



# MEDS20009 *Science and Instrumentation of Ultrasound*

## Term 3 - 2023

Profile information current as at 03/05/2024 06:35 pm

All details in this unit profile for MEDS20009 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

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 3 - 2023

- Online
- Sydney

### 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](#).

## 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

 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
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

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: [Vancouver](#)  
For further information, see the Assessment Tasks.

## Teaching Contacts

**Michelle Fenech** Unit Coordinator  
[m.fenech@cqu.edu.au](mailto:m.fenech@cqu.edu.au)

## Schedule

### Week 1: The physics of ultrasound - 06 Nov 2023

Module/Topic	Chapter	Events and Submissions/Topic
Pulse echo principle and sound parameters part 1. <ul style="list-style-type: none"><li>• Physics principle basics explained</li><li>• Pulse echo principle</li><li>• Sound parameters.</li></ul>	Lectures and notes provided	

### Week 2: The physics of ultrasound - 13 Nov 2023

Module/Topic	Chapter	Events and Submissions/Topic
Pulse echo principles and sound parameters part 2. <ul style="list-style-type: none"><li>• Pulsed ultrasound</li><li>• PRP</li><li>• PRF</li><li>• PD</li><li>• DF</li><li>• SPL</li><li>• Bandwidth.</li></ul>	Lectures and notes provided	

### Week 3: Acoustic impedance - 20 Nov 2023

Module/Topic	Chapter	Events and Submissions/Topic
Reflection of sound and acoustic impedance.	Lectures and notes provided	

### Week 4: Transducers - 27 Nov 2023

Module/Topic	Chapter	Events and Submissions/Topic
Ultrasound transducers.	Lectures and notes provided	

### Vacation Week - 04 Dec 2023

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

No new content.

#### Week 5: Imaging resolution - 11 Dec 2023

Module/Topic	Chapter	Events and Submissions/Topic
Ultrasound imaging resolution. <ul style="list-style-type: none"><li>• Spatial resolution</li><li>• Contrast resolution</li><li>• Temporal resolution.</li></ul>	Lectures and notes provided	

#### Week 6: Doppler ultrasound - 18 Dec 2023

Module/Topic	Chapter	Events and Submissions/Topic
Doppler ultrasound part 1.	Lectures and notes provided	

#### Vacation Week - 25 Dec 2023

Module/Topic	Chapter	Events and Submissions/Topic
No new content.		

#### Week 7: Doppler ultrasound - 01 Jan 2024

Module/Topic	Chapter	Events and Submissions/Topic
Doppler ultrasound part 2 Haemodynamics.	Lectures and notes provided	Assessment 1: Online Quiz. Opens Monday 9am, closes Sunday 4pm AEST.

#### Week 8: Imaging artifacts - 08 Jan 2024

Module/Topic	Chapter	Events and Submissions/Topic
Ultrasound imaging artifacts.	Lectures and notes provided	

#### Week 9: Bioeffects - 15 Jan 2024

Module/Topic	Chapter	Events and Submissions/Topic
Bioeffects associated with diagnostic medical ultrasound.	Lectures and notes provided	

#### Week 10: Image optimisation - 22 Jan 2024

Module/Topic	Chapter	Events and Submissions/Topic
Advancements in ultrasound imaging and image optimisation.	Lectures and notes provided	

#### Week 11: Content consolidation - 29 Jan 2024

Module/Topic	Chapter	Events and Submissions/Topic
Bringing the physics together.	Lectures and notes provided	

#### Week 12: Revision - 05 Feb 2024

Module/Topic	Chapter	Events and Submissions/Topic
Revision and online test.	Lectures and notes provided	Assessment 2: Online test opens Wednesday 9am, closes exam week Tuesday 9am AEST.

#### Exam Week - 12 Feb 2024

Module/Topic	Chapter	Events and Submissions/Topic
		Online test closes Tuesday 9am AEST.

## Term Specific Information

This unit is delivered completely online.  
The schedule for online tutorials will be announced at the commencement of the term.

## Assessment Tasks

# 1 Online quiz

## 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 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. The quiz will be open for one week prior to the due date. You will require internet access to complete this online quiz. You will have 40 minutes to complete the test. Once it has been started, it cannot be paused, or re-started. It is open book but must be completed without the assistance of anyone else.

## Number of Quizzes

1

## Frequency of Quizzes

Other

## Assessment Due Date

Note: The quiz opens in week 7 Monday 2 Jan, 9am AEST.

## Return Date to Students

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. To pass this unit, you are required to pass both this quiz and the final online test.

## Referencing Style

- [Vancouver](#)

## Submission

Online

## Submission Instructions

The quiz must be completed by you, without assistance or 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

## Assessment Type

Online Test

## Task Description

This online test will open in week 12. It 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 multi-choice questions. The test will be open for one week prior to the due date to allow you to complete it.

You will require internet access to complete this online quiz. You will have 60 minutes to complete the test. Once it has been started, it cannot be paused, or re-started. It is open book but must be completed without the assistance of anyone

else.

**Assessment Due Date**

The test opens in week 12, Wednesday 8 Feb 9am AEST.

**Return Date to Students**

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 or 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