



# **ECHO28001 Cardiac Imaging, Haemodynamics and Pharmacotherapy**

## **Term 1 - 2020**

Profile information current as at 02/05/2024 04:42 pm

All details in this unit profile for ECHO28001 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.

### **Corrections**

#### **Unit Profile Correction added on 30-03-20**

The end of term examination has now been changed to an alternate form of assessment. Please see your Moodle site for details of the assessment.

The Residential School and practical assessment for this unit have been replaced with an alternative delivery strategy. Please see your Moodle site for further details.

## General Information

### Overview

The aim of this unit is to provide introductory knowledge in cardiac imaging, haemodynamic assessment and pharmacotherapy, providing a foundation for future study in the Graduate Diploma of Cardiac Ultrasound. You will acquire knowledge of the physics behind ultrasound image formation and instrumentation. You will learn haemodynamic principles which apply to volumetric flow, valve assessment and pressure calculation and develop an understanding of how pharmacotherapy affects cardiac performance. You will further develop your physics knowledge and skill of ultrasound imaging through participation in an intensive on-campus scanning workshop, in a simulated clinical environment.

### 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

Pre-requisite: Enrolment in CL74 Graduate Diploma of Cardiac Ultrasound

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 - 2020

- 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 Quiz(zes)**

Weighting: 20%

#### 2. **Practical Assessment**

Weighting: 20%

#### 3. **Examination**

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. Discuss the theoretical principles underlying assessment of cardiac haemodynamics using echocardiography and cardiac catheterisation
2. Describe how cardiac performance is altered by pharmacotherapeutic agents
3. Discuss the physics behind ultrasound image formation and instrumentation, including imaging artefacts
4. Apply knowledge of ultrasound physics and practical skills to acquire optimal ultrasound images, with due regard for bioeffects and safety
5. Perform basic Doppler haemodynamic calculations using data derived from an echocardiogram.

Linked to the Australian Sonographers Accreditation Registry (ASAR) Accreditation Standards for Cardiac Sonography:

### Foundation Units of Competence

- Unit 1: Deliver safe, patient centred service
- Unit 2: Practice within professional and ethical frameworks
- Unit 3: Locate, analyse and synthesise information to support evidence based practice
- Unit 4: Contribute to workplace health and safety and quality assurance
- Unit 5: Communicate effectively

### Critical Practice Unit of Competence

- Unit 8: Cardiac

## 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
<b>1 - Online Quiz(zes) - 20%</b>			•		
<b>2 - Examination - 60%</b>	•	•	•		•
<b>3 - Practical Assessment - 20%</b>				•	

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
<b>1 - Knowledge</b>	•	•	•	•	•
<b>2 - Communication</b>	•	•	•	•	
<b>3 - Cognitive, technical and creative skills</b>	•			•	•
<b>4 - Research</b>					

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
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) - 20%	○	○				○		
2 - Examination - 60%	○	○	○					
3 - Practical Assessment - 20%	○	○	○			○		

## Textbooks and Resources

### Textbooks

ECHO28001

#### **Prescribed**

##### **A Sonographer's Guide to the Assessment of Heart Disease**

Edition: 1st (2016)

Authors: Bonita Anderson

Echotext

Brisbane , QLD , Australia

ISBN: 978-0-9923222-0-5

Binding: Hardcover

ECHO28001

#### **Prescribed**

##### **Echocardiography: The Normal Examination and Echocardiographic Measurements**

Edition: 3rd (2017)

Authors: Bonita Anderson

Echotext

Brisbane , QLD , Australia

ISBN: 978-0-9923222-1-2

Binding: Hardcover

ECHO28001

#### **Prescribed**

##### **The Physics and Technology of Diagnostic Ultrasound: A Practitioner's Guide**

Edition: 1 (2012)

Authors: Dr Robert Gill

High Frequency Publishing

Sydney , NSW , Australia

ISBN: 9780987292148

Binding: eBook

ECHO28001

#### **Supplementary**

##### **Pathophysiology of Heart Disease A Collaborative Project of Medical Students and Faculty**

Edition: 6th (2018)

Authors: Leonard S.Lilly

Wolters Kluwer

Hagerstown , Maryland , Washington

ISBN: 9781451192759

Binding: eBook

#### **Additional Textbook Information**

Prescribed Echocardiography textbooks will be utilised across multiple units within the Graduate Diploma of Cardiac Ultrasound program. Paper texts for all of the above books can be purchased at the CQUni Bookshop 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

**Paula Boucaut** Unit Coordinator  
[p.boucaut@cqu.edu.au](mailto:p.boucaut@cqu.edu.au)

## Schedule

### Week 1 - 09 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Physics fundamentals, sound propagation	Anderson B. Echocardiography : The Normal Examination and Echocardiographic Measurements. 3rd ed. Brisbane: Echotext; 2017. Chapter 1, p 1-9.  Gill R. The Physics and Technology of Diagnostic Ultrasound: A Practitioner's Guide. 1st ed. [eBook]. Sydney: High Frequency Publishing; 2012. Chapter 1, p 1-5; Chapter 2, p 7-16.	

### Week 2 - 16 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Acoustic impedance, transducer and beam characteristics	Gill R. The Physics and Technology of Diagnostic Ultrasound: A Practitioner's Guide. 1st ed. [eBook]. Sydney: High Frequency Publishing; 2012. Chapter 2, p 11-12; Chapter 3, p 17-20; Chapter 4, p 25-29, 39-40; Chapter 5, p 43-44; Chapter 11, p 121-123	

### Week 3 - 23 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Beam focussing, A-mode, B-mode and M-mode	Gill R. The Physics and Technology of Diagnostic Ultrasound: A Practitioner's Guide. 1st ed. [eBook]. Sydney: High Frequency Publishing; 2012. Chapter 3, p 20-21 & 23-24; Chapter 4, p 27-35; Chapter 12, p 127-129.	

### Week 4 - 30 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Resolution, acoustic windows, transducers and B-mode steering	Gill R. The Physics and Technology of Diagnostic Ultrasound: A Practitioner's Guide. 1st ed. [eBook]. Sydney: High Frequency Publishing; 2012. Chapter 4, p 32-36; Chapter 10, p 109-113	<b>Online Quiz 1</b> will open at 8:00 am (AEST) on Thursday 2nd April (Week 4) and will close at 8:00 pm (AEST) on Friday 4th April. This quiz will assess topics covered during Weeks 1 to 3.

### Week 5 - 06 Apr 2020

Module/Topic	Chapter	Events and Submissions/Topic
Residential School		<b>Compulsory Residential School</b> Monday 6th April. Students will commence completion of the <b>Practical Assessment</b> during this residential school.

### Break Week - 13 Apr 2020

Module/Topic	Chapter	Events and Submissions/Topic
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**Week 6 - 20 Apr 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Signal Analysis and processing	Gill R. The Physics and Technology of Diagnostic Ultrasound: A Practitioner's Guide. 1st ed. [eBook]. Sydney: High Frequency Publishing; 2012. Chapter 5, p 41-51; Chapter 10, p 114-116.	<b>Practical Assessment - Physics Residential Lab manual</b> submission is due 8:00 pm (AEST) Friday 24th April.

**Week 7 - 27 Apr 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Quality control and B-mode artifacts	<p>Anderson B. Echocardiography : The normal examination and echocardiographic measurements. 3rd ed. Brisbane: Echotext; 2017. Chapter 1, p 19-28.</p> <p>Gill R. The Physics and Technology of Diagnostic Ultrasound: A Practitioner's Guide. 1st ed. [eBook]. Sydney: High Frequency Publishing; 2012. Chapter 6, p 53-64 &amp; 65-69; Chapter 8, p 153-60; Chapter 10, p 114-116.</p>	<p><b>Online Quiz 2</b> will open at 8:00 am (AEST) on Thursday 30th April (Week 7) and will close at 8:00 pm (AEST) Friday 1st May.</p> <p>This quiz will assess topics covered during Weeks 4 to 6.</p>

**Week 8 - 04 May 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Doppler Ultrasound	<p>Anderson B. Echocardiography : The normal examination and echocardiographic measurements. 3rd ed. Brisbane: Echotext; 2017. Chapter 5, p 83-103.</p> <p>Gill R. The Physics and Technology of Diagnostic Ultrasound: A Practitioner's Guide. 1st ed. [eBook]. Sydney: High Frequency Publishing; 2012. Chapter 7, p 71-92.</p>	

**Week 9 - 11 May 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Contrast, harmonics, biological effects and new developments	<p>Anderson B. Echocardiography : The normal examination and echocardiographic measurements. 3rd ed. Brisbane: Echotext; 2017. Chapter 1, p 13-14 &amp; 29-30.</p> <p>Gill R. The Physics and Technology of Diagnostic Ultrasound: A Practitioner's Guide. 1st ed. [eBook]. Sydney: High Frequency Publishing; 2012. Chapter 8, p 89-100; Chapter 11, p 117-125, Chapter 12, p 130-136.</p>	

**Week 10 - 18 May 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Assessment of cardiac haemodynamics using Doppler echocardiography and cardiac catheterisation	<p>Anderson B. A Sonographer's Guide to the Assessment of Heart Disease. 1st ed. Brisbane: Echotext; 2016. Chapter 1, p 1-14.</p> <p>Anderson B. Echocardiography : The normal examination and echocardiographic measurements. 3rd ed. Brisbane: Echotext; 2017. Chapter 11, p 203-232; Chapter 12; p 233-240.</p>	



**Week 11 - 25 May 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Pharmacotherapy	Lilly, L. Pathophysiology of heart disease. 6th ed. Philadelphia: Woltzters Kluwer; 2016. Chapter 17; p 400-454.	

**Week 12 - 01 Jun 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Revision and examination preparation		

**Exam Block - 08 Jun 2020**

Module/Topic	Chapter	Events and Submissions/Topic
		Individual examination schedules can be accessed via your personal <b>MyCentre student account</b> .

**Exam Block - 15 Jun 2020**

Module/Topic	Chapter	Events and Submissions/Topic
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## Term Specific Information

**Unit Coordinator and Contact details**

Your coordinator for ECHO28001 Cardiac Imaging, Haemodynamics and Pharmacotherapy is Paula Boucaut. The most efficient and preferred method of contacting Paula is via the Q&A forum located on the unit Moodle site. Nevertheless, if your query is of a personal nature, please contact Paula directly via email (p.boucaut@cqu.edu.au) or phone (0730234108).

**Unit Tutorials**

Tutorials for this unit will be delivered 'live' online using ZOOM (the links required for accessing the tutorials are provided on the Moodle site). The sessions will also be recorded and made available on Moodle. The tutorials are structured and will focus on answering the weekly study questions (these can be found on Moodle under each weekly tab), and contextualisation of key concepts in preparation for related assessments.

**Unit Study Commitment**

As per Australian educational standards, you are expected to commit a total of 150 hours (i.e. 12.5 hours per week) of engagement toward your study for this unit. A suggestion for how you should allocate your study commitment per week is as follows:

- 3 hours watching recorded lectures
- 2 hours completing recommended readings
- 1.5 hours creating study notes
- 1 hour completing the weekly study questions
- 1 hour participating in/or viewing the weekly tutorial
- 4 hours preparing for quizzes, practical assessments or the final examination

All students are required to attend an on-campus **Compulsory Residential School** on Monday 6th April. Students will be notified of the campus venue details and residential school schedule upon term commencement.

Please ensure that you review the 'Welcome video' available on the Moodle site for further unit specific information.

## Assessment Tasks

### 1 Online Quiz(zes)

**Assessment Type**

Online Quiz(zes)

**Task Description**

Each quiz will assess your understanding of the content presented within this unit. Questions may be drawn from lectures, additional resources provided (e.g. prescribed readings) or tutorial presentations.

Each quiz can be accessed through the assessment tab on Moodle at the assigned time.

- Each quiz will be marked out of 20 marks.
- Questions may include multiple choice, short answer, or image interpretation format.
- Each quiz will be open for 30 minutes.

**Once started, each quiz cannot be paused or restarted. Only one attempt per quiz is permitted.**

As each quiz is online and open book, you will find it useful if you have produced your own notes from the lectures and that you are familiar with the unit information. Questions will be drawn from a resource bank, to allow tests to be different for each student. You may benefit from having a calculator available when sitting the quiz.

This assessment is to be undertaken as an individual. As with all other university examination, colluding with other students on non-group work tasks is considered academic misconduct, and may lead to action being taken the Deputy Dean of Learning and Teaching HMAS.

#### **Number of Quizzes**

2

#### **Frequency of Quizzes**

#### **Assessment Due Date**

Quiz 1 will open at 8:00 am (AEST) on Thursday 2nd April (Week 4) and will close at 8:00 pm (AEST) on Friday 3rd April. This quiz will assess topics covered during Weeks 1 to 3. Quiz 2 will open at 8:00 am (AEST) on Thursday 30th April (Week 7) and will close at 8:00 pm (AEST) Friday 1st May. This quiz will assess topics covered during Weeks 4 to 6.

#### **Return Date to Students**

Individual student results and feedback will be made available once submissions have been marked and moderated. The online quiz question pool in its entirety will not be released to students.

#### **Weighting**

20%

#### **Minimum mark or grade**

To PASS this assessment task, a minimum of 50% must be achieved for the combined 'overall' mark from quiz 1 and 2 (i.e. 20/40 marks overall).

#### **Assessment Criteria**

You will be required to answer a variety of online questions.

#### **Question responses will be assessed according to the:**

- use of appropriate terminology and descriptors as well as grammar and spelling
- student's ability to appropriately interpret presented sonographic images and associated data
- student's ability to succinctly respond with accurate answers

Your score from each individual quiz will contribute 10% to your final grade. Thus, your combined score from the quizzes will contribute to 20% of your final grade (2 quizzes x 10% = 20%).

The specific dates that each quiz opens and closes are outlined above. Please note that the quizzes must be completed before the due date listed. In the absence of an approved extension, there will be no opportunity to complete the task after this date, and there will be no opportunity to apply a late penalty of five percent per day.

#### **Please note:**

It is your responsibility to ensure that you commence each online quiz before Friday 7:30 pm (AEST).

- Each quiz will automatically close at 8:00 pm (AEST)
- If you have not completed the test by this time, your test may be submitted incomplete or with no answers
- You will have 30 minutes to attempt each quiz
- Students are reminded that IT support from the university Information and Technology Division (TASAC) is only available during AEST business hours

In the absence of an approved extension, this assessment cannot be completed at a later time.

Students will receive a mark of zero (or fail) for this assessment, if you have not completed it by the scheduled date and time and do not have an extension.

Students are advised to refer to the 'Assessment Policy and Procedure (Higher Education Coursework)' document for additional university guidelines regarding assessments.

#### **Referencing Style**

- [Vancouver](#)

## Submission

Online

## Submission Instructions

Each quiz is accessed via the assessment tab in Moodle.

## Learning Outcomes Assessed

- Discuss the physics behind ultrasound image formation and instrumentation, including imaging artefacts

## Graduate Attributes

- Knowledge
- Communication
- Ethical and Professional Responsibility

# 2 Practical Assessment

## Assessment Type

Practical Assessment

## Task Description

The residential school will provide an opportunity for the students to explore the physical principles of ultrasound and develop their knowledge of machine instrumentation and controls under the guidance of a tutor.

This practical assessment will be commenced during the Residential School in Week 5. You will use knowledge from previous weeks as well as skills learned at the Residential School to perform tasks under the supervision of a Tutor.

- The residential school laboratory manual can be downloaded from the Moodle site.
- Students will commence completion of the laboratory manual questions during the residential school.
- Students are required to bring a USB stick to the residential school to save acquired images.

## This practical assessment requires students to:

- observe the effect of changing machine parameters on the resultant image
- perform practical tasks set out in their laboratory manual
- obtain, annotate and store ultrasound images during the residential school that will assist to answer questions detailed in their laboratory manual (for later submission)

Questions posed in the laboratory manual will assess the student's understanding of each lab task performed during the residential school.

## Assessment Due Date

24th April Week 6.

## Return Date to Students

Results will be made available once submissions have been marked and moderated.

## Weighting

20%

## Assessment Criteria

Students will be assessed on their ability to:

- provide accurate responses to questions posed in their lab manual using appropriate terminology
- provide appropriate illustrative images in response to questions posed

This assessment carries a 20% weighting toward your final unit grade.

**A 5% mark penalty will be applied for each day, or part thereof, that the final residential school laboratory manual submission is late.**

Students are advised to refer to the 'Assessment Policy and Procedure (Higher Education Coursework)' document for additional university guidelines regarding assessments.

## Referencing Style

- [Vancouver](#)

## Submission

Online

## Submission Instructions

Students will be required to upload their completed lab manual answers to the unit Moodle page via the link provided in

the assessment block. The completed lab manual should be submitted as a single Word Doc.

**Learning Outcomes Assessed**

- Apply knowledge of ultrasound physics and practical skills to acquire optimal ultrasound images, with due regard for bioeffects and safety

**Graduate Attributes**

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

## Examination

**Outline**

Complete an invigilated examination.

**Date**

During the examination period at a CQUniversity examination centre.

**Weighting**

60%

**Length**

180 minutes

**Minimum mark or grade**

50%

**Exam Conditions**

Closed Book.

**Materials**

Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).

Calculator - non-programmable, no text retrieval, silent only

## 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