



# MATH11219 Applied Calculus

## Term 3 - 2022

Profile information current as at 11/12/2023 05:08 pm

All details in this unit profile for MATH11219 have been officially approved by CQU University 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

In this unit, you will apply the essential calculus concepts, processes, and techniques to develop mathematical models for science and engineering problems. You will use the Fundamental Theorem of Calculus to illustrate the relationship between the derivative and the integral of a function. The theorem will also be applied to problems involving definite integrals. Differential calculus will be used to construct mathematical models that investigate a variety of rate-of-change and optimisation problems. You will learn how to apply the standard rules and techniques of integration. Science and engineering disciplinary problems will be investigated through the use of differential equations. Other important elements of this unit are the communication of results, concepts, and ideas using mathematics as a language. Mathematical software will also be used to visualise, analyse, validate, and solve problems studied in the unit.

### Details

Career Level: *Undergraduate*

Unit Level: *Level 1*

Credit Points: 6

Student Contribution Band: 7

Fraction of Full-Time Student Load: 0.125

### Pre-requisites or Co-requisites

Prerequisite: MATH11218 Anti-requisite: MATH12223 or MATH12224

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 3 - 2022

- Online

### 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 Coordinator reflection

##### Feedback

A large segment of students would substantially benefit from ensuring sufficient practice with the fundamental mathematics curriculum covered in the unit.

##### Recommendation

Update unit assessment to include workbook submissions that capture the students practice, in developing solutions to the units curriculum, during the term.

## Unit Learning Outcomes

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

1. Interpret the derivative as a rate of change to apply the rules of differentiation in investigating rates of change of functions
2. Construct mathematical models to investigate optimisation problems using differential calculus
3. Carry out the process of integration as the inverse operation of differentiation
4. Apply standard rules and techniques of integration to construct and analyse simple mathematical models involving rates of change and elementary differential equations
5. Use the Fundamental Theorem of Calculus to illustrate the relationship between the derivative and the integral of a function and apply the theorem to problems involving definite integrals
6. Communicate results, concepts, and ideas in context using mathematics as a language
7. Use mathematical software to visualise, analyse, validate and solve problems.

**The Learning Outcomes for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Professional Engineers in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability and 3. Professional and Personal Attributes at the following levels:**

**Introductory 1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 1N 2N 3N 4N 5N 6N 7N ) 2.1 Application of established engineering methods to complex engineering problem-solving. (LO: 1N 2N 3N 4N 5N 7N ) 2.2 Fluent application of engineering techniques, tools and resources. (LO: 1N 2N 3N 4N 5N 7N ) 3.2 Effective oral and written communication in professional and lay domains. (LO: 6N ) 3.3 Creative, innovative and pro-active demeanour. (LO: 1N 2N 3N 4N 5N ) 3.4 Professional use and management of information. (LO: 6N )**

**Note: LO refers to the Learning Outcome number(s) which link to the competency and the levels: N - Introductory, I - Intermediate and A - Advanced.**

**Refer to the Engineering Undergraduate Course Moodle site for further information on the Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course level mapping information <https://moodle.cqu.edu.au/course/view.php?id=1511>**

## 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
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
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

MATH11219

#### Prescribed

##### **Engineering Mathematics: A Foundation for Electronic, Electrical, Communications and Systems Engineers**

Fifth Edition (2017)

Authors: Anthony Croft, Robert Davison, Martin Hargreaves and James Flint

Pearson

Harlow, England

ISBN: 978-1-292-14665-2

Binding: Paperback

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#### Supplementary

##### **ESSENTIALS AND EXAMPLES OF APPLIED MATHEMATICS**

Edition: 2nd edn (2020)

Authors: William Guo

Pearson Australia

Melbourne, VIC, Australia

ISBN: 9780655703624

Binding: Paperback

[View textbooks at the CQUniversity Bookshop](#)

### IT Resources

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

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Access to a document scanner and/or pdf converter (all assessment submitted electronically as pdf file)
- Access to a printer (for printing assessment and tutorial materials)
- Access to a webcam, speakers and microphone or a headset (for participating in Zoom lectures and tutorials)

## Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)

For further information, see the Assessment Tasks.

## Teaching Contacts

**Lasi Piyathilaka** Unit Coordinator

[l.piyathilaka@cqu.edu.au](mailto:l.piyathilaka@cqu.edu.au)

## Schedule

### Week 1 - 07 Nov 2022

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 10.1 to 10.8	Chapter 10: Differentiation	Textbook Exercises 10.3 to 10.8 and Week 1 Tutorial Exercises

### Week 2 - 14 Nov 2022

Module/Topic	Chapter	Events and Submissions/Topic
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Textbook Sections 11.1 to 11.4	Chapter 11: Techniques of Differentiation	Textbook Exercises 11.2 to 11.4 and Week 2 Tutorial Exercises
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### Week 3 - 21 Nov 2022

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 12.1 to 12.4	Chapter 12: Application of Differentiation	Textbook Exercises 12.2 to 12.4 and Week 3 Tutorial Exercises

### Week 4 - 28 Nov 2022

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 6.1 to 6.6	Chapter 6: Sequences and Series	Textbook Exercises 6.2 to 6.6 and Week 4 Tutorial Exercises

### Vacation Week - 05 Dec 2022

Module/Topic	Chapter	Events and Submissions/Topic
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### Week 5 - 12 Dec 2022

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 18.1 to 18.6	Chapter 18: Taylor Polynomials, Taylor Series and Maclaurin Series	Textbook Exercises 18.2 to 18.6 and Week 5 Tutorial Exercises <b>Assignment 1</b> Due: Week 5 Friday (16 Dec 2022) 5:00 pm AEST

### Week 6 - 19 Dec 2022

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 13.1 to 13.3	Chapter 13: Integration	Textbook Exercises 13.2 to 13.3 and Week 6 Tutorial Exercises

### Vacation Week - 26 Dec 2022

Module/Topic	Chapter	Events and Submissions/Topic
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### Week 7 - 02 Jan 2023

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 14.1 to 14.4	Chapter 14: Techniques of Integration	Textbook Exercises 14.2 to 14.4 and Week 7 Tutorial Exercises

### Week 8 - 09 Jan 2023

Module/Topic	Chapter	Events and Submissions/Topic
Resource Materials	Further Topics in Integration	Resource Material Exercises and Week 8 Tutorial Exercises

### Week 9 - 16 Jan 2023

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 19.1 to 19.4	Chapter 19: Ordinary Differential Equations	Textbook Exercises 19.2 to 19.4 and Week 9 Tutorial Exercises

### Week 10 - 23 Jan 2023

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 19.5 to 19.6	Chapter 19: Ordinary Differential Equations	Textbook Exercises 19.5 to 19.6 and Week 10 Tutorial Exercises <b>Assignment 2</b> Due: Week 10 Monday (23 Jan 2023) 5:00 pm AEST

### Week 11 - 30 Jan 2023

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 25.1 to 25.5	Chapter 25: Functions of Several Variables	Textbook Exercises 25.3 to 25.5 and Week 11 Tutorial Exercises

## Week 12 - 06 Feb 2023

Module/Topic	Chapter	Events and Submissions/Topic
Revision		Week 12 Tutorial Exercises

## Exam Week - 13 Feb 2023

Module/Topic	Chapter	Events and Submissions/Topic
		Final Examination

## Assessment Tasks

### 1 Assignment 1

#### Assessment Type

Written Assessment

#### Task Description

This is an individual assignment. Students are reminded that all aspects of work submitted are to be the results of their own personal studies.

Please see the unit Moodle site for the questions in this assignment. Assignment 1 will be available for download under the "Assessment" tile on the unit Moodle website, together with complete instructions for online submission of your solutions to the assignment questions.

Marks will be deducted for assignments that are submitted late without an extension request.

Assignments will receive NO marks if submitted after the solutions have been released.

#### Assessment Due Date

Week 5 Friday (16 Dec 2022) 5:00 pm AEST

#### Return Date to Students

We strive to have feedback and solutions available within two weeks, or as soon as the marking process is completed.

#### Weighting

20%

#### Assessment Criteria

The final weighted result is out of 20. Questions are awarded full marks if they are error-free, partial marks if there are some errors, and no marks if not attempted or contain so many errors as to render the attempt to be without value.

Answers to all questions should be neatly and clearly presented and full working is required to obtain maximum credit for solutions.

#### Referencing Style

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

#### Submission

Online

#### Submission Instructions

Assignment One is uploaded as a single PDF document to the unit Moodle site for MATH11219. Full details are provided on the unit Moodle site.

#### Learning Outcomes Assessed

- Interpret the derivative as a rate of change to apply the rules of differentiation in investigating rates of change of functions
- Construct mathematical models to investigate optimisation problems using differential calculus
- Communicate results, concepts, and ideas in context using mathematics as a language
- Use mathematical software to visualise, analyse, validate and solve problems.

#### Graduate Attributes

- Communication
- Problem Solving

- Critical Thinking
- Information Literacy
- Information Technology Competence

## 2 Assignment 2

### Assessment Type

Written Assessment

### Task Description

This is an individual assignment. Students are reminded that all aspects of work submitted are to be the results of their own personal studies.

Please see the unit Moodle site for the questions in this assignment. Assignment 2 will be available for download under the "Assessment" tile on the unit Moodle website, together with complete instructions for online submission of your solutions to the assignment questions.

Marks will be deducted for assignments that are submitted late without an extension request.

Assignments will receive NO marks if submitted after the solutions have been released.

### Assessment Due Date

Week 10 Monday (23 Jan 2023) 5:00 pm AEST

### Return Date to Students

We strive to have feedback and solutions available within two weeks, or as soon as the marking process is completed.

### Weighting

20%

### Assessment Criteria

The final weighted result is out of 20. Questions are awarded full marks if they are error-free, partial marks if there are some errors, and no marks if not attempted or contain so many errors as to render the attempt to be without value.

Answers to all questions should be neatly and clearly presented and full working is required to obtain maximum credit for solutions.

### Referencing Style

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

### Submission

Online

### Submission Instructions

Assignment 2 is uploaded as a single PDF document to the unit Moodle site for MATH11219. Full details are provided on the unit Moodle site.

### Learning Outcomes Assessed

- Carry out the process of integration as the inverse operation of differentiation
- Apply standard rules and techniques of integration to construct and analyse simple mathematical models involving rates of change and elementary differential equations
- Use the Fundamental Theorem of Calculus to illustrate the relationship between the derivative and the integral of a function and apply the theorem to problems involving definite integrals
- Communicate results, concepts, and ideas in context using mathematics as a language
- Use mathematical software to visualise, analyse, validate and solve problems.

### Graduate Attributes

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

## 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**

Students must score a minimum of 50% of the marks available on the examination.

**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