MATH12223 *Calculus and Linear Algebra A*
Term 1 - 2020

All details in this unit profile for MATH12223 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.

Corrections

Unit Profile Correction added on 30-04-20
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 learning outcomes assessed are unchanged.

General Information

Overview
In this unit, you will study vectors, complex numbers, single variable differential calculus and linear algebra. Through a visual, verbal, numerical and algebraic approach, with particular focus on the practical power of calculus, you will develop a conceptual understanding of calculus and apply differentiation to solve problems in scientific engineering and other disciplines. You will use linear operations to determine the inverse and determinants of matrices. You will use vectors and complex numbers to solve relevant problems, formulate and apply functions and graphs in modelling applied mathematics problems. Other important elements of this unit are the communication of results, concepts and ideas using mathematics as a language.

Details
Career Level: *Undergraduate*
Unit Level: *Level 2*
Credit Points: *6*
Student Contribution Band: *7*
Fraction of Full-Time Student Load: *0.125*

Pre-requisites or Co-requisites
Prerequisite: MATH11160 or MATH11246 Anti-Requisite: MATH11163
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

- Online
- Rockhampton

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. **Written Assessment**
Weighting: 25%
2. **Written Assessment**
Weighting: 25%
3. **Examination**
Weighting: 50%

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 feedback

Feedback

To outline the appropriate learning strategy in Week 1 so that students are aware what it takes to progressively develop their math skills

Recommendation

Will highlight this in the unit introduction in Week 1 in the future.

Feedback from Student feedback

Feedback

To explain complex questions with more details and a slower pace

Recommendation

Will spend more time on explain the process of solving complex questions step by step in an appropriate pace as long as the time is allowed.

Unit Learning Outcomes

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

1. Solve problems requiring the use of vectors and complex numbers
2. Apply linear operations to determine the inverse and determinants of matrices
3. Formulate and apply functions and graphs in modelling applied mathematics problems
4. Solve problems using the concepts of limit, continuity and derivative, and rules of differentiation of functions
5. Determine solutions to problems involving rates of change, optimisation and approximate computation through differentiation
6. Communicate results, concepts and ideas in context using mathematics as a language.

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	6
1 - Written Assessment - 25%	•	•				•
2 - Written Assessment - 25%			•	•	•	•
3 - Examination - 50%	•	•	•	•	•	

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
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 - Written Assessment - 25%	•	•	•	•		•		•		
2 - Written Assessment - 25%	•	•	•	•		•		•		
3 - Examination - 50%	•	•	•	•		•		•		

Textbooks and Resources

Textbooks
MATH12223

Prescribed

ESSENTIALS AND EXAMPLES OF APPLIED MATHEMATICS
Edition: 1st edn (2018)
Authors: Guo, WW
Pearson Australia
Melbourne , VIC , Australia
ISBN: 9781488623820
Binding: Paperback

Additional Textbook Information
Copies are available for purchase at the CQUni Bookshop here: http://bookshop.cqu.edu.au (search on the Unit code)

View textbooks at the CQUniversity Bookshop

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

William Guo Unit Coordinator
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Schedule

Week 1 - 09 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Unit outline Introduction to the new Queensland senior secondary mathematics syllabus	Week 1 notes	Read Week 1 notes; Complete Week 1 exercises

Week 2 - 16 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Vectors and Applications	Chapter 9.1	Read Chapter Chapter 9.1; Complete Week 2 exercises

Week 3 - 23 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Complex Numbers and Operations	Chapter 9.2	Read Chapter 9.2; Complete Week 3 exercises

Week 4 - 30 Mar 2020

Module/Topic	Chapter	Events and Submissions/Topic
Differentiation: Limits and Continuities of Continuous Functions	Chapter 10.1	Read Chapter 10.1; Complete Week 4 exercises

Week 5 - 06 Apr 2020

Module/Topic	Chapter	Events and Submissions/Topic
Differentiation: Derivatives of Continuous Functions	Chapter 10.2	Read Chapter 10.2; Complete Week 5 exercises

Vacation Week - 13 Apr 2020

Module/Topic	Chapter	Events and Submissions/Topic
Mid-Term Break		

Week 6 - 20 Apr 2020

Module/Topic	Chapter	Events and Submissions/Topic
Differentiation: Advanced Techniques of Differentiation, and Higher Order Derivatives	Chapter 10.3, 10.5	Read Chapter 10.3, 10.5; Complete Week 6 exercises

Week 7 - 27 Apr 2020

Module/Topic	Chapter	Events and Submissions/Topic
Differentiation: Critical Points and Extreme Values of Functions	Chapter 11.2	Read Chapter 11.2; Complete Week 7 exercises **Assignment 1** Due: Week 7 Wednesday (29 Apr 2020) 11:55 pm AEST

Week 8 - 04 May 2020

Module/Topic	Chapter	Events and Submissions/Topic
Differentiation: Applications of Differentiation	Chapter 11.1 and 11.4	Read Chapter 11.1 and 11.4; Complete Week 8 exercises

Week 9 - 11 May 2020

Module/Topic	Chapter	Events and Submissions/Topic
Differentiation: Differentials and Approximation	Chapter 11.3.1, 11.3.3	Read Chapter 11.3.1, 11.3.3; Complete Week 9 exercises

Week 10 - 18 May 2020

Module/Topic	Chapter	Events and Submissions/Topic
Matrices: Fundamentals of Matrices and Vectors	Chapter 14.1	Read Chapter 14.1; Complete Week 10 exercises

Week 11 - 25 May 2020

Module/Topic	Chapter	Events and Submissions/Topic
Matrices: Determinants, Inverse Matrices	Chapter 14.2-14.3	Read Chapter 14.2-14.3; Complete Week 11 exercises

Week 12 - 01 Jun 2020

Module/Topic	Chapter	Events and Submissions/Topic
Unit review and examination preparation		**Assignment 2** Due: Week 12 Wednesday (3 June 2020) 11:55 pm AEST

Review/Exam Week - 08 Jun 2020

Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 15 Jun 2020

Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Assignment 1

Assessment Type
Written Assessment

Task Description
This is an individual assignment.
This assignment is to test student's learning outcomes of topics studied in Weeks 1-6. The assignment details are provided on the Moodle website.

Assessment Due Date
Week 7 Wednesday (29 Apr 2020) 11:55 pm AEST

Return Date to Students
Week 9 Wednesday (13 May 2020)
It is envisaged that feedback and solutions will be available in two weeks, or as soon as the marking process is completed.

Weighting
25%

Assessment Criteria
The final mark is out of 25. Questions are awarded the full marks allocated if they are error-free, partial marks if there are some problems, and no marks if not attempted or contain so many errors as to render the attempt to be without value. To ensure maximum benefit, answers to all questions should be neatly and clearly presented and all appropriate working should be shown. Assignments will receive NO marks if submitted after the solutions are released.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit one PDF file through the Moodle website.

Learning Outcomes Assessed

- Solve problems requiring the use of vectors and complex numbers
- Apply linear operations to determine the inverse and determinants of matrices
- Communicate results, concepts and ideas in context using mathematics as a language.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence
- Ethical practice

2 Assignment 2

Assessment Type
Written Assessment

Task Description
This is an individual assignment.
This assignment is to test student's learning outcomes of topics studied in Weeks 7-11. The assignment details are provided on the Moodle website.

Assessment Due Date
Week 12 Wednesday (3 June 2020) 11:55 pm AEST

Return Date to Students
Review/Exam Week Wednesday (10 June 2020)
It is envisaged that the feedback and solutions will be available before the exam.

Weighting
25%

Assessment Criteria
The final mark is out of 25. Questions are awarded the full marks allocated if they are error-free, partial marks if there are some problems, and no marks if not attempted or contain so many errors as to render the attempt to be without value. To ensure maximum benefit, answers to all questions should be neatly and clearly presented and all appropriate working should be shown. Assignments will receive NO marks if submitted after the solutions are released.

Referencing Style

- [Harvard (author-date)](Harvard)

Submission
Online

Submission Instructions
Submit one PDF file through the Moodle website.

Learning Outcomes Assessed

- Formulate and apply functions and graphs in modelling applied mathematics problems
- Solve problems using the concepts of limit, continuity and derivative, and rules of differentiation of functions
- Determine solutions to problems involving rates of change, optimisation and approximate computation through differentiation
- Communicate results, concepts and ideas in context using mathematics as a language.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence
- Ethical practice

Examination

Outline
Complete an invigilated examination.

Date
During the examination period at a CQUniversity examination centre.

Weighting
50%

Length
180 minutes

Minimum mark or grade
50% (25 marks or higher out of the 50 marks available in the exam)

Exam Conditions
Open Book.

Materials
Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).
Calculator - all non-communicable calculators, including scientific, programmable and graphics calculators are authorised

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