



# **MEDI13001 *Science and Instrumentation 3***

## **Term 1 - 2020**

Profile information current as at 20/04/2024 02:37 pm

All details in this unit profile for MEDI13001 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

### Corrections

#### **Unit Profile Correction added on 06-04-20**

The end of term examination has now been changed to an alternate form of assessment. Please see your Moodle site for details of the assessment.

## General Information

### Overview

This unit will expand on your prior study of x-ray equipment and imaging processes of specialised imaging technologies. The primary focus of the unit is on the technical fundamentals (both theoretical and practical) of Computed Tomography to enable safe and effective scan technique. You will examine in detail the equipment operation of computed tomography and its processes of data acquisition, processing, reconstruction and display. You will explore dose and image optimisation strategies and quality assurance testing. You will be introduced to the physical and operational principles of advanced medical imaging modalities including angiography, magnetic resonance imaging, ultrasound imaging and nuclear medicine imaging.

### Details

Career Level: *Undergraduate*

Unit Level: *Level 3*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

### Pre-requisites or Co-requisites

Pre-requisites MEDI12001 Radiation Science; and MEDI12002 Science & Instrumentation 1, and MEDI12005 Science and Instrumentation 2, and MEDI12007 Quality Processes for Dose and Image Optimisation

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

### Offerings For Term 1 - 2020

- Mackay

### Attendance Requirements

All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

### Website

[This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.](#)

## Class and Assessment Overview

### Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

### Class Timetable

#### [Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

#### [Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

### Assessment Overview

#### 1. **Practical and Written Assessment**

Weighting: 50%

#### 2. **Examination**

Weighting: 50%

### Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the [University's Grades and Results Policy](#) for more details of interim results and final grades.

## CQUniversity Policies

**All University policies are available on the [CQUniversity Policy site](#).**

You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the [CQUniversity Policy site](#).

## Previous Student Feedback

### Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

#### Feedback from unit evaluation, student emails and comments in class

**Feedback**

Students appreciated the method of delivery (recorded lectures) and the 5-minute Moodle videos used to explain complex concepts in other ways

**Recommendation**

Maintain method of delivery and encourage students to ask questions so that relevant 5-minute Moodle videos can be developed.

#### Feedback from Coordinator reflection, discussions with teaching team, unit evaluation

**Feedback**

Several of the labs directly helped with understanding of the content, but other labs sessions were not as relevant.

**Recommendation**

Review the lab activities to ensure relevance. Consider the number of labs needed in this unit.

#### Feedback from unit evaluation, student emails and in-class comments

**Feedback**

Students appreciated quick responses to questions and the coordinator's willingness to help wherever possible.

**Recommendation**

Maintain fast turnaround for questions and concerns. Continue to encourage students to ask for help when needed.

## Unit Learning Outcomes

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

1. Discuss the processes of data acquisition and processing, image reconstruction, reformatting and display and of quality assurance testing in computed tomography
2. Operate computed tomography equipment safely and effectively, with consideration to patient dose, image quality and equipment conservation
3. Manipulate three dimensional (3D) data sets in computed tomography
4. Discuss the design, operational features and clinical safety considerations of computed tomography equipment and of specialised imaging modalities such as angiography, ultrasonography and nuclear medicine imaging.

The learning outcomes are mapped to the following domains of the MRPBA's 'Professional capabilities for medical radiation practice':

- Domain 1A 3
- Domain 4.1
- Domain 5.1, 5.3

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



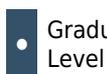
N/A  
Level



Introductory  
Level



Intermediate  
Level



Graduate  
Level



Professional  
Level



Advanced  
Level

### Alignment of Assessment Tasks to Learning Outcomes

| Assessment Tasks                           | Learning Outcomes |   |   |   |
|--|-------------------|---|---|---|
|  | 1                 | 2 | 3 | 4 |
| 1 - Practical and Written Assessment - 50% | •                 | • | • |   |
| 2 - Examination - 50%                      | •                 |   |   | • |

### Alignment of Graduate Attributes to Learning Outcomes

| Graduate Attributes                                 | Learning Outcomes |   |   |   |
|---|-------------------|---|---|---|
|   | 1                 | 2 | 3 | 4 |
| 1 - Communication                                   | •                 | • |   | • |
| 2 - Problem Solving                                 |                   | • | • | • |
| 3 - Critical Thinking                               |                   |   |   |   |
| 4 - Information Literacy                            |                   |   |   |   |
| 5 - Team Work                                       |                   |   |   |   |
| 6 - Information Technology Competence               | •                 | • | • |   |
| 7 - Cross Cultural Competence                       |                   |   |   |   |
| 8 - Ethical practice                                |                   | • |   |   |
| 9 - Social Innovation                               |                   |   |   |   |
| 10 - Aboriginal and Torres Strait Islander Cultures |                   |   |   |   |

### Alignment of Assessment Tasks to Graduate Attributes

| Assessment Tasks                           | Graduate Attributes |   |   |   |   |   |   |   |   |    |
|--|---------------------|---|---|---|---|---|---|---|---|----|
|  | 1                   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 - Practical and Written Assessment - 50% | •                   | • |   |   |   | • |   | • |   |    |
| 2 - Examination - 50%                      | •                   | • |   |   |   | • |   |   |   |    |

## Textbooks and Resources

### Textbooks

MEDI13001

#### Prescribed

#### Computed Tomography for Technologists

2nd Edition (2018)

Authors: Romans, Lois E.

Lippincott Williams & Wilkins

Sydney , NSW , Australia

ISBN: 9781496375858

Binding: Paperback

#### Additional Textbook Information

The Romans textbook will be used for both MEDI13001 Science & Instrumentation 3 and MEDI13002 Imaging Procedures 3. The Romans book is also available as a Vital Source e-book with no expiry and may be purchased directly from the publisher's [Vital Source website](#).

However, if preferred, copies are available for purchase at the CQUni Bookshop here: <http://bookshop.cqu.edu.au> (search on the Unit code).

### IT Resources

#### You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)

## Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)

For further information, see the Assessment Tasks.

## Teaching Contacts

**Natalie Sciascia** Unit Coordinator

[n.sciascia@cqu.edu.au](mailto:n.sciascia@cqu.edu.au)

## Schedule

### Week 1 - 09 Mar 2020

| Module/Topic                          | Chapter  | Events and Submissions/Topic |
|---------------------------------------|--|------------------------------|
| Introduction to CT and CT Terminology | Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L<br>Recommended readings available on the unit Moodle site |                              |

### Week 2 - 16 Mar 2020

| Module/Topic              | Chapter   | Events and Submissions/Topic |
|---------------------------|---|------------------------------|
| Components of a CT System | Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L<br>chapter 2<br>Recommended readings available on the unit Moodle site |                              |

**Week 3 - 23 Mar 2020**

| Module/Topic           | Chapter  | Events and Submissions/Topic |
|------------------------|--|------------------------------|
| Data Acquisition in CT | Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L chapter 5<br>Recommended readings available on the unit Moodle site |                              |

**Week 4 - 30 Mar 2020**

| Module/Topic       | Chapter  | Events and Submissions/Topic |
|--------------------|--|------------------------------|
| Data Display in CT | Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L chapter 4<br>Recommended readings available on the unit Moodle site |                              |

**Week 5 - 06 Apr 2020**

| Module/Topic          | Chapter  | Events and Submissions/Topic |
|-----------------------|--|------------------------------|
| Data Management in CT | Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L chapters 3, 8 & 9<br>Recommended readings available on the unit Moodle site |                              |

**Vacation Week - 13 Apr 2020**

| Module/Topic | Chapter | Events and Submissions/Topic |
|--------------|---------|------------------------------|
| Break        |         |                              |

**Week 6 - 20 Apr 2020**

| Module/Topic                         | Chapter  | Events and Submissions/Topic |
|--------------------------------------|--|------------------------------|
| Image Quality and Patient Dose in CT | Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L chapter 6<br>Recommended readings available on the unit Moodle site |                              |

**Week 7 - 27 Apr 2020**

| Module/Topic         | Chapter   | Events and Submissions/Topic |
|----------------------|---|------------------------------|
| CT Quality Assurance | Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L chapter 7(Quality Assurance methods)<br>Recommended readings available on the unit Moodle site |                              |

**Week 8 - 04 May 2020**

| Module/Topic | Chapter  | Events and Submissions/Topic |
|--------------|--|------------------------------|
| CT Artefacts | Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L chapter 7 (Image Artifacts)<br>Recommended readings available on the unit Moodle site |                              |

**Week 9 - 11 May 2020**

| Module/Topic   | Chapter  | Events and Submissions/Topic   |
|--|--|--|
| Imaging equipment for specialised applications: DSA, MRI | Recommended readings available on the unit Moodle site | <b>Practical Portfolio</b> Due: Week 9 Friday (15 May 2020) 4:00 pm AEST |

## Week 10 - 18 May 2020

| Module/Topic  | Chapter  | Events and Submissions/Topic |
|---|--|------------------------------|
| Imaging equipment for specialised applications: Ultrasound and Nuclear Medicine | Recommended readings available on the unit Moodle site |                              |

## Week 11 - 25 May 2020

| Module/Topic  | Chapter | Events and Submissions/Topic |
|---------------|---------|------------------------------|
| Consolidation |         |                              |

## Review/Exam Week - 08 Jun 2020

| Module/Topic | Chapter | Events and Submissions/Topic |
|--------------|---------|------------------------------|
|--------------|---------|------------------------------|

## Exam Week - 15 Jun 2020

| Module/Topic | Chapter | Events and Submissions/Topic |
|--------------|---------|------------------------------|
|--------------|---------|------------------------------|

## Term Specific Information

This unit is at Mackay Ooralea campus running from Weeks 1 to 14. The formal exam for this unit will be held within the exam timetable period.

All lectures for this unit are pre-recorded and must be viewed before attending any scheduled class or lab activity. The on-line quizzes are formative, designed to help you assess your understanding of the weekly content. Quizzes should be completed before attending any scheduled class or lab activity.

Note that 150 hours of student engagement is required for this unit. You should plan to complete pre-reading (1 hr/wk), view all lectures (2 hrs/wk), supervised labs (1 hr/wk) and tutorials (1 hr/wk), as this will be integral to the development of knowledge required for the assessments of the unit. Further time will be required to undertake unsupervised lab activities for completion of the portfolio assessment. Revision, completion of the portfolio and preparation for the in-class test and exam must be factored into your time management plan. In total, you should expect to spend approximately 12.5 hours per week studying for this unit.

The unit coordinator for this unit is: **Natalie Sciascia**

Preferred contact is by email at [n.sciascia@cqu.edu.au](mailto:n.sciascia@cqu.edu.au). Alternatively, I can be contacted by phone on (07) 4940 7482 or Ext. 57482.

## Assessment Tasks

### 1 Practical Portfolio

#### Assessment Type

Practical and Written Assessment

#### Task Description

This assessment task is based on the scheduled computed tomography (CT) laboratory activities and independent study. During the weekly lab activities you will use imaging phantoms and test tools to acquire a variety of CT images and to understand critical concepts. You must use this learning and CT images to compile a portfolio and submit it electronically on the unit Moodle site. To complete the portfolio, you must respond to a set of questions regarding key concepts in CT imaging. These task questions will be made available on the unit Moodle site.

- Your portfolio must be no more than 3500 words, excluding references. Stick to the question asked and avoid irrelevant content in your responses. A response that is complete, correct, clearly stated and contains only relevant content will achieve full marks.
- When explaining each key concept, define the core technical terms and support your discussions with relevant CT images acquired during the CT lab activities. In addition to the use of the CT images that you have produced, you may also use diagrams to illustrate the concept.
- Ensure that the diagrams and images are properly labelled and linked to the content. All externally sourced images and/or diagrams must be acknowledged using the Harvard system. Avoid images and diagrams with very large file sizes as they will cause submission issues when you are uploading your portfolio on the unit Moodle

site.

- If the task questions ask for the clinical significance of a key concept to the control of image appearances, patient dose and equipment conservation, make sure you include that in your discussions. You must support your discussions with literature from the field, including your text book. Please note that any information that you draw from another source (whether you paraphrase or quote verbatim) must be cited using the Harvard system.
- The final page(s) must be a list of references used in your portfolio. This reference list must follow the Harvard style.
- Your submission must be a word-processed document. Acceptable file types are Word document (either .doc or .docx format) or a PDF file that is a conversion of a word processed document (NOT an image of a scanned document). Any images/photographs/diagrams may be contained within the document or provided collectively as a separate PDF file. Each image must be clearly titled to communicate which part of the portfolio content it illustrates. All submissions must be processed through TURNITIN.
- Ensure that your document includes a header with your name and student number and a footer with the unit code and term/year.
- Note that although you will work with classmates to acquire CT images used in your portfolio, the written component is an individual task and must be your own work.

### **Assessment Due Date**

Week 9 Friday (15 May 2020) 4:00 pm AEST

### **Return Date to Students**

Written feedback provided within 2 weeks of the due date

### **Weighting**

50%

### **Minimum mark or grade**

50%

### **Assessment Criteria**

The portfolio will be assessed on the following criteria:

- familiarity with content including clarity and correctness of concept explanations
- quality, appropriate labeling and relevance of images and diagrams selected to illustrate the concept
- correct use, spelling and definition of technical terms
- extent and correctness of clinical considerations of the concept
- appropriate use and citing of references (Harvard Style)
- quality, completeness and relevance of information offered, including adherence to word limit

A detailed marking rubric will be posted on the unit Moodle site to specify the requirements for each criterion listed above.

### **Referencing Style**

- [Harvard \(author-date\)](#)

### **Submission**

Online

### **Learning Outcomes Assessed**

- Discuss the processes of data acquisition and processing, image reconstruction, reformatting and display and of quality assurance testing in computed tomography
- Operate computed tomography equipment safely and effectively, with consideration to patient dose, image quality and equipment conservation
- Manipulate three dimensional (3D) data sets in computed tomography

### **Graduate Attributes**

- Communication
- Problem Solving
- Information Technology Competence
- Ethical practice

## **Examination**

**Outline**

Complete an invigilated examination.

**Date**

During the examination period at a CQUniversity examination centre.

**Weighting**

50%

**Length**

180 minutes

**Minimum mark or grade**

50

**Exam Conditions**

Closed Book.

**Materials**

Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).  
Calculator - all non-communicable calculators, including scientific, programmable and graphics calculators are authorised

## Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the [Student Academic Integrity Policy and Procedure](#). This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

**What is a breach of academic integrity?**

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

**Why is academic integrity important?**

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

**Where can I get assistance?**

For academic advice and guidance, the [Academic Learning Centre \(ALC\)](#) can support you in becoming confident in completing assessments with integrity and of high standard.

**What can you do to act with integrity?**



**Be Honest**

If your assessment task is done by someone else, it would be dishonest of you to claim it as your own



**Seek Help**

If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)



**Produce Original Work**

Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem