MEDI12005 *Science and Instrumentation 2*
Term 2 - 2018

Profile information current as at 14/12/2025 12:38 pm

General Information

Overview
This unit builds on Science and Instrumentation 1 and aims to provide you with insights about the x-ray generator and timing circuit in the digital environment. You will learn about exposure technique charts and their application in digital x-ray systems. You will also be introduced to the physical and operational principles of orthopantomography (OPG),mammography, mobile and fluoroscopic systems. This unit will help you further understand how image quality and dose can be influenced for fluroscopic systems. You will use a digital radiological simulation lab and a mobile x-ray unit for experential learning.

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
Prerequisites: MEDI12001 Radiation Science and MEDI12002 Science and Instrumentation 1
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 - 2018

- 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. **In-class Test(s)**
Weighting: 20%
2. **Practical and Written Assessment**
Weighting: 20%
3. **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 Unit coordinator MI team

Feedback
Number of assessment items

Recommendation
Maintain the use of 3 assessment items as they are effective in focusing the students on core content and unit learning outcomes.

Feedback from Student - Have your say evaluation Unit Coordinator

Feedback
Lab supervision

Recommendation
Have more explicit instructions and information about lab supervision in the unit Moodle site.

Feedback from Student - Have your say evaluation Unit Coordinator

Feedback
Assessment feedback

Recommendation
Maintain provision of feedback on individual assessment questions to enable students to identify where they went wrong and how to correct their errors.

Feedback from Student - Have your say evaluation Unit Coordinator

Feedback
Group work

Recommendation
Review instructions and marking rubric for group assessment to ensure that every group member plays their part.

Unit Learning Outcomes

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

1. Relate the main subcomponents of the x-ray generator to the overall generator operation and the controlled production of radiation.
2. Outline the use of exposure timing devices in controlling the duration of a given exposure and the safe operation of a digital radiographic unit.
3. Construct a technique chart for a general radiographic unit with digital image receptor system.
4. Discuss the design and operational features of the orthopantomography (OPG), mammography, mobile and fluoroscopic units.
5. Analyse how image quality and radiation dose can be controlled for fluroscopic systems.

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	5
1 - In-class Test(s) - 20%	•	•		•	•
2 - Practical and Written Assessment - 20%			•		
3 - In-class Test(s) - 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 - In-class Test(s) - 20%	•	•		•						
2 - Practical and Written Assessment - 20%		•		•	•	•				
3 - In-class Test(s) - 60%	•	•		•						

Textbooks and Resources

Textbooks

MEDI12005

Prescribed

Essentials of Radiographic Physics & Imaging
Edition: 2nd (2016)
Authors: James Johnston and Terri Fauber
Elsevier
St. Louis , Missouri , USA
ISBN: 978-0-323-33966-7
Binding: Hardcover

Additional Textbook Information
Students should be having copies of the the textbook since it was used in two units in Term 1 of Year 2. As the textbook will be used in other units during Years 2 of the course, it is recommended that students use the edition listed.

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

Vacation Week - 13 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 20 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
X-ray Generators • Role in Medical Imaging • Major components • Types of generators, operation, advantages versus disadvantages	Essentials of Radiographic Physics & Imaging 2nd edn - Excerpt from Chapters 4 & 10 (also see Unit Moodle site for assigned reading from online resources)	Tutorial 1

Week 7 - 27 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
Timing circuits • Role in Medical Imaging • Types of timers • AEC - components & operation • APR system	Essentials of Radiographic Physics & Imaging 2nd edn - Excerpt from Chapter 13 (also see Unit Moodle site for assigned reading from online resources)	Tutorial 2

Week 8 - 03 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Exposure technique charts • Roles & limitations • Types (including characteristics, advantages and disadvantages) • Constructing an exposure technique chart	Essentials of Radiographic Physics & Imaging 2nd edn - Excerpt from Chapter 13 (also see Unit Moodle site for assigned reading from online resources)	Lab 1 In-Class Test 1 Tutorial 3

Week 9 - 10 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
OPG units • Constructional features and operation • Common errors and artifacts • Advantages and disadvantages	Essentials of Radiographic Physics & Imaging 2nd edn - Excerpt from Chapter 15 (also see Unit Moodle site for assigned reading from online resources)	Lab 2 Tutorial 4

Week 10 - 17 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Fluoroscopic imaging chain • Analog versus digital • Image contrast, spatial resolution and signal-to-noise ratio • Safe and effective use of fluoroscopic systems	Essentials of Radiographic Physics & Imaging 2nd edn - Excerpt from Chapter 14 (also see Unit Moodle site for assigned reading from online resources)	Lab 3 Tutorial 5

Week 11 - 24 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Conventional Mammography and Digital Breast Tomosynthesis (DBT) • Major components of conventional mammography unit • Factors/principles associated with operation of conventional mammography unit • Contribution of technical factors to image quality and patient dose in conventional tomography • Features of DBT unit • Principles of DBT • comparison of conventional mammography with DBT	Essentials of Radiographic Physics & Imaging 2nd edn - Excerpt from Chapter 15 (also see Unit Moodle site for assigned reading from online resources)	Lab 4 Tutorial 6

Week 12 - 01 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
Mobile units • Types, operation, advantages and disadvantages • Technical considerations • Radiation protection rules	Essentials of Radiographic Physics & Imaging 2nd edn - Excerpt from Chapter 15 (also see Unit Moodle site for assigned reading from online resources)	Lab 5 Tutorial 7

Review/Exam Week - 08 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
		In-Class Test 2

Exam Week - 15 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
		Exposure Technique Chart Due: Exam Week Tuesday (16 Oct 2018) 4:00 pm AEST

Term Specific Information

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 from Weeks 8 - 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
- 1 - 2 hours for completing assigned reading
- 1 - 2 hours for competing other posted learning activities
- 1 - 2 hours for creating study notes to meet weekly learning goals using lectures and readings
- 1 - 2 hours for working on posted tutorial questions in preparation for tutorial
- 1 hour for participation in tutorial
- 1.5 - 2 hours lab activity preparation and participation
- 1 - 2 hours for preparation and/or revision for in-class tests
- 1 - 1.5 hours for working on group assessment

Assessment Tasks

1 In-Class Test 1

Assessment Type
In-class Test(s)

Task Description
This assessment requires you to demonstrate knowledge and understanding of the content in this unit. 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 future scope of practice and you will build upon them in your future clinical capacity.

This test will be held during scheduled class time in Week 8. It will assess your understanding of the topics related to Weeks 6 and 7 of the unit content as detailed in the posted weekly learning outcomes. 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 duration 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. There will be four parts to the test:

- Part 1 has True/False questions with explanations where you will be required to state whether the information is true or false and provide an explanation to support your decision.
- Part 2 has Fill-in-the-blank questions where you will be required to provide the correct term or phrase to complete the sentence. Correct spelling is compulsory in this section.
- Part 3 has short answer questions where you will be required to answer a set of main questions (comprising of 2 -3 sub-questions within each) on a broad topic from Weeks 6 & 7.
- Part 4 consists of one question on a broad topic from Weeks 6 & 7 and will test your demonstration of theory concepts using explanations which may include drawing diagrams to illustrate the points made.

The total possible marks and the marks for each question will be indicated on the test paper. Further details of the test breakdown 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 Procedures, this task is to be completed during a 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 started. **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 8.

Return Date to Students

General feedback will be provided in Week 10. Individualised feedback will be provided in Week 11.

Weighting
20%

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 based on the depth and breadth of the required response, and will be indicated on the test paper.

Referencing Style

- Harvard (author-date)

Submission
Offline Online

Learning Outcomes Assessed

- Relate the main subcomponents of the x-ray generator to the overall generator operation and the controlled production of radiation.
- Outline the use of exposure timing devices in controlling the duration of a given exposure and the safe operation of a digital radiographic unit.
- Discuss the design and operational features of the orthopantomography (OPG), mammography, mobile and fluoroscopic units.
- Analyse how image quality and radiation dose can be controlled for fluroscopic systems.

Graduate Attributes

- Communication
- Problem Solving
- Information Literacy

2 Exposure Technique Chart

Assessment Type
Practical and Written Assessment

Task Description
This assessment requires you to demonstrate knowledge and understanding of the content in this unit. 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 future scope of practice and you will build upon them in your future clinical capacity.

This is a group based assessment and it is worth 20 % of the final unit grade. There are two (2) parts to this assessment:

Part 1 - Exposure technique chart (10%)

- You will be required to work in your selected groups during the scheduled lab sessions to create a full exposure technique chart such as one would expect to see in the clinical environment for use with either the DR or the CR

Radiography lab.
- You will use the content learned in Week 8 to help you generate the exposure technique chart for all body parts, all beam paths and all patient sizes, including pediatrics.
- You are to actively participate in the lab activities to generate the full exposure technique chart and the compilation of the submitted group work.
- There will be one Exposure technique chart submitted per group.

Part 2 - Individual report (10%)
Each student is to submit an individual report. Your report should

- include an Introduction, definition and purpose of an exposure technique chart, conclusion and referencing
- outline how the technical factors were determined to produce the baseline images for the body region(s) that you were responsible for
- explain the underlying theories that were used in extrapolating factors for the body region(s) that you were responsible for
- discuss the applicability and limitations of the anthropomorphic phantoms used
- have the images or list of images in PACS as supporting evidence of your work

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 processes 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.

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

Assessment Due Date
Exam Week Tuesday (16 Oct 2018) 4:00 pm AEST

Return Date to Students

Two weeks after the group submission due date.

Weighting
20%

Assessment Criteria
This assessment will be graded using the following criteria:
Part 1 - Exposure technique chart

- Clarity and correctness of the exposure technique chart generated.
- Applicability and appropriateness of exposure technique chart created with respect to DR/CR room.

Part 2 - Individual report

- Completeness of all required sections of the report listed in the Assessment task.
- Determination of appropriate technical factors to produce baseline images.
- Selection and application of relevant theory concepts in the generation of the chart.
- Discussion of applicability and limitations of the anthropomorphic phantoms used.

Referencing Style

- Harvard (author-date)

Submission
Online Group

Learning Outcomes Assessed

- Construct a technique chart for a general radiographic unit with digital image receptor system.

Graduate Attributes

- Problem Solving
- Information Literacy
- Team Work
- Information Technology Competence

3 In-Class Test 2

Assessment Type
In-class Test(s)

Task Description
This assessment requires you to demonstrate knowledge and understanding of the content in this unit. 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 future scope of practice and you will build upon them in your future clinical capacity.

This is the second In-class test and it will be held during the scheduled class time in Week 13. The purpose of this test is to assess your understanding of the topics related to Weeks 9 to 12 of the unit content as detailed in the posted weekly learning outcomes. There will be a mixture of recall, problem solving and application of concepts to imaging situations type questions. The total possible marks and the marks for each question will be indicated on the test paper.

This test is a closed-book assessment of 90 minutes duration 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. There will be four parts to the test:

- Part 1 has True/False questions with explanations where you will be required to state whether the information is true or false and provide an explanation to support your decision.
- Part 2 has Fill-in-the-blank questions where you will be required to provide the correct term or phrase to complete the sentence. Correct spelling is compulsory in this section.
- Part 3 has short answer questions where you will be required to answer a set of main questions (comprising of 2 -3 sub-questions within each) on a broad topic from Weeks 9 -12.
- Part 4 consists of one question on a broad topic from Weeks 9 - 12 and will test your demonstration of theory concepts using explanations which may include drawing diagrams to illustrate the points made.

Further details of the test breakdown 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 Procedures, 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

General feedback will be provided within 2 weeks. Individualised feedback will be provided within 3 weeks.

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 based on the depth and breadth of the required response, and will be indicated on the test paper.

Referencing Style

- Harvard (author-date)

Submission
Offline Online

Learning Outcomes Assessed

- Relate the main subcomponents of the x-ray generator to the overall generator operation and the controlled production of radiation.
- Outline the use of exposure timing devices in controlling the duration of a given exposure and the safe operation of a digital radiographic unit.
- Discuss the design and operational features of the orthopantomography (OPG), mammography, mobile and fluoroscopic units.
- Analyse how image quality and radiation dose can be controlled for fluroscopic systems.

Graduate Attributes

- Communication
- Problem Solving
- Information Literacy

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