrast the generation and use of advanced imaging modalities
- ULO4:** Critically appraise the principles of radiographic image production and processing
- ULO5:** Explain the biological effects of radiation
- ULO6:** Summarise radiation protection in relation to radiography

## Assessment Tasks

### Coronavirus (COVID-19) Update

Assessment details are no longer provided here as a result of changes due to the Coronavirus (COVID-19) pandemic.

Students should consult [iLearn](#) for revised unit information.

[Find out more about the Coronavirus \(COVID-19\) and potential impacts on staff and students](#)

## General Assessment Information

### LABORATORIES

You will be scheduled to attend three laboratory sessions throughout the semester. Missed sessions must be made up prior to week 13. A timetable will be released early in the semester to inform you which laboratory sessions you should attend. Please email the lab manager, Adam Joyce [adam.joyce@mq.edu.au](mailto:adam.joyce@mq.edu.au) if you have concerns regarding your laboratory session time or to arrange making-up missed sessions.

### IN-CLASS EXAMS

If an in-class exam is missed a supplementary exam will only be considered under the Special Consideration policy (<https://students.mq.edu.au/study/my-study-program/special-consideration>), applied for through [www.ask.mq.edu.au](http://www.ask.mq.edu.au) within 5 days of the assessment.

If you attend and complete an examination you are declaring that you are fit to sit that assessment and Special Consideration will not normally be granted.

## **THEORY EXAMINATIONS**

The University Examination period for Semester 1, 2020 is from June 9th to June 26th 2020.

You are expected to present yourself for examination at the time and place designated in the University Examination Timetable. The timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in Final form approximately four weeks before the commencement of the examinations.

You are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. You are expected to ensure that you are available until the end of the teaching semester that is the final day of the official examination period.

The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for Special Consideration. Information about unavoidable disruption and the Special Consideration process is available at <https://students.mq.edu.au/study/my-study-program/special-consideration>, applied for through [www.ask.mq.edu.au](http://www.ask.mq.edu.au) within 5 days of the disruption.

If you receive [special consideration](#) for the final exam, a supplementary exam will be scheduled in the interval between July 13th to July 24th, 2020. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the [policy](#) prior to submitting an application. You can check the supplementary exam information page on FSE101 in iLearn ([bit.ly/FSESupp](http://bit.ly/FSESupp)) for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination. If you are approved for Special Consideration and granted a supplementary exam, only your supplementary exam result will be counted towards your final grade.

If you attend and complete an examination you are declaring that you are fit to sit that assessment and Special Consideration will not normally be granted.

Students with a pre-existing disability/health condition or prolonged adverse circumstances may be eligible for ongoing assistance and support. Such support is governed by other policies and may be sought and coordinated through [Student Wellbeing and Support Services](#).

## **Delivery and Resources**

### **Coronavirus (COVID-19) Update**

Any references to on-campus delivery below may no longer be relevant due to COVID-19.

Please check here for updated delivery information: [https://ask.mq.edu.au/account/public/display/unit\\_status](https://ask.mq.edu.au/account/public/display/unit_status)

## **LECTURES**

2-hour lectures each week on Tuesday 2-4pm in 23 Wallys Walk - T2 Theatre. These lectures are also available on iLearn.

## **LABORATORY SESSIONS**

3 x 3-hour practical laboratory's per student as scheduled, starting week 3. You will be divided into separate groups and will attend the appropriate weeks as indicated on the laboratory schedule, available on the unit iLearn page.

## **TUTORIAL SESSIONS**

5 x 1-hour tutorial sessions per student as scheduled. You will be divided into separate groups and attend alternate weeks starting week 2 (week 1 for those scheduled on Friday).

## **iLEARN PAGE**

The web page for this unit can be found at: <https://ilearn.mq.edu.au> and following the links for either Postgraduate or Undergraduate students. There is a combined iLearn page for HLTH3140 and CHIR6410 students.

## **REQUIRED TEXTS/MANUALS**

Radiological Science For Technologists - Physics, Biology and Protection. - Stewart C Bushong 10th Edition, Elsevier, 2013.

HLTH3140/CHIR6410 Laboratory Notebook 2020.

## **REFERENCES**

Essentials of Radiologic Science. - Robert A. Fosbinder & Denise Orth; Philadelphia : Wolters Kluwer Health/Lippincott Williams & Wilkins. 2010

Principles of Radiological Physics. - Robin Wilks, (2nd Edition), Churchill Livingstone Edinburgh. 1987

Introduction to Radiologic Technology. - LaVerne Tolley Gurley & William J. Callaway (7th Edition); Mosby St Louis 2011

# **Unit Schedule**

### **Coronavirus (COVID-19) Update**

The unit schedule/topics and any references to on-campus delivery below may no longer be relevant due to COVID-19. Please consult [iLearn](#) for latest details, and check here for updated delivery information: [https://ask.mq.edu.au/account/pub/display/unit\\_status](https://ask.mq.edu.au/account/pub/display/unit_status)

### **WEEK 1 Rich Mildren and Simon French**

Introduction to Unit; Electricity and magnetism/Explanation of syllabus.

### **WEEK 2 Rich Mildren**

Electric currents. Electromagnetic radiation. X-ray circuits. X-ray tubes.

### **WEEK 3 Rich Mildren**

What are X-rays and how are they produced. X-ray interactions.

#### **WEEK 4 Hazel Jenkins**

Historical background and the current use of radiography. Image formation. Optical Density and Contrast as related to exposure parameters: milliamperes (mA), time (s), milliampere seconds (mAs), Kilovoltage (kVp), distance (SID or FFD).

#### **WEEK 5 Hazel Jenkins**

Scatter radiation. Grids. Image sharpness. Assessing the image.

#### **WEEK 6 - Craig Moore**

Radiographic film. Film processing. Sensitometry & densitometry. Characteristic curve. Intensifying screens – Construction; Spectral matching; Screen speed; Quantum mottle Film/screen cassettes;

#### **WEEK 7 - Craig Moore**

Direct Radiography, Computed Radiography, Radiological Information Systems (RIS) and Picture Archival and Communication Systems (PACS). Digital Image manipulation – Window and Level (Density and Contrast). Exposure Indices.

#### **WEEK 8 - Craig Moore**

Variable kVp techniques. Automatic Exposure Control (AEC). Image artifacts.

#### **WEEK 9 - Craig Moore**

Biological effects of radiation. The Law of Bergonne & Tribondeau. Linear energy transfer. Types of cell damage.

#### **WEEK 10 - Craig Moore**

Direct & indirect effects. High-dose radiation effects. Radiation & pregnancy. Genetic effects.

#### **WEEK 11 - Craig Moore**

Radiation protection. Reduction of radiation dose to the patient. Reduction of radiation exposure to the staff. Effective dose. Regulations. Radiation detectors. Natural background radiation.

#### **WEEK 12 - Craig Moore**

Special radiographic equipment (Fluoroscopy, CT, MRI).

#### **WEEK 13 No lecture for HLTH3140 (CHIR6410 lecture will occur)**

## **Policies and Procedures**

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)

- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)

- [Ask a Librarian](#)

## Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

## Changes since First Published

Date	Description
21/02/2020	Staff added and schedule updated