



MATH12224 Calculus and Linear Algebra B

Term 2 - 2019

Profile information current as at 11/05/2024 11:32 pm

All details in this unit profile for MATH12224 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 integral calculus and linear algebra. The fundamental theorem of calculus is studied as well as various techniques for evaluating integrals like the substitution rule, integration by parts, trigonometric substitution and various numerical approximations. A number of applications of integral calculus are investigated including finding the area between curves, the volume of solids and cylindrical shells, the length of a curve, the average value of a function, as well as applications in physics and engineering. Modelling real world problems with differential equations is studied along with techniques for solving first order differential equations using direction fields and Euler's method, or using methods for separable equations. The use of differential equations to formulate exponential and logistic models of various growth and decay processes is also investigated. Matrices are revisited with particular focus on the determinant of a matrix and how it can be used to solve linear systems of equations. Finally infinite sequences and series are studied along with methods of determining if they converge or diverge. The use of power series to integrate and differentiate functions is investigated with particular emphasis on the Taylor and Maclaurin series representation of a function. Mathematical software is also used to analyse and solve most problems studied in the unit. Note: If you have completed unit MATH11164 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 MATH12223 Calculus and Linear Algebra A

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 2 - 2019

- 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: 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](#).

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 evaluation

Feedback

Students wish to have new lectures uploaded or new information.

Recommendation

The new videos will be considered in the future.

Feedback from Student evaluation

Feedback

It is necessary to record new tutorial videos based on questions from students.

Recommendation

Record new tutorial videos.

Feedback from Self-reflection

Feedback

Steward's textbook is too big and difficult for students in this unit.

Recommendation

This textbook will be reviewed and another concise book may be considered.

Feedback from Student evaluation

Feedback

Moodle site should be changed completely.

Recommendation

Review and improve Moodle site.

Unit Learning Outcomes

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

1. Assess and apply the fundamental theorem of calculus.
2. Evaluate definite and indefinite integrals using the substitution rule, integration by parts, trigonometric substitution and other numerical approximations.
3. Critically analyse and apply integral calculus to problems of calculating areas, volumes, lengths, average values and other applications in physics and engineering.
4. Model problems with differential equations, with a particular focus on exponential and logistic models.
5. Solve first order differential equations using direction fields and Euler's method, or using methods for separable equations.
6. Use the determinant of a matrix to solve a system of linear equations.
7. Analyse the convergence and divergence of infinite sequences or series with particular focus on power series.
8. Calculate a Taylor or Maclaurin series representation of a function and use it to integrate or differentiate a function.
9. Use mathematical software to visualise, analyse and solve problems in single variable integral 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
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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

There are no required textbooks.

Additional Textbook Information

As MATH12223 is the prerequisite for MATH12224, those students who passed MATH12223 in Term 1 of 2019 can keep using the same textbook for MATH12224 in Term 2 of 2019. An extract of revised chapters related to MATH12224 as a PDF file will be available on Moodle.

For students who passed MATH12223 prior to 2019, they may choose to use this extracted PDF file or purchase a copy of the textbook from the Bookshop: "**Essentials and Examples of Applied Mathematics**" (1st edn, ISBN 9781488623820) by William Guo, Pearson Australia (2018). Paper copies are available 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: [Harvard \(author-date\)](#)
For further information, see the Assessment Tasks.

Teaching Contacts

William Guo Unit Coordinator
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Schedule

Week 1 - 15 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Review of Differentials Fundamentals of Indefinite integrals	Section 11.3.1 Differentials of Functions Section 12.1 Fundamentals of Indefinite integrals	Read Sections 11.3.1 & 12.1 Complete Tutorial 1 exercises

Week 2 - 22 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Integration by Substitution	Section 12.2.1 Integration by Substitution	Read Section 12.2.1; complete Tutorial 2 exercises

Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Integration by Parts	Section 12.2.2 Integration by Parts	Read Section 12.2.2; complete Tutorial 3 exercises

Week 4 - 05 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
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Integration by Complete Differentials and Partial Fractions	Sections 12.2.3-12.2.4 Integration by Complete Differentials and Partial Fractions	Read Sections 12.2.3-12.2.4; complete Tutorial 4 exercises
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Week 5 - 12 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Applications of Indefinite Integration	Section 12.3 Applications of Indefinite Integration	Read Section 12.3; complete Tutorial 5 exercises

Vacation Week - 19 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
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Week 6 - 26 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Essentials of Definite Integration	Section 13.1 Essentials of Definite Integration	Read Section 13.1; complete Tutorial 6 exercises Assignment 1 Due: Week 6 Wednesday (28 Aug 2019) 11:55 pm AEST

Week 7 - 02 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Applications of Definite Integration (I)	Section 13.2.1 Applications of Definite Integration	Read Section 13.2.1; complete Tutorial 7 exercises

Week 8 - 09 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Applications of Definite Integration (II)	Sections 13.2.1-13.2.2 Applications of Definite Integration	Read Sections 13.2.1-13.2.2; complete Tutorial 8 exercises

Week 9 - 16 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Numeric Integration	Section 16.3 Numeric Integration	Read Section 16.3; complete Tutorial 9 exercises

Week 10 - 23 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Solving Systems of Linear Equations (I)	Sections 15.1 and 15.2.1 Solving Systems of Linear Equations	Read Sections 15.1 & 15.2.1; complete Tutorial 10 exercises

Week 11 - 30 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Solving Systems of Linear Equations (II)	Sections 15.2.2 and 15.2.3 Solving Systems of Linear Equations	Read Sections 15.2.2 & 15.2.3; complete Tutorial 11 exercises

Week 12 - 07 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
Examination preview and preparation		Assignment 2 Due: Week 12 Wednesday (9 Oct 2019) 11:55 pm AEST

Review/Exam Week - 14 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
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Exam Week - 21 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
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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 1-5. The assignment details are provided on the Moodle website.

Assessment Due Date

Week 6 Wednesday (28 Aug 2019) 11:55 pm AEST

Return Date to Students

Week 8 Wednesday (11 Sept 2019)

It is envisaged that feedback and solutions will be available in two weeks, or as soon as the process is completed.

Weighting

20%

Assessment Criteria

The final mark is out of 20. 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

- Assess and apply the fundamental theorem of calculus.
- Evaluate definite and indefinite integrals using the substitution rule, integration by parts, trigonometric substitution and other numerical approximations.
- Use mathematical software to visualise, analyse and solve problems in single variable integral 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

This is an individual assignment.

This assignment is to test student's learning outcomes of topics studied in Weeks 6-11. The assignment details are provided on the Moodle website.

Assessment Due Date

Week 12 Wednesday (9 Oct 2019) 11:55 pm AEST

Return Date to Students

It is envisaged that feedback and solutions will be available prior to sitting the standard examination.

Weighting

20%

Assessment Criteria

The final mark is out of 20. 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

- Critically analyse and apply integral calculus to problems of calculating areas, volumes, lengths, average values and other applications in physics and engineering.
- Model problems with differential equations, with a particular focus on exponential and logistic models.
- Solve first order differential equations using direction fields and Euler's method, or using methods for separable equations.
- Use mathematical software to visualise, analyse and solve problems in single variable integral 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% (24 marks or higher out of the 60 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