MATH12223 *Calculus and Linear Algebra A*
Term 1 - 2017

Profile information current as at 18/05/2024 06:05 pm

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.

General Information

Overview

The unit covers topics in single variable differential calculus and linear algebra. The emphasis is on a conceptual understanding of calculus through a visual, verbal, numerical and algebraic approach with particular focus on the practical power of calculus. Topics covered include functions, mathematical models of real world processes, complex numbers, vectors, matrices and systems of linear equations. However the main focus is on limits, continuity and derivatives which are studied extensively, and are used to derive the rules of differentiation like the product, quotient and chain rules as well as implicit differentiation. Applications of differentiation are discussed like l'Hospital's rule and Newton's method, and differentiation is applied to the areas of optimisation and determining the shape of curves. Mathematical software is also used to investigate and solve most problems studied in the unit. Note: if you have completed unit MATH11163 then you cannot take this unit.

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 Technology Mathematics
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 - 2017

- Distance

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: 20%
2. **Written 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.

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 Course evaluation

Feedback

Low score by students for Learning Resources in the course evaluation

Recommendation

WolframAlpha is an excellent learning resource which is not used much in the course. At the moment students have limited access to the software on the internet. I will investigate incorporating WolframAlpha more into the course, particularly as there is the possibility that we can extend our Mathematica subscription to include WolframAlpha. This will allow students to see the full working for any particular maths problem and so will assist students with independent learning and when I run the weekly online BBCollaborate tutorials.

Action

The free online software program WolframAlpha was used each week in the online Zoom tutorial for the Distance students. It assisted students to visualise complex problems and also to check the validity of their mathematical working and solution.

Unit Learning Outcomes

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

1. Formulate and apply mathematical functions and graphs to model typical applied scenarios.
2. Apply the concepts of limit, continuity and derivative of a function to solve problems.
3. Apply the rules of differentiation like the product, quotient and chain rules, as well as implicit differentiation in appropriate situations.
4. Apply differentiation to solve problems involving rates of change including optimisation, determining the shape of curves, l'Hospital's rule and Newton's method.
5. Analyse and solve problems using complex numbers and trigonometry.
6. Apply vectors and vector operators in two and three dimensional space, particularly for the equations of lines and planes.
7. Solve systems of linear equations using elimination and row operations.
8. Apply matrices and matrix operators, particularly for solving systems of linear equations.
9. Use mathematical software to visualise, analyse and solve problems in single variable differential calculus and linear algebra.

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	7	8	9
1 - Written Assessment - 20%	●	●			●				●
2 - Written Assessment - 20%			●	●	●				●
3 - Examination - 60%	●	●	●	●	●	●	●	●	

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes								
	1	2	3	4	5	6	7	8	9
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 - 20%	•	•	•	•		•		•		
2 - Written Assessment - 20%	•	•	•	•		•		•		
3 - Examination - 60%	•	•	•	•				•		

Textbooks and Resources

Textbooks

MATH12223

Prescribed

Calculus: concepts and contexts
Edition: 4th edn (2010)
Authors: Stewart, J
Brooks Cole
Pacific Grove , USA
ISBN: 9780495560654
Binding: Hardcover
MATH12223

Prescribed

Student Solutions Manual (Metric International Edition) for Stewart's Single Variable Calculus: Concepts and Contexts
4th edition (2010)
Authors: James Stewart
Brooks Cole
Pacific Grove , USA
ISBN: 1-4390-4693-X
Binding: Paperback

Additional Textbook Information
Please note the following comments about textbooks:
The Stewart Calculus textbook and the Student Solutions Manual are **absolutely compulsory** for MATH12223. These two books are also the prescribed textbooks for the Term 2 mathematics unit MATH12224. Hence you will not need to buy any more textbooks if you are enrolling in MATH12224 in Term 2. The Stewart Calculus textbook is also the prescribed textbook for the mathematics unit MATH13217. Please contact the unit coordinator if you wish to discuss further the topic of textbooks for any of these courses.

View textbooks at the CQUniversity Bookshop

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- WolframAlpha on the internet

Referencing Style

All submissions for this unit must use the referencing style: Harvard (author-date)
For further information, see the Assessment Tasks.

Teaching Contacts

Ross Shepherd Unit Coordinator
r.shepherd@cqu.edu.au

Schedule

Week 1 - 06 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic

| Lecture 1 - Course Info & Preview
Lecture 2 - Appendix A
Lecture 3 - Appendix C | **Textbook** - Preview plus Appendix A & Appendix C | Do week 1 tutorial exercises. |

Week 2 - 13 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1 - Section 1.1 & 1.2 **Lecture 2** - Section 1.3 & 1.4 **Lecture 3** - Section 1.5	**Textbook** - Sections 1.1 to 1.5 inclusive	Do week 2 tutorial exercises.

Week 3 - 20 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1 - Section 1.6 **Lecture 2** - Section 1.7 & Appendix I **Lecture 3** - Appendix I & Section 2.1	**Textbook** - Sections 1.6 to 2.1 inclusive & Appendix I	Do week 3 tutorial exercises.

Week 4 - 27 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1 - Section 2.2 **Lecture 2** - Section 2.3 **Lecture 3** - Section 2.4 & 2.5	**Textbook** - Sections 2.2 to 2.5 inclusive	Do week 4 tutorial exercises.

Week 5 - 03 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1 - Section 2.6 **Lecture 2** - Section 2.7 **Lecture 3** - Section 2.8	**Textbook** - Sections 2.6 to 2.8 inclusive	Do week 5 tutorial exercises. **Assignment 1** Due: Week 5 Friday (7 Apr 2017) 11:00 pm AEST

Vacation Week - 10 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 17 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1 - Section 3.1 **Lecture 2** - Section 3.2 & 3.3 **Lecture 3** - Section 3.4 & 3.5	**Textbook** - Sections 3.1 to 3.5 inclusive	Do week 6 tutorial exercises.

Week 7 - 24 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1 - Section 3.6 **Lecture 2** - Section 3.7 **Lecture 3** - Section 3.8 & 3.9	**Textbook** - Sections 3.6 to 3.9 inclusive	Do week 7 tutorial exercises.

Week 8 - 01 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1 - Section 4.1 **Lecture 2** - Section 4.2 **Lecture 3** - Section 4.3	**Textbook** - Sections 4.1 to 4.3 inclusive	Do week 8 tutorial exercises.

Week 9 - 08 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1 - Section 4.5 **Lecture 2** - Section 4.6 **Lecture 3** - Section 4.7 & 4.8	**Textbook** - Sections 4.5 to 4.8 inclusive	Do week 9 tutorial exercises. **Assignment 2** Due: Week 9 Friday (12 May 2017) 11:00 pm AEST

Week 10 - 15 May 2017

Module/Topic	Chapter	Events and Submissions/Topic

| **Lecture 1** - Section 9.1 & 9.2
Lecture 2 - Section 9.3 & 9.4
Lecture 3 - Section 9.5 | **Textbook** - Sections 9.1 to 9.5 inclusive | Do week 10 tutorial exercises. |

Week 11 - 22 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1 - Euclidean m-space **Lecture 2** - Systems of linear equations **Lecture 3** - Row reduction of linear systems	Lecture notes available on Moodle website	Do week 11 tutorial exercises.

Week 12 - 29 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1 - Introduction to matrices **Lecture 2** - Matrices equations and inverses **Lecture 3** - Revision	Lecture notes available on Moodle website	Do week 12 tutorial exercises.

Review/Exam Week - 05 Jun 2017

Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 12 Jun 2017

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

To pass the unit (MATH12223) you must obtain:

- at least 24 out of 60 marks on the final exam **AND**
- at least 50% on the combined total mark for the two assignments and the exam.

Each of the two assignments is worth 20% of the total assessment for this course. Each assignment question is an even-numbered exercise from the textbook. Full working must be shown for each assignment question. It is recommended that you work routinely and methodically through a selection of odd-numbered exercises from the textbook as solutions to all odd-numbered exercises are available in the Student Solutions Manual which is a prescribed text and available from the Bookshop. To help you I have provided a suggested list of Tutorial Exercises (from the textbook) on the Moodle website. Solutions to the Tutorial Exercises are in the Student Solutions Manual which is a prescribed text.

Assessment Tasks

1 Assignment 1

Assessment Type
Written Assessment

Task Description
Submit full worked solutions to twenty even-numbered exercises selected from the Stewart Calculus textbook. The exercises cover topics from Weeks 1 to 4 of the course. The selected exercises and other assignment 1 details are given on the Moodle website.

Assessment Due Date
Week 5 Friday (7 Apr 2017) 11:00 pm AEST
Submit in Week 5 by 11pm on Friday.

Return Date to Students
Week 6 Friday (21 Apr 2017)
Results will be available to students two weeks after the submission date.

Weighting
20%

Assessment Criteria
Marks for each assignment question will be awarded for the setting out, showing the correct steps in the solution as well as finding the correct answer. Full details about the assessment criteria for assignment 1 are available on the Moodle website.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Assignment 1 must be submitted online as a PDF document through the upload facility on the MATH12223 Moodle website.

Learning Outcomes Assessed

- Formulate and apply mathematical functions and graphs to model typical applied scenarios.
- Apply the concepts of limit, continuity and derivative of a function to solve problems.
- Analyse and solve problems using complex numbers and trigonometry.
- Use mathematical software to visualise, analyse and solve problems in single variable differential calculus and linear algebra.

Graduate Attributes

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

2 Assignment 2

Assessment Type
Written Assessment

Task Description
Submit full worked solutions to twenty even-numbered exercises selected from the Stewart Calculus textbook. The exercises cover topics from Weeks 5 to 8 of the course. The selected exercises and other details are given on the Moodle website.

Assessment Due Date
Week 9 Friday (12 May 2017) 11:00 pm AEST
Submit in Week 9 by 5pm on Friday

Return Date to Students
Week 11 Friday (26 May 2017)
Results will be available to students two weeks after the submission date.

Weighting
20%

Assessment Criteria
Marks for each assignment question will be awarded for the setting out, showing the correct steps in the solution as well as finding the correct answer. Full details about the assessment criteria for assignment 2 are available on the Moodle website.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Assignment 2 must be submitted online as a PDF document through the upload facility on the MATH12223 Moodle website.

Learning Outcomes Assessed

- Apply the rules of differentiation like the product, quotient and chain rules, as well as implicit differentiation in

appropriate situations.
- Apply differentiation to solve problems involving rates of change including optimisation, determining the shape of curves, l'Hospital's rule and Newton's method.
- Analyse and solve problems using complex numbers and trigonometry.
- Use mathematical software to visualise, analyse and solve problems in single variable differential calculus and linear algebra.

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
60%

Length
180 minutes

Minimum mark or grade
40% (or 24 marks out of the 60 marks available on the exam).

Exam Conditions
Open Book.

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

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