



MEDS20009 Science and Instrumentation of Ultrasound

Term 1 - 2021

Profile information current as at 01/05/2024 04:04 am

All details in this unit profile for MEDS20009 have been officially approved by CQUUniversity 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

This unit aims to develop knowledge and understanding of the science and instrumentation of clinical ultrasound to enable you to practically produce and optimise sonographic images to support clinical decision making. The unit emphasis will be on image optimisation, safety and quality assurance. This unit will form the foundation from which you will build image acquisition, recognition and assessment skills as part of the Graduate Certificate in Clinical Ultrasound.

Details

Career Level: *Postgraduate*

Unit Level: *Level 8*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

There are no requisites for this unit.

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 - 2021

- 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 Postgraduate 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: 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 email.

Feedback

The alteration of the physics written assessment due to covid-19 where images were provided to students to discuss helped my learning.

Recommendation

Consider providing assessment tasks that are not related to image acquisition by students in residential schools but rather allow students to comment on clinical images. This may include discussion of how images could be optimised or how artifacts are demonstrated or can be overcome.

Feedback from Student email.

Feedback

The feedback provided on assessment tasks was helpful.

Recommendation

Continue to provide in-depth feedback on written assessments to enhance student understanding and the practical applications of physics principles.

Feedback from Student email.

Feedback

It is expensive having to pay for travel and accommodation for one little alone two separate residential schools.

Recommendation

Consider either condensing the residential school into a single residential school, or running a virtual residential school, to take into consideration the costs of travel and accommodation for students.

Unit Learning Outcomes

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

1. Apply the knowledge of physical principles of diagnostic ultrasound to the acquisition and optimisation of sonographic imaging
2. Interpret the cause of imaging artifacts and use problem solving skills to reduce and overcome these artifacts on real time sonographic imaging using all modes of ultrasound
3. Discuss the bioeffects and safety issues associated with diagnostic medical sonography and how these can be managed.

Alignment of Learning Outcomes, Assessment and Graduate Attributes



Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes		
	1	2	3
1 - Online Quiz(zes) - 40%	•	•	
2 - Online Test - 60%	•	•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes		
	1	2	3
1 - Knowledge	◦	◦	◦
2 - Communication	◦		
3 - Cognitive, technical and creative skills	◦	◦	
4 - Research			
5 - Self-management			
6 - Ethical and Professional Responsibility	◦		◦
7 - Leadership			
8 - 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
1 - Online Quiz(zes) - 40%	◦		◦			◦		
2 - Online Test - 60%	◦	◦	◦			◦		

Textbooks and Resources

Textbooks

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Supplementary

Artifacts in Diagnostic Medical Ultrasound, Volume 1, Grayscale Artifacts 1st (2012)

Edition: 1st (2012)

Authors: Martin Necas

High Frequency Publishing

Sydney , NSW , Australia

ISBN: 978-0987292179

Binding: eBook

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Supplementary

The physics and technology of diagnostic ultrasound: A practitioner's guide.

Edition: 1st (2012)

Authors: Dr Robert Gill

High Frequency Publishing

Sydney , NSW , Australia

ISBN: 9780987292100

Binding: eBook

Additional Textbook Information

If you prefer a paper copy, the CQUni Bookshop The Physics and Technology of Diagnostic Ultrasound available at a reduced price. See them here: <http://bookshop.cqu.edu.au> (search on the Unit code)

IT Resources

You will need access to the following IT resources:

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

Referencing Style

All submissions for this unit must use the referencing style: [Vancouver](#)

For further information, see the Assessment Tasks.

Teaching Contacts

Michelle Fenech Unit Coordinator

m.fenech@cqu.edu.au

Schedule

Week 1 - 08 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Pulse echo principle and sound parameters Part 1 (Physics principle basics explained, Pulse echo principle and sound parameters)	Lectures and notes provided	

Week 2 - 15 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Pulse echo principles and sound parameters part 2 (Pulsed ultrasound, PRP, PRF, PD, DF, SPL, bandwidth)	Lectures and notes provided	
Week 3 - 22 Mar 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Reflection of sound and acoustic impedance	Lectures and notes provided	Zoom tutorial this week (Time TBC)
Week 4 - 29 Mar 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Ultrasound transducers	Lectures and notes provided	
Week 5 - 05 Apr 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Ultrasound imaging resolution (spatial, contrast and temporal resolution)	Lectures and notes provided	Zoom tutorial this week (Time TBC)
Vacation Week - 12 Apr 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Week 6 - 19 Apr 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Doppler ultrasound part 1	Lectures and notes provided	
Week 7 - 26 Apr 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Doppler Ultrasound part 2 and haemodynamics	Lectures and notes provided	Zoom tutorial this week (Time TBC) Online quiz (week 6/7) Due: Week 7 Wednesday (28 Apr 2021) 9:00 am AEST
Week 8 - 03 May 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Ultrasound imaging artifacts	Lectures and notes provided	
Week 9 - 10 May 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Bioeffects associated with diagnostic medical ultrasound	Lectures and notes provided	Zoom tutorial this week (Time TBC)
Week 10 - 17 May 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Advancements in Ultrasound imaging	Lectures and notes provided	
Week 11 - 24 May 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Practical use of ultrasound physics - image optimisation	Lectures and notes provided	Zoom tutorial this week (Time TBC)
Week 12 - 31 May 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Bringing the physics together	Lectures and notes provided	
Review/Exam Week - 07 Jun 2021		
Module/Topic	Chapter	Events and Submissions/Topic

Online test (Opens week 12) Due:
Review/Exam Week Wednesday (9
June 2021) 9:00 am AEST

Exam Week - 14 Jun 2021

Module/Topic

Chapter

Events and Submissions/Topic

Term Specific Information

The unit coordinator for this unit for Term 1, 2021 is Leanne McKnoutly. The best way to contact Leanne is via email and her email address is: l.mcknoutly@cqu.edu.au. Live online tutorials will be held (via Zoom) on weeks 3, 5, 7, 9 and 11 to assist with your learning in this unit and prepare you for success in completing your assessment tasks in this unit. There is no on-campus residential school associated with this unit.

Assessment Tasks

1 Online quiz (week 6/7)

Assessment Type

Online Quiz(zes)

Task Description

An online quiz will be conducted which consists of multi-choice questions. It will assess you on unit content related to weeks one to five. The quiz will comprise of 20 multi-choice questions (some calculation may be required, so you will require a calculator to complete this quiz). You will be required to select the most appropriate and correct answer from a selection of possible answers in relation to the question asked. You will have 40 minutes to complete the quiz (equates to two minutes to complete each question). The quiz will be open for one week, to allow you to complete it and will open on Wednesday 21st April, 2021 at 9 am (week 6) and will close on Wednesday 28th April, 2021 at 9am (week 7). You will require internet access to complete this online quiz.

Number of Quizzes

1

Frequency of Quizzes

Other

Assessment Due Date

Week 7 Wednesday (28 Apr 2021) 9:00 am AEST

Note: The quiz must be completed by this time (quiz will be open from Wednesday 21st April at 9am and will close on Wednesday 28th April at 9am).

Return Date to Students

Week 9 Wednesday (12 May 2021)

via Moodle

Weighting

40%

Minimum mark or grade

50%

Assessment Criteria

Questions will be related to content of week 1 to week 5 of this unit. You will need to obtain 50% in this quiz to pass this unit. There are 20 questions, each worth one mark each.

Referencing Style

- [Vancouver](#)

Submission

Online

Submission Instructions

The quiz must be completed by you, without assistance of collusion with others.

Learning Outcomes Assessed

- Apply the knowledge of physical principles of diagnostic ultrasound to the acquisition and optimisation of sonographic imaging
- Interpret the cause of imaging artifacts and use problem solving skills to reduce and overcome these artifacts on real time sonographic imaging using all modes of ultrasound

Graduate Attributes

- Knowledge
- Cognitive, technical and creative skills
- Ethical and Professional Responsibility

2 Online test (Opens week 12)

Assessment Type

Online Test

Task Description

This online test which will open in week 12 will assess your understanding of all content covered in the unit (weeks 1 to 11). The questions will include a combination of short answer questions and some multi-choice questions. The test will be open for one week to allow you to complete it. The test will open on Wednesday 3rd June at 9am (week 12) and will close on Wednesday 9th June at 9am (the following week).

Assessment Due Date

Review/Exam Week Wednesday (9 June 2021) 9:00 am AEST

Return Date to Students

Exam Week Friday (18 June 2021)

via Moodle

Weighting

60%

Minimum mark or grade

50%

Assessment Criteria

Short answer questions will require typed responses which will be assessed according to:

- use of appropriate sonographic physics terminology
- correct relevance of response to the question asked
- adequate detail provided in the answer to demonstrate a depth of understanding of sonographic physics concepts and their practical application.

Referencing Style

- [Vancouver](#)

Submission

Online

Submission Instructions

The quiz must be completed by you, without assistance of collusion with others.

Learning Outcomes Assessed

- Apply the knowledge of physical principles of diagnostic ultrasound to the acquisition and optimisation of sonographic imaging
- Interpret the cause of imaging artifacts and use problem solving skills to reduce and overcome these artifacts on real time sonographic imaging using all modes of ultrasound
- Discuss the bioeffects and safety issues associated with diagnostic medical sonography and how these can be managed.

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Ethical and Professional Responsibility

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