



# MATH12224 *Calculus and Linear Algebra B*

## Term 2 - 2018

Profile information current as at 29/04/2024 08:33 am

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 - 2018

- 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](#).

## 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 Unit Evaluations

##### Feedback

Video resources were favourably commented on by distance students. Students made use of the instructional based videos.

##### Recommendation

Continue to develop and upgrade video resources.

## 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



### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes								
	1	2	3	4	5	6	7	8	9
<b>1 - Written Assessment - 20%</b>	•	•							•
<b>2 - Written Assessment - 20%</b>			•	•	•				•
<b>3 - Examination - 60%</b>	•	•	•	•	•	•	•	•	

### 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

MATH12224

#### Prescribed

##### Calculus : Concepts and Contexts

Edition: 4th edn (2017)

Authors: Stewart , James

Cengage Learning

Florence , KY , USA

ISBN: 9781337687669

Binding: Paperback

#### Additional Textbook Information

**This unit uses the same textbook prescribed for the first Term unit MATH12223 Calculus and Linear**

**Algebra A.** Students don't need to buy any textbooks for this unit if they have the Metric International 4th edition of Stewart's Calculus textbook.

[View textbooks at the CQUniversity Bookshop](#)

### IT Resources

**You will need access to the following IT resources:**

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Wolfram Alpha (available free 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

**Yucang Wang** Unit Coordinator

[y.wang2@cqu.edu.au](mailto:y.wang2@cqu.edu.au)

## Schedule

### Week 1 - 09 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Unit overview, Areas & Distance, The Definite Integral	Stewart 5.1 & 5.2	Do week 1 tutorial exercises.

### Week 2 - 16 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Evaluating Definite Integrals, Fundamental Theorem of Calculus, Substitution Rule	Stewart 5.3, 5.4 & 5.5	Do week 2 tutorial exercises.

### Week 3 - 23 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

Integration by Parts, Trigonometric Integrals & Trigonometric Substitution	Stewart 5.6 & 5.7 (part)	Do week 3 tutorial exercises.
--	--------------------------	-------------------------------

#### Week 4 - 30 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Integration using Partial Fractions, Using Tables and Computer Algebra Systems	Stewart 5.7 (part), Appendix G & 5.8	Do week 4 tutorial exercises.

#### Week 5 - 06 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
Approximate Integration, Improper Integrals	Stewart 5.9 & 5.10	Do week 5 tutorial exercises.  <b>Written Assessment</b> Due: Week 5 Friday (10 Aug 2018) 11:00 pm AEST

#### Vacation Week - 13 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

#### Week 6 - 20 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
More about Areas, Volumes, Volumes by Cylindrical Shells	Stewart 6.1 to 6.3	Do week 6 tutorial exercises.

#### Week 7 - 27 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
Arclength, Average Value of a Function, Applications to Physics and Engineering	Stewart 6.4 to 6.6	Do week 7 tutorial exercises.

#### Week 8 - 03 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Modelling with Differential Equations, Direction Fields and Euler's Method, Separable Methods	Stewart 7.1, 7.2 & 7.3	Do week 8 tutorial exercises.

#### Week 9 - 10 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Exponential Growth & Decay, The Logistic Equation	Stewart 7.4 & 7.5	Do week 9 tutorial exercises.  <b>Written Assessment</b> Due: Week 9 Friday (14 Sep 2018) 11:00 pm AEST

#### Week 10 - 17 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Determinants, Cramer's Rule, Sequences	Venit 4.1 to 4.3 & Stewart 8.1	Do week 10 tutorial exercises.

#### Week 11 - 24 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Series, Tests of Convergence, Estimating Sums	Stewart 8.2, 8.3 & 8.4	Do week 11 tutorial exercises.

#### Week 12 - 01 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
Power Series and Function Representations, Taylor and Maclaurin Series	Stewart 8.5, 8.6 & 8.7	Do week 12 tutorial exercises.

## Review/Exam Week - 08 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

## Exam Week - 15 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

## Assessment Tasks

### 1 Written Assessment

#### Assessment Type

Written Assessment

#### Task Description

Assignment 1 is a non-supervised assessment item and must be completed individually by each student. The questions cover topics from Weeks 1 to 4 of the unit. 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. Assignment 1 will be made available at the end of Week 1 under the ASSESSMENT Block on the Moodle site.

**Full assignment details are available on the MATH12224 Moodle website.**

#### Assessment Due Date

Week 5 Friday (10 Aug 2018) 11:00 pm AEST

Submit by 11pm on Friday of Week 5.

#### Return Date to Students

Week 7 Friday (31 Aug 2018)

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 single PDF document through the MATH12224 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 Written Assessment

#### Assessment Type

Written Assessment

**Task Description**

Assignment 2 is a non-supervised assessment item and must be completed individually by each student. The questions cover topics from Weeks 5 to 8 of the unit. 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. Assignment 2 will be made available at the end of Week 5 under the ASSESSMENT Block on the Moodle site.

**Full assignment details are available on the MATH12224 Moodle website.**

**Assessment Due Date**

Week 9 Friday (14 Sept 2018) 11:00 pm AEST

Submit by 11pm on Friday of Week 9.

**Return Date to Students**

Week 11 Friday (28 Sept 2018)

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 single PDF document through the MATH12224 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%

**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