MEDI13001 *Science and Instrumentation 3*
Term 1 - 2022

Profile information current as at 14/12/2025 04:10 pm

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 - 2022

- 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. **Online Quiz(zes)**
Weighting: 50%
2. **Laboratory/Practical**
Weighting: Pass/Fail
3. **Online Test**
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 Student feedback & Self-reflection

Feedback
The assessment tasks were heavily weighted in the latter part of the term.

Recommendation
Review the assessment strategy and timing of due dates to better manage time demands on both students and staff.

Feedback from Student feedback

Feedback
Students appreciated the delivery of the lecture material as video recordings enabling them to review the lectures multiple times and at their convenience.

Recommendation
Maintain the use of pre-recorded lectures to support students' on-line learning.

Feedback from student feedback and instructor reflection

Feedback
The use of hands-on lab activities supplemented by some recorded lab demonstrations was effective in supporting student learning.

Recommendation
Maintain the use of hands-on labs.

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.

This unit maps to the following components of the Medical Radiation Practice Board of Australia's Professional Capabilities for Medical Radiation Practice (2020 version):

- 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 - Online Quiz(zes) - 50%	•	•	•	
2 - Laboratory/Practical - 0%		•	•	
3 - Online Test - 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				

Textbooks and Resources

Textbooks

MEDI13001

Prescribed

Bontrager's Textbook of Radiographic Positioning and Related Anatomy
9th Edition (2018)
Authors: John Lampignano & Leslie E. Kendrick
Elsevier
St. Louis , Missouri , USA
ISBN: 9780323399661
Binding: Hardcover
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 Computed Tomography for Technologists textbook is also used for MEDI13002 in the same term.
The Bontrager's Textbook of Radiographic Positioning and Related Anatomy is the same textbook used for MEDI12003 & MEDI12006 in Year 2. Students may use Edition 9 or Edition 10 of this textbook.

View textbooks at the CQUniversity Bookshop

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

Schedule

Week 1 - 07 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic

Introduction to CT and CT Terminology	Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L Chapter 1 - Basic Principles of CT Recommended readings available on the unit Moodle site	CT Practical Lab

Week 2 - 14 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Components of a CT System	Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L Chapter 2 - Data Acquisition Recommended readings available on the unit Moodle site	CT Practical Lab, on-campus tutorial

Week 3 - 21 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Data Acquisition in CT	Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L Chapter 5 - Methods of Data Acquisition Recommended readings available on the unit Moodle site	CT Practical Lab, on-campus tutorial

Week 4 - 28 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Data Management in CT	Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L Chapter 3 - Image Reconstruction, Chapter 8 - Post-processing & Chapter 9 - Data Management Recommended readings available on the unit Moodle site	CT Practical Lab, on-campus tutorial

Week 5 - 04 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
Data Display in CT	Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L Chapter 4 - Image Display Recommended readings available on the unit Moodle site	CT Practical Lab, on-campus tutorial **Online Quiz Week 5** - Thursday 7th April 2022 at 3-4pm AEST

Vacation Week - 11 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
Break Week		

Week 6 - 18 Apr 2022

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 - Image Quality Recommended readings available on the unit Moodle site	CT Practical Lab, on-campus tutorial

Week 7 - 25 Apr 2022

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 Recommended readings available on the unit Moodle site	CT Practical Lab, on-campus tutorial

Week 8 - 02 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
CT Artefacts	Computed Tomography for Technologists (2nd ed.): A Comprehensive Text, Romans, L Chapter 7 - Quality Assurance (Image Artifacts) Recommended readings available on the unit Moodle site	CT Practical Lab, on-campus tutorial **Online Quiz Week 8** - Thursday 5th May 2022 at 3-4pm AEST **Practical CT Equipment Use** Due: Week 8 Thursday (5 May 2022) 5:00 pm AEST

Week 9 - 09 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Imaging equipment for specialised applications: EOS & DSA	Recommended readings available on the unit Moodle site	On-campus tutorial

Week 10 - 16 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Imaging equipment for specialised applications: Ultrasound & MRI	Recommended readings available on the unit Moodle site	On-campus tutorial

Week 11 - 23 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Imaging equipment for specialised applications: PET CT & Nuclear Medicine	Recommended readings available on the unit Moodle site	On-campus tutorial

Week 12 - 30 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Consolidation		On-campus tutorial

Review/Exam Week - 06 Jun 2022

Module/Topic	Chapter	Events and Submissions/Topic
		Final Online Test Due: Review/Exam Week Tuesday (7 June 2022) 11:00 am AEST

Exam Week - 13 Jun 2022

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

This unit is delivered in on-campus mode at Mackay Ooralea campus from Weeks 1 to 12.

The lecture content will be pre-recorded and run from Week 1 to 11. You will need to be on campus for CT practical labs from Week 1 onwards. Tutorials commence on campus from Week 2 onwards. Tutorials will not be recorded.

Each week's tutorial and lab activity builds on the content of the pre-recorded lectures for the week, so you need to ensure you have watched the lectures prior to attending labs and tutorials. The weekly on-line quizzes are formative, designed to help you assess your understanding of the weekly content. The weekly on-line quizzes should be completed before attending any scheduled class or lab activity.

Note that 150 hours of student engagement is required for this unit. That equates on average to about 10–12 hours per week. You should plan to budget your weekly time to include on average:
• Viewing lecture recordings (2 hrs)
• Completing assigned readings (1 hr)
• Creating study notes (2–3 hrs)
• Preparing for and participating in labs (2 hrs)
• Preparing and participating in tutorials (2–3 hrs)
• Preparation for and completion of assessments (2 hrs)

The Unit Coordinator for this unit is: Natalie Sciascia
Preferred contact is by email at n.sciascia@cqu.edu.au. Alternatively, I can be contacted by phone on (07) 4940 7482 or Ext. 57482.

Assessment Tasks

1 Online Quizzes (Weeks 5 & 8)

Assessment Type
Online Quiz(zes)

Task Description
This assessment consists of two parts to complete online via the Unit Moodle page:

- Online Quiz Week 5 - Thursday 7th April 2022
- Online Quiz Week 8 - Thursday 5th May 2022

Online Quiz Week 5
You will write an online Moodle quiz to demonstrate your ability to apply the concepts and use the terminology based on content provided from Weeks 1-4 of this unit.

Question tasks will be of the same types that you will practice in weekly tutorials and weekly formative quizzes. These tasks may include analysis of projected diagrams, photographs and CT images to identify CT components and discuss data acquisition and data management in CT. Some questions may require a calculator to complete.

This quiz is scheduled to take place online via the Unit Moodle page, on Thursday 7th April, 2022. The Moodle quiz availability period will be from 3:00pm - 4:00pm on the stated date. Once you open the test, you will have 30 mins to complete it, up to 4:00pm on 7th April 2022. All unfinished tests will be automatically submitted at that time.

The Online Quiz Week 5 is weighted at 15% of the total unit grade.

Online Quiz Week 8
You will write an online Moodle quiz to demonstrate your ability to apply the concepts and use the terminology from Weeks 1-7 with a particular emphasis on Weeks 5-7.

Question tasks will be of the same types that you will practice in weekly tutorials and weekly formative quizzes. These tasks may include analysis of projected diagrams, photographs and CT images to discuss data acquisition, management and display, patient dose, image quality and quality assurance in CT. Some questions may require a calculator to complete.

This quiz is scheduled to take place online via the Unit Moodle page, on Thursday 5th May, 2022. The Moodle quiz availability period will be from 2:45pm - 4:15pm on the stated date. Once you open the test, you will have 1 hour to complete it, up to 4:15pm on the 5th May 2022. All unfinished tests will be automatically submitted at that time.

The Online Quiz Week 8 is weighted at 35% of the total unit grade.

To complete these quizzes, ensure that you have arranged to use a computer in good working order with adequate power/charged battery.

The Online Quiz Week 5 and Online Quiz Week 8 are both open book assessments. Your test responses must be your own work. It means that during the test you may access your study notes, textbook, the unit Moodle site and/or any website. The standards of academic integrity still apply. Just as for written assignments, you must acknowledge intellectual content in your answers that is not your own work. Basic statements of facts are considered 'common knowledge' in the context of this unit so they do not need to be cited. However, *if you copy any explanation word-for-word from ANY source, you must put that content in quotation marks and formally cite your source.* Otherwise, this is plagiarism. You must undertake this test as an individual with no assistance from or discussion with others. All incidents of academic integrity breaches will be reported as per University policy.

In the absence of an approved extension, you cannot complete this assessment at a later time, and you will receive a mark of zero for the assessment. If you have an approved extension, you will be assigned a new test date and time as soon as possible after the original test date. It is your responsibility to ensure that you can attend at that new assigned date/time. Please see Section 5 of the the University's Assessment Policy and Procedure for details regarding Assessment Management, specifically around assessment extension.

Number of Quizzes

Frequency of Quizzes

Assessment Due Date

Online Quiz Week 5 - 7th April 2022 at 3-4pm AEST, Online Quiz Week 8 - 5th May 2022 at 3-4pm AEST

Return Date to Students

Feedback provided within 2 weeks of each online quiz

Weighting
50%

Assessment Criteria
Question responses will be scored on the following criteria:

- Correct use of scientific terminology
- Correct selection and application of core concepts to the specific content of the question
- Clarity, correctness, relevance and completeness of the response in addressing the question that was asked
- Evidence of critical thinking in application of concepts to specific circumstances.

The number of marks for each question are allocated based on the depth and breadth of the required response, and will be indicated on each quiz.

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

2 Practical CT Equipment Use

Assessment Type
Laboratory/Practical

Task Description
The safe and competent operation of CT equipment is a vital skill that all CT radiographers need to achieve. As such, you will be expected to demonstrate these skills whilst working in the CT imaging lab.

In each week's lab you will learn how to perform one or more of the tasks listed below as your group completes the prescribed lab activity. These tasks are:
1. Operate the gantry controls correctly
2. Use the workstation software to obtain the planning image/s
3. Use the workstation software to plan scans
4. Modify the scanning parameters
5. Perform multiplanar reformat
6. Modify image display
7. Observe safety protocols for equipment use

By the final lab, you will need to have attained sufficient familiarity with the equipment hardware and software to carry out each listed task with moderate assistance. Not every task will be carried out in every lab and each member of the group will carry out different parts of the lab's instructions. Therefore, you will need to ensure regular attendance at labs and regular practice outside of class time in order to ensure you can perform all tasks by the final lab.

During each lab class your lab instructor will observe your performance, will provide you brief feedback and will document any tasks that you have performed at the required level in the Practical CT Equipment Use Form. After the final lab class in Week 8 the Unit Coordinator will review the completed forms to determine whether or not you have demonstrated the ability to perform the listed tasks at the required level.

Assessment Due Date
Week 8 Thursday (5 May 2022) 5:00 pm AEST

Return Date to Students
Week 10 Thursday (19 May 2022)

Weighting
Pass/Fail

Assessment Criteria
For each task, you are assessed on your familiarity with the:
• Hardware and software controls and selection options used for the task
• Sequence of steps needed to carry out the task

You will demonstrate the required level of familiarity when you are able to carry out the required sequence of activities for the task relatively independently with occasional guidance and/or correction.

Referencing Style

- Harvard (author-date)

Submission
Offline

Learning Outcomes Assessed

- 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

3 Final Online Test

Assessment Type
Online Test

Task Description
You will write an online Moodle test of 100 minutes to demonstrate your ability to apply the concepts and use the terminology based on content provided from all weeks of this unit.

The test will have a range of question formats including multiple choice and short to medium-length questions. Question tasks will be similar to the type that you will practice in weekly tutorials, weekly formative quizzes and online quizzes. These tasks may include analysis of projected diagrams, photographs and CT images. Some questions may require a calculator to complete.

This test is scheduled to take place online via the Unit Moodle page, on Tuesday 7th June, 2022. The Moodle test availability period will be from 8:45am - 11:00am on the stated date. Once you open the test, you will have 100 minutes (1 hr 40 mins) to complete it, up to 11:00am on the 7th June 2022. All unfinished tests will be automatically submitted at that time.

To complete the test, ensure that you have arranged to use a computer in good working order with adequate power/charged battery.

This online test is an open book assessment. Your test responses must be your own work. It means that during the test you may access your study notes, textbook, the unit Moodle site and/or any website. The standards of academic integrity still apply. Just as for written assignments, you must acknowledge intellectual content in your answers that is not your own work. Basic statements of facts are considered 'common knowledge' in the context of this unit so they do not need to be cited. However, *if you copy any explanation word-for-word from ANY source, you must put that content in quotation marks and formally cite your source.* Otherwise, this is plagiarism. You must undertake this test as an individual with no assistance from or discussion with others. All incidents of academic integrity breaches will be reported as per University policy.

In the absence of an approved extension, you cannot complete this assessment at a later time, and you will receive a mark of zero for the assessment. If you have an approved extension, you will be assigned a new test date and time as soon as possible after the original test date. It is your responsibility to ensure that you can attend at that new assigned date/time. Please see Section 5 of the the University's Assessment Policy and Procedure for details regarding Assessment Management, specifically around assessment extension.

Assessment Due Date
Review/Exam Week Tuesday (7 June 2022) 11:00 am AEST

Return Date to Students
Exam Week Friday (17 June 2022)

Weighting
50%

Minimum mark or grade
50%

Assessment Criteria
Question responses will be scored on the following criteria:

- Correct use of scientific terminology
- Correct selection and application of core concepts to the specific content of the question
- Clarity, correctness, relevance and completeness of the response in addressing the question that was asked
- Evidence of critical thinking in application of concepts to specific circumstances.

The number of marks for each question are allocated based on the depth and breadth of the required response, and will be indicated on the test.

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
- 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.

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