



# MEDI12007 Quality Processes for Dose and Image Optimisation

## Term 2 - 2019

Profile information current as at 08/05/2024 06:49 am

All details in this unit profile for MEDI12007 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.

## General Information

### Overview

You will apply knowledge of equipment operation and use as well as radiographic image acquisition techniques to the optimisation of radiographic images and patient dose. You will perform quality control and quality assurance procedures to measure and maintain the performance of radiographic and ancillary equipment. You will investigate the impact of technical factor selection on patient dose and image quality. Through these you will learn to make informed selections of technical parameters for radiographic procedures and to justify your decision-making.

### Details

Career Level: *Undergraduate*

Unit Level: *Level 2*

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 and Instrumentation 1 Co-requisite: MEDI12004 Medical Imaging Clinical Course 1 MEDI12005 Science & Instrumentation 2

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 2 - 2019

- 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: 40%

#### 2. **In-class Test(s)**

Weighting: 60%

### 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 Coordinator reflection Have your say student evaluation

##### Feedback

Students appreciated the timing of 2 x 1 hr long lecture block since the split lecture style encourages students to review and consolidate the information learned before proceeding to learning new content in the next session.

##### Recommendation

Maintain the use of 2 x 1 hr long sessions over 2 days instead of having a 2 hour long lecture block.

## Unit Learning Outcomes

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

1. Assess the performance of radiographic and ancillary equipment relative to quality standards.
2. Troubleshoot imaging faults and equipment problems.
3. Assess radiographic images for various objective and subjective aspects of image quality.
4. Relate radiographic equipment performance, use and technical parameter selection to patient dose and image quality.
5. Justify the selection of technical parameters for a radiographic image in the context of the clinical circumstances.

Medical Radiation Practice Board of Australia's Professional Capabilities Standards:

Domain 1: 3. Assume responsibility and accept accountability for clinical decisions.

Domain 3: 1. Apply critical and reflective thinking to resolve clinical challenges.

Domain 4: 1. Implement safe radiation practice appropriate to their division of registration. 2. Confirm and operate equipment safely and appropriate to their division of registration. 3. Maintain safety of self and others in the work environment appropriate to their division of registration. 4. Safely manage radiation and radioactivity in the environment.

Domain 5: 2. Apply principles of medical radiation physics and instrumentation.

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
<b>1 - Practical and Written Assessment - 40%</b>			•	•	•
<b>2 - In-class Test(s) - 60%</b>	•	•	•	•	•

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
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 - 40%	•	•		•		•				
2 - In-class Test(s) - 60%	•	•		•		•		•		

## Textbooks and Resources

### Textbooks

**There are no required textbooks.**

### 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

**Reshmi Kumar** Unit Coordinator  
[r.d.kumar@cqu.edu.au](mailto:r.d.kumar@cqu.edu.au)

## Schedule

### Week 1 - 15 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
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### Week 2 - 22 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
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### Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
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### Week 4 - 05 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
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### Week 5 - 12 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
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### Vacation Week - 19 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
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### Week 6 - 26 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
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#### Assessing radiographic image quality

- subjective versus objective assessment
- standard versus target exposure index
- deviation index
- test tools for image quality measurement
- Receiver operating curve, sensitivity, specificity, accuracy, gold standard, true positive, false positive, true negative and false negative about diagnostic tests

Refer to the unit Moodle site for assigned readings.

Lab 1

### Week 7 - 02 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
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#### Selection of technical parameters in context of clinical circumstances

- Clinical factors impacting performance demands of the imaging system and modification of techniques.

Refer to the unit Moodle site for assigned readings.

Lab 2  
Tutorial 1

### Week 8 - 09 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
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**Troubleshooting equipment problems**

- Identifying and using symptoms to find the cause
- Systematic analysis using existing tools and processes
- Image artifacts

Refer to the unit Moodle site for assigned readings.

Tutorial 2

**Week 9 - 16 Sep 2019**

Module/Topic	Chapter	Events and Submissions/Topic
<b>Quality Control (QC) and QC testing</b> <ul style="list-style-type: none"><li>• Scope, process and documentation</li><li>• Benefits of QC program</li><li>• Performance standards</li><li>• Evidence of compliance</li></ul>	Refer to the unit Moodle site for assigned readings.	Lab 3 Tutorial 3 Part 1 and Part 2 (SPA) of Practical & Written Assessment due 18/09/19 at 4:00 PM AEST

**Week 10 - 23 Sep 2019**

Module/Topic	Chapter	Events and Submissions/Topic
<b>QC testing of Radiographic &amp; Ancillary Equipment - Part 1</b> <ul style="list-style-type: none"><li>• QC testing for visual inspection/check of equipment</li><li>• QC testing of generator</li><li>• QC testing of bucky and grid</li></ul>	Refer to the unit Moodle site for assigned readings.	Tutorial 4

**Week 11 - 30 Sep 2019**

Module/Topic	Chapter	Events and Submissions/Topic
<b>QC testing of Radiographic &amp; Ancillary Equipment - Part 2</b> <ul style="list-style-type: none"><li>• QC testing of CR image receptor and CR image reader</li><li>• QC testing of DR detectors</li></ul>	Refer to the unit Moodle site for assigned readings.	Lab 4 Tutorial 5

**Week 12 - 07 Oct 2019**

Module/Topic	Chapter	Events and Submissions/Topic
<b>QC testing of Radiographic &amp; Ancillary Equipment - Part 3</b> <ul style="list-style-type: none"><li>• QC testing of AEC system</li><li>• QC testing of location controls</li></ul>	Refer to the unit Moodle site for assigned readings.	Lab 5 Tutorial 6 Part 2 of Practical & Written Assessment due 09/10/19 at 4:00 PM AEST

**Review/Exam Week - 14 Oct 2019**

Module/Topic	Chapter	Events and Submissions/Topic
		In-Class Test <ul style="list-style-type: none"><li>• Wednesday 16/10/19 (9am -11am &amp; 11am -1pm)</li></ul>

**Exam Week - 21 Oct 2019**

Module/Topic	Chapter	Events and Submissions/Topic
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## Term Specific Information

For any unit related queries, students can contact your unit coordinator, Reshmi Kumar, using the Q & A forum in the unit Moodle site or e-mail [r.d.kumar@cqu.edu.au](mailto:r.d.kumar@cqu.edu.au)

This is a condensed unit that runs from Weeks 6 -14, as most of you are on placement during the first half of term. Being a six credit unit, you are still expected to commit 150 hours to the unit, which equates to about 16.5 hours per week over the 9 weeks. Tutorials are interactive sessions where your participation enables you to check your understanding of and your ability to apply the week's concepts and for you to build your skills in responding to test questions. Your regular and active participation strongly supports your success in the unit.

There will be a total of five labs between Weeks 6 to 12. Take note that you are to adhere to the Course Dress Code when using the Medical Imaging simulation labs and a zero-tolerance policy will be followed.

A suggested time budget for weekly study is:

- 2 hours for lectures and taking notes
- 2 hours for completing assigned readings
- 2 hours for completing other posted learning activities
- 2 hours for creating study notes to meet weekly learning goals using lectures and readings
- 2 hours for working on posted tutorial questions in preparation for tutorial
- 1 hour for participation in tutorial
- 2 hours lab activity preparation and participation
- 2 hours for preparation and/or revision for the In-class test
- 1.5 hours for working on group assessment

There is no prescribed textbook for this unit - you will be provided with weekly reading resources in the unit Moodle site.

## Assessment Tasks

### 1 Practical & Written Assessment

#### **Assessment Type**

Practical and Written Assessment

#### **Task Description**

In the medical imaging profession, radiographic image acquisition and patient dose is highly dependent on the use of correct technical parameters and proper equipment performance. This assessment requires you to apply the concepts learned in this unit to demonstrate your knowledge and understanding of the importance of optimising patient dose and image quality. The concepts assessed are relevant to your future scope of practice and you will build upon them in your future clinical capacity.

There are three parts to this assessment:

#### **Part 1 - Group Report (15%)**

- You will work as a lab group to create a small-scale single-blind study of the impact of technical factor selection on image quality.
- Half of the class will be assigned a test using a subjective measure of image quality and the other half will be assigned an objective measure of image quality.
- Your group will create a set of images for the blind study, then administer the blinded test to the members of 3 other lab groups to collect data. Students assigned to conduct the subjective test will take part in the objective test for the other lab groups and vice versa.
- You will then analyse your data using Receiver Operating Curves.
- As a group, you will discuss your experimental findings, compare it with theory you have studied to date and make recommendations for clinical application of your findings, particularly in optimising patient dose and image quality.
- There will be one report submitted per group with the images or list of images in PACS as supporting evidence of your work.

## **Part 2 - Self and Peer Assessment -SPA (5 %)**

To ensure that each group member is proactive in the group work, each group member will be required to assess each individual team member's contribution towards the group work. This will be accomplished by each group member taking part in ONE self and peer assessment.

- You will submit your SPA form in **Week 9**. In confidence, you will score yourself and each of the team members for their degree of contribution to the team work process. You will be asked 10 questions concerning your own and your peers' participation as team members. The average of your assessment by your peers will form part of your mark for this part of the group assessment.

## **Part 3 - Individual Submission (20 %)**

You will be presented with evidence (which may include radiographs and/r technical data) of an equipment problem. You will submit an individual write-up. Your write-up must:

- include an introduction, conclusion and referencing
- use relevant theory to analyse the information provided to identify the problem and discuss possible implications of the problem on technical factor selection for specific clinical situations, image quality and patient absorbed dose

**For Parts 1 and 3, your submission must be a word-processed document with appropriate layout including relevant headings and sub-headings that enable information to be easily read.**

- Acceptable file types are Word document (either .doc or .docx format) or pdf file that is a conversion of a word-processed document (NOT an image file such as a scanned document).
- All submissions must be processed through TURNITIN.

**Please note that further details regarding the requirements for this assessment will be provided on the unit Moodle site.**

### **Assessment Due Date**

Part 1 and Part 2 are due at 4:00 PM on 18/09/19 (Week 9). Part 2 is due at 4:00 PM on 09/10/19 (Week 12).

### **Return Date to Students**

Part 1 and Part 2 feedback will be provided on 02/10/19 (Week 11). Part 2 feedback will be provided on 25/10/19 (Week 14).

### **Weighting**

40%

### **Assessment Criteria**

This assessment will be graded using the following criteria:

#### **Part 1 - Group report**

- Inclusion of correct images or image list from PACS
- Clarity and correctness of experimental findings and Receiver Operating Curves.
- Selection and application of core concepts in analysis.
- Factual correctness and relevance of recommendations for clinical application of findings.
- Referencing

#### **Part 2 - SPA**

- peer assessment of team work process (dependability, task acceptance, timely productivity, contribution to team discussions and collaboration with team members etc.)

#### **Part 3 - Individual submission**

- Completeness of all required sections of the write-up listed in the Assessment task
- Correct identification of problem and possible implications



- Correct selection and application of core concepts in analysis
- Factual correctness of explanations and discussions
- Relevance of written content to core concepts
- Referencing

**Further details will be posted on the unit Moodle site.**

### Referencing Style

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

### Submission

Online

### Learning Outcomes Assessed

- Assess radiographic images for various objective and subjective aspects of image quality.
- Relate radiographic equipment performance, use and technical parameter selection to patient dose and image quality.
- Justify the selection of technical parameters for a radiographic image in the context of the clinical circumstances.

### Graduate Attributes

- Communication
- Problem Solving
- Information Literacy
- Information Technology Competence

## 2 In-class test

### Assessment Type

In-class Test(s)

### Task Description

Each health profession possesses a body of knowledge, the fundamentals of which must be learnt and understood. The medical imaging profession has selected these concepts as relevant to your scope of practice and you will build upon them in your future clinical capacity. This in-class test will be held in **Week 13** and you will write the in-class test to demonstrate your ability to apply the concepts and use the terminology from Weeks 6 - 12 of the unit. All questions will be based on the posted weekly learning goals. Question tasks will be of the same types that you will practice in weekly tutorials. These tasks may include analysis of projected diagrams, photographs and/or radiographs, creation of line diagrams to illustrate concepts, explanations and discussions.

There will be a mixture of recall, problem solving and application of concepts to imaging situations type questions. ***This test is a closed-book assessment of 90 minutes and will be delivered at computer workstations so that you may view both text and visuals.*** You may choose to provide your test responses either in traditional pen-and-paper format or electronically at the workstation. You will have a five minute perusal time prior to the allotted writing time.

The total possible marks and the marks for each question will be indicated on the test paper. Further details of the test overview and mark allocation will be made available on the unit Moodle site.

This test must be written at the timetabled date and time. As per the Assessment Policy and Procedure, this task is to be completed during the defined period. There is no opportunity to apply a late penalty. If you arrive late, you may enter the test room up to 30 minutes after the start of the test, however, you will still be required to submit your test at the standard test end time. You will not be allowed entry more than 30 minutes after the test starts. ***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 not completed it by the scheduled date and time.***

### Assessment Due Date

The test is to be written during the designated timetabled session in Week 13.

### Return Date to Students

Feedback will be provided within 2 weeks of the test due date.

**Weighting**

60%

**Minimum mark or grade**

50 %

**Assessment Criteria**

Question responses will be scored on the following criteria:

- correct use of terminology
- correct selection and application of core concepts to the specific content of the question
- clarity, correctness, relevance and completeness of response in addressing the question that was asked

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

**Referencing Style**

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

**Submission**

Online

**Learning Outcomes Assessed**

- Assess the performance of radiographic and ancillary equipment relative to quality standards.
- Troubleshoot imaging faults and equipment problems.
- Assess radiographic images for various objective and subjective aspects of image quality.
- Relate radiographic equipment performance, use and technical parameter selection to patient dose and image quality.
- Justify the selection of technical parameters for a radiographic image in the context of the clinical circumstances.

**Graduate Attributes**

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

## 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