



MEDS20009 Science and Instrumentation of Ultrasound

Term 1 - 2018

Profile information current as at 30/04/2024 12:30 am

All details in this unit profile for MEDS20009 have been officially approved by CQU University 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 produce optimum images. The unit emphasis will be on safety and quality assurance. You are required to attend ultrasound skills workshops to complete this unit. In the practical workshops you will apply your knowledge of scanning technique and image optimisation. 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 - 2018

- Mixed Mode

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).

Residential Schools

This unit has a Compulsory Residential School for distance mode students and the details are:

Click here to see your [Residential School Timetable](#).

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 Test**

Weighting: Pass/Fail

2. **Practical Assessment**

Weighting: Pass/Fail

Assessment Grading

This is a pass/fail (non-graded) unit. To pass the unit, you must pass all of the individual assessment tasks shown in the table above.

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 Moodle

Feedback

No feedback at this stage

Recommendation

None

Unit Learning Outcomes

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

1. Apply knowledge of ultrasound interaction with tissue and practical skills to acquire diagnostic ultrasound images
2. Assess and solve problems with images in relation to artifacts and diagnostic usefulness
3. Compare the different modes of ultrasound and their applications in medical ultrasound
4. Identify and manage safety issues in medical ultrasound.

The International Federation for Emergency Medicine (IFEM) Point of care curriculum guidelines

3.3 Demonstration of how to generate and optimise an image- 1, 3 and 5

3.4 Demonstration of good practice in point-of-care ultrasound- 1.2.3.5 and 6

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
1 - Online Test - 0%	•	•		•
2 - Practical Assessment - 0%	•	•	•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes			
	1	2	3	4
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 Test - 0%	○	○	○	○		○		
2 - Practical Assessment - 0%	○	○	○		○	○		

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)
- Zoom Conferencing (Webcam and Microphone)

Referencing Style

All submissions for this unit must use the referencing style: [Vancouver](#)
For further information, see the Assessment Tasks.

Teaching Contacts

Aamer Aziz Unit Coordinator
a.aziz@cqu.edu.au

Schedule

Week 1 - 05 Mar 2018

Module/Topic	Chapter	Events and Submissions/Topic
Module 1 Introduction to Ultrasound modes and instrumentation, transducers, image orientation, and sound wave science.	Chapter 2 The Physics and Technology of Diagnostic Ultrasound (R. Gill). Provided on Moodle. Lectures available.	

Week 2 - 12 Mar 2018

Module/Topic	Chapter	Events and Submissions/Topic
Module 1 Introduction to Ultrasound modes and instrumentation, transducers, image orientation, and sound wave science.	Lectures available.	

Week 3 - 19 Mar 2018

Module/Topic	Chapter	Events and Submissions/Topic
Module 1 Introduction to Ultrasound modes and instrumentation, transducers, image orientation, and sound wave science.	Lectures available.	

Week 4 - 26 Mar 2018

Module/Topic	Chapter	Events and Submissions/Topic
Module 2 Interaction of sound with tissue and image artifacts. Equipment performance and resolution. Additional modes and capabilities.	Lectures available. Module 2 notes available.	Tutorial Tuesday night 7pm AEST via Zoom.

Week 5 - 02 Apr 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Module 2 Interaction of sound with tissue and image artifacts. Equipment performance and resolution. Additional modes and capabilities. Lectures available. Module 2 notes available.

Vacation Week - 09 Apr 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Week 6 - 16 Apr 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Module 2 Interaction of sound with tissue and image artifacts. Equipment performance and resolution. Additional modes and capabilities. Lectures available. Module 2 notes available.

Week 7 - 23 Apr 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Module 3 Doppler Ultrasound and imaging artifacts. Putting it together - Practical approach to image optimisation. Lectures available. Module 3 notes available.

Week 8 - 30 Apr 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Module 3 Doppler Ultrasound and imaging artifacts. Putting it together - Practical approach to image optimisation. Lectures available. Module 3 notes available. Tutorial Tuesday night 7pm AEST via Zoom.

Week 9 - 07 May 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Module 3 Doppler Ultrasound and imaging artifacts. Putting it together - Practical approach to image optimisation. Lectures available. Module 3 notes available.

Week 10 - 14 May 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Module 4 Bioeffects and safety issues in Ultrasound. Lectures available. Module 4 notes available.

Week 11 - 21 May 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Module 4 Bioeffects and safety issues in Ultrasound. Lectures available. Module 4 notes available. Tutorial Tuesday 7pm AEST via Zoom. Residential School Saturday May 26th 10 am - 4pm. Brisbane, Mackay, Sydney CQU campuses (Perth and Melbourne availability pending student locations at end of enrolment period).

Week 12 - 28 May 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Revision. Revise and sit your online test this week.

Revision

Lab manual completion relating to residential school Due: Week 12 Thursday (31 May 2018) 11:00 pm AEST

Term Specific Information

The unit coordinator for MEDS20009 is Bridie Wylie who is based on the Brisbane campus. She is available Tuesday to Thursday at b.wylie@cqu.edu.au. Email Bridie if you would like a phone appointment.

Access to the internet is required to undertake this unit, as unit materials, tutorials and updates will be provided via Moodle, email and zoom. It is important to check your student CQU emails regularly as emails will be sent each week to keep you on track, and if supplementary material is required, this will be available on Moodle and emails will be sent to you to let you know if any changes have been made. Tutorials are scheduled throughout the term. These will be undertaken via zoom. Please note these are scheduled for QLD times. If there is something you would like discussed at the tutorials, please email in advance so we can allow time for your topic to be discussed.

You need to ensure that you are available at some stage to undertake the online test in week 12 (test will be open from the Monday 28th May in week 12 at 9 am until the following Monday the 4th of June 9am cut off time). You will require internet access to undertake this test Each question will address one topic or set of images, and there will be multiple parts to answer in each question. Some parts within the question will be multiple choice, at least one part will require writing a short answer, and at least one part will require you to fill in the blanks or match the correct answers to questions relating to the same topic.

The test will be open for 2 hours (allowing 12 minutes per question) and only one attempt is allowed. Once started the test cannot be paused, stopped or re-started. Once you have completed the test, it cannot be re-taken. Questions will be drawn from a pool of questions to allow tests to be different for each student. Image viewing questions may be included.

The residential school Lab manual will need to be downloaded prior to the practical day, completed, and then uploaded by Thursday 31st of May.

Assessment Tasks

1 Online Test

Assessment Type

Online Test

Task Description

An online test will be conducted to assess your understanding of content in this unit. The test will be online and must be accessed through the 'assessment tab' on Moodle and will comprise of 10 questions, each of 10 marks. Each question will address one topic or set of images, and there will be multiple parts to answer in each question. Some parts within the question will be multiple choice, at least one part will require writing a short answer, and at least one part will require you to fill in the blanks or match the correct answers to questions relating to the same topic.

The test will be open for 2 hours (allowing 12 minutes per question) and only one attempt is allowed. Once started the test cannot be paused, stopped or re-started. Once you have completed the test, it cannot be re-taken. Questions will be drawn from a pool of questions to allow tests to be different for each student. Image viewing questions may be included. This is an open book test.

Assessment Due Date

Review/Exam Week Monday (4 June 2018) 9:00 am AEST

Return Date to Students

Exam Week Friday (15 June 2018)

Weighting

Pass/Fail

Minimum mark or grade

50%

Assessment Criteria

Students need to obtain a minimum score of 50% in the online test to pass the unit.

The short answer and multi-choice written test will assess the following:

- Learning objectives from Modules 1 to 4.
- Learning objectives from the Zoom tutorials.
- Learning objectives from the residential school lab manual.

There will be a mixture of recall, problem solving and application of concepts to imaging examples presented in the

exam. The short answer questions and MCQ will test your demonstration of theory concepts by asking you to make responses that use correct terminology. 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 as you are completing it. You will be required to correctly select or write the correct terminology for a given question. Short answer marks will be allocated based on correctness of the theory and knowledge you present in your responses.

A 10 mark question is comprised of 4 sections.

Part A of each question is a Multiple Choice Question which is allocated 2 marks.

Part B of each question is a short answer response which is allocated 6 marks.

Part C of each question requires you to type or select the correct responses and this is allocated 2 marks.

Part D of each question is either a multiple choice question or a matching exercise to correctly name, identify, or give terminology that is correctly applied to the topic and is allocated 2 marks.

Referencing Style

- [Vancouver](#)

Submission

Online

Learning Outcomes Assessed

- Apply knowledge of ultrasound interaction with tissue and practical skills to acquire diagnostic ultrasound images
- Assess and solve problems with images in relation to artifacts and diagnostic usefulness
- Identify and manage safety issues in medical ultrasound.

Graduate Attributes

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

2 Lab manual completion relating to residential school

Assessment Type

Practical Assessment

Task Description

The residential school must be fully attended to pass this unit.

All questions in the residential school lab manual must be answered and a completed lab manual submitted via the assessment tab in moodle by Thursday 31st May by 23:00 AEST (11pm).

The practical residential school day provides you with hands-on tuition so that you can acquire and optimise a B-mode, colour, and spectral doppler image. You are required to perform basic probe manipulation skills, understand how to adjust imaging parameters, and observe and describe the effect of manipulating the various buttons on the ultrasound machine. There are questions within the lab manual which you will need to complete on the day, or in the week after. The completed lab manual then needs to be uploaded and submitted via the assessment tab in Moodle.

Assessment Due Date

Week 12 Thursday (31 May 2018) 11:00 pm AEST

Return Date to Students

Exam Week Monday (11 June 2018)

Weighting

Pass/Fail

Minimum mark or grade

50%. All sections must be completed.

Assessment Criteria

The lab manual will assess the following criteria:

- Describe the effect of manipulating the various buttons on the ultrasound machine.
- Recognise and describe the affect of these parameters: Depth, gain, focus.
- Describe what parameters and buttons can be adjusted to minimise attenuation in a B mode image.
- Describe what factors affect the frame rate.
- Describe how TGC affects and image and recognise when it is inappropriately adjusted.

- Explain how various imaging parameters affect the colour doppler image.
- Describe what the blue and red indicate in any given colour doppler image.
- Explore power doppler imaging.
- Describe how Power doppler is different to Colour doppler mode.
- Describe which imaging modes are angle dependent.
- Describe techniques to optimise colour doppler ultrasound on an artery.
- Explain how various imaging parameters affect the spectral doppler image.

Referencing Style

- [Vancouver](#)

Submission

Online

Learning Outcomes Assessed

- Apply knowledge of ultrasound interaction with tissue and practical skills to acquire diagnostic ultrasound images
- Assess and solve problems with images in relation to artifacts and diagnostic usefulness
- Compare the different modes of ultrasound and their applications in medical ultrasound
- Identify and manage safety issues in medical ultrasound.

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Self-management
- 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