



MEDI12007 Quality Processes for Dose and Image Optimisation

Term 2 - 2020

Profile information current as at 14/12/2025 05:24 pm

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 apply the concepts of quality control testing and quality assurance to monitor equipment performance, detect performance issues and document findings. 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, MEDI12002 Science and Instrumentation 1
Co-requisite: 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 - 2020

- Online

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. **Online Test**

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 Student Have Your Say

Feedback

Students found the weekly tutorial a useful tool for learning.

Recommendation

Maintain the use of weekly tutorials to enable students to review and consolidate the weekly content.

Feedback from Student Have Your Say Coordinator Reflection

Feedback

Some students struggled with understanding the assessment requirements and marking rubric(s).

Recommendation

Create instruction videos that focus on each assessment item. Include examples of poor and good approaches with respect to the marking rubric to encourage better understanding of the assessment requirements and marking rubric(s) by the students.

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. Apply metrics of image quality to describe and evaluate visibility and accuracy of radiographic images
4. Relate radiographic equipment performance and the selection of image acquisition and processing parameters to patient dose and image quality
5. Critically appraise evidence to inform decision-making in balancing dose and image optimisation.

Medical Radiation Practice Board of Australia's Professional Capabilities Standards (2019):

Domain 4 Capability 1. Resolve challenges through application of critical thinking and reflective practice.

Domain 5 Capability 1. Perform and provide safe radiation practice.

Domain 5 Capability 3. Implement quality assurance processes imaging or treating patients/clients.

Alignment of Learning Outcomes, Assessment and Graduate Attributes

 N/A Level	 Introductory Level	 Intermediate Level	 Graduate Level	 Professional Level	 Advanced Level
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Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
1 - Practical and Written Assessment - 40%			•	•	•
2 - Online Test - 60%	•	•	•	•	

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 - Online Test - 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

Schedule

Week 1 - 13 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Assessing radiographic image quality <ul style="list-style-type: none">• Review of image quality and key factors affecting it• Subjective versus objective assessment of image quality• Standard versus target exposure index• Deviation index• Test tools for image quality measurement	Refer to the unit Moodle site for assigned readings.	Introductory tutorial

Week 2 - 20 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Evaluating visibility and accuracy of radiographic images <ul style="list-style-type: none">• Receiver operating curve• Sensitivity and specificity• Accuracy and gold standard• True positive (TP), false positive (FP), true negative (TN) and false negative (FN) about diagnostic tests	Refer to the unit Moodle site for assigned readings.	Online tutorial

Week 3 - 27 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
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Radiographic equipment performance, patient dose and image quality

- Review of Image acquisition and processing parameters impacting performance demands of the imaging system
- Modification of image acquisition and processing parameters to balance patient dose and optimise images

Refer to the unit Moodle site for assigned readings.

Online tutorial

Week 4 - 03 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Image artifacts <ul style="list-style-type: none"> • Types, causes and their appearances • Preventing or minimising impact on image quality 	Refer to the unit Moodle site for assigned readings.	Online tutorial

Week 5 - 10 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Quality assurance (QA) and quality control (QC) in medical imaging <ul style="list-style-type: none"> • Scope, process and documentation of QA and QC • Benefits of QA and QC program • Performance standards • Evidence of compliance • Remedial and suspension actions 	Refer to the unit Moodle site for assigned readings.	Online tutorial

Vacation Week - 17 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Break week		

Week 6 - 24 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Visual check of equipment & QC testing of collimator, bucky and grid <ul style="list-style-type: none"> • QC testing for visual inspection/check of equipment • Light beam alignment test • Location control/Detente test • Grid alignment test • Grid uniformity test 	Refer to the unit Moodle site for assigned readings.	Online tutorial

Week 7 - 31 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
QC testing of generator <ul style="list-style-type: none"> • Half value layer (HVL) test • Radiation output test • kVp reproducibility test • Reciprocity test • Linearity test 	Refer to the unit Moodle site for assigned readings.	Online tutorial

Week 8 - 07 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
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QC testing of digital systems

- CR image plate spot check, inspection and cleaning
- Background dark noise
- Ghosting or erasure test
- Flat field test
- SMPTE test
- DR detector calibration

Refer to the unit Moodle site for assigned readings.

Online tutorial

Week 9 - 14 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
QC testing of AEC system <ul style="list-style-type: none"> • kV compensation test • AEC reproducibility test • AEC patient thickness compensation test 	Refer to the unit Moodle site for assigned readings.	Online tutorial ROC, image and dose optimization report Due: Week 9 Friday (18 Sept 2020) 3:00 pm AEST

Week 10 - 21 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Troubleshooting equipment problems - Basics <ul style="list-style-type: none"> • Quality management in medical imaging • Identifying and using symptoms to find the cause • Systematic analysis using existing tools and processes 	Refer to the unit Moodle site for assigned readings.	Online tutorial

Week 11 - 28 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Troubleshooting equipment problems - Application <ul style="list-style-type: none"> • Identifying and using symptoms to find the cause • Systematic analysis using existing tools and processes 	Refer to the unit Moodle site for assigned readings.	Online tutorial

Week 12 - 05 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
Consolidation of quality improvement processes		Online tutorial

Review/Exam Week - 12 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
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Exam Week - 19 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
		End of term online test

Term Specific Information

MEDI12007 will be delivered online in Term 2, 2020. The content will be covered from Weeks 1-12. The end of term test will be held in Week 14. Being a six credit unit, you are expected to commit 150 hours to the unit, which equates to approximately 12.5 hours per week over the 12 weeks. A suggested time budget for weekly study is:

- 2 hours for watching recorded lectures and taking notes
- 2 hours for completing assigned reading
- 1.5 hours for completing other posted learning activities such as virtual labs.
- 2 hours for creating study notes to meet weekly learning goals using lectures and readings
- 2 hours for working on posted tutorial questions and virtual lab data analysis in preparation for tutorial
- 1 hour for participation in tutorial
- 2 hours for preparation and/or revision for assessments

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.

Assessment Tasks

1 ROC, image and dose optimization report

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 two parts to this assessment:

Part 1 - Receiver operating curve report (20%)

- You be provided with experimental data involving subjective and objective analysis of the impact of technical factor selection on image quality.
- You will analyse the data using Receiver Operating Curves.
- You will discuss the 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.

Part 2 - Image quality and dose optimisation report (20 %)

- You will be presented with evidence which may include radiographs and/or technical data related to a specific clinical situation.
- You will critically appraise the information to discuss the possible implications of the technical data on radiographic equipment performance, image quality and patient dose.
- You will use theory you have studied to date to make recommendations that support informed decisions on balancing dose and optimising image quality in this specific clinical circumstance.

Both Parts 1 and 2 are to be submitted in the form of a report with the following format: Introduction, body and conclusion. The word limit for each part is 2000 words +/-10 % and 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.

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

Assessment Due Date

Week 9 Friday (18 Sept 2020) 3:00 pm AEST

Return Date to Students

Individual feedback will be provided within two weeks of assessment due date.

Weighting

40%

Assessment Criteria

This assessment will be graded using the following criteria:

Part 1 - Receiver operating curve report

- Completeness of all required sections of the write-up listed in the Assessment task
- Clarity and relevance of introduction and conclusion
- 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.
- Completeness and correctness of referencing
- Adherence to word count limit

Part 2 - Image quality and dose optimisation report

- Completeness of all required sections of the write-up listed in the Assessment task
- Clarity and relevance of introduction and conclusion
- 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
- Completeness and correctness of referencing
- Adherence to word count limit

Further details will be posted on the unit Moodle site.

Referencing Style

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

Submission

Online

Learning Outcomes Assessed

- Apply metrics of image quality to describe and evaluate visibility and accuracy of radiographic images
- Relate radiographic equipment performance and the selection of image acquisition and processing parameters to patient dose and image quality
- Critically appraise evidence to inform decision-making in balancing dose and image optimisation.

Graduate Attributes

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

2 Online Test

Assessment Type

Online Test

Task Description

You will complete an end of term online test in Week 14 to demonstrate your ability to apply the concepts and the use of

terminology from Weeks 4 -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 the weekly tutorials. These tasks may include analysis of projected diagrams, photographs and/or radiographs to explain and discuss concepts. There will be a mixture of problem solving and application of concepts to imaging situations type questions.

This assessment is to be undertaken as an individual. As with all other university assessment, colluding with other students on non-group work is considered academic misconduct. Inserting answers from other websites at the time of the online test is considered plagiarism. The online test is an open book assessment, however, you must be mindful of the time you are taking to answer each question and have an understanding of the content and familiarity with your resources to use them effectively.

The test is a timed online test via Moodle and will be for a 3 hr duration. You will have an additional ten minutes perusal time. This test must be written at the timetabled date and time. As per the Assessment Procedures, this task is to be completed during a defined period. There is no opportunity to apply a late penalty. **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 14.

Return Date to Students

Individual feedback will be provided two weeks after the test 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 the response in addressing the question that was asked

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

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
- Apply metrics of image quality to describe and evaluate visibility and accuracy of radiographic images
- Relate radiographic equipment performance and the selection of image acquisition and processing parameters to patient dose and image quality

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