



MATH11219 Applied Calculus

Term 2 - 2024

Profile information current as at 12/11/2024 05:54 am

All details in this unit profile for MATH11219 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

In this unit, you will apply the essential calculus concepts, processes, and techniques to develop mathematical models for science and engineering problems. Throughout the term, you will record handwritten worked examples of all problems attempted in a workbook to create a comprehensive resource for solving mathematical problems, which you can apply in the exam and throughout your course and career. You will use the Fundamental Theorem of Calculus to illustrate the relationship between a function's derivative and integral. The theorem will also be applied to problems involving definite integrals. Differential calculus will be used to construct mathematical models that investigate various 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 explored through the use of differential equations. Other essential elements of this unit are communicating 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 2 - 2024

- Bundaberg
- Cairns
- Gladstone
- Mackay
- 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: Pass/Fail

2. **Online Quiz(zes)**

Weighting: Pass/Fail

3. **Examination**

Weighting: Pass/Fail

Assessment Grading

This is a pass/fail (non-graded) unit. To pass the unit, you must pass all of the individual assessment tasks shown in the table above.

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 SUTE

Feedback

Students were not happy with the amount of questions they have to solve in workbook based assessment items.

Recommendation

A number of questions in the workbook-based assessment item should be revisited to reduce the workload by removing similar types of questions from the workbook.

Feedback from SUTE

Feedback

Students preferred solving smaller number of tutorial questions in detail rather than explaining large number of questions within one tutorial session.

Recommendation

Tutorial questions should be reviewed and identify the key questions to be discussed during the tutorial session in detail.

Feedback from SUTE

Feedback

Students found content and real-world applications used within the unit interesting.

Recommendation

This content should be retained.

Feedback from SUTE

Feedback

Some students found content taught in the unit not relevant to their discipline of study.

Recommendation

Content should be reviewed to include material that covers multiple disciplines.

Feedback from SUTE

Feedback

Students expected more detailed individualised feedback for their assessments.

Recommendation

More detailed feedback should be given to assessments.

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 proactive demeanor. (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 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 - 0% | • | • | • | • | • | • | • |
| 2 - Online Quiz(zes) - 0% | • | • | • | • | • | | |
| 3 - Examination - 0% | • | • | • | • | • | • | |

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 | | | | | | | |

Textbooks and Resources

Textbooks

MATH11219

Prescribed

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

5th Edition (2017)

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

Pearson

Harlow , Harlow , England

ISBN: 978-1-292-14665-2

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Supplementary

Essentials and Examples of Applied Mathematics

2nd Edition (2022)

Authors: William W. Guo

Pearson Australia

Melbourne , VIC , Australia

ISBN: 978-0-655-70362-4

[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

Azad Rahman Unit Coordinator

a.rahman2@cqu.edu.au

Schedule

Week 1 - 08 Jul 2024

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

Week 2 - 15 Jul 2024

| Module/Topic | Chapter | Events and Submissions/Topic |
|-------------------------------|-----------------------------------|---|
| Techniques of Differentiation | Chapter 11: Sections 11.1 to 11.4 | Textbook Exercises 11.2 to 11.4 and Week 2 Tutorial Exercises |

| Week 3 - 22 Jul 2024 | | |
|--|-----------------------------------|---|
| Module/Topic | Chapter | Events and Submissions/Topic |
| Application of Differentiation | Chapter 12: Sections 12.1 to 12.4 | Textbook Exercises 12.2 to 12.4 and Week 3 Tutorial Exercises |
| Week 4 - 29 Jul 2024 | | |
| Module/Topic | Chapter | Events and Submissions/Topic |
| Sequences and Series | Chapter 6: Sections 6.1 to 6.6 | Textbook Exercises 6.2 to 6.6 and Week 4 Tutorial Exercises Competency Test 1 (Online Quiz) Due : Week 4 Friday 11:59 pm AEST |
| Week 5 - 05 Aug 2024 | | |
| Module/Topic | Chapter | Events and Submissions/Topic |
| Taylor Polynomials, Taylor Series and Maclaurin Series | Chapter 18: Sections 18.1 to 18.6 | Textbook Exercises 18.2 to 18.6 and Week 5 Tutorial Exercises Handwritten Workbook Part A Due: Week 5 Friday 11:59 pm AEST |
| Vacation Week - 12 Aug 2024 | | |
| Module/Topic | Chapter | Events and Submissions/Topic |
| | | |
| Week 6 - 19 Aug 2024 | | |
| Module/Topic | Chapter | Events and Submissions/Topic |
| Integration | Chapter 13: Sections 13.1 to 13.3 | Textbook Exercises 13.2 to 13.3 and Week 6 Tutorial Exercises |
| Week 7 - 26 Aug 2024 | | |
| Module/Topic | Chapter | Events and Submissions/Topic |
| Techniques of Integration | Chapter 14: Sections 14.1 to 14.4 | Textbook Exercises 14.2 to 14.4 and Week 7 Tutorial Exercises |
| Week 8 - 02 Sep 2024 | | |
| Module/Topic | Chapter | Events and Submissions/Topic |
| Further Topics in Integration | Unit Resource Materials | Resource Material Exercises and Week 8 Tutorial Exercises Competency Test 2 (Online Quiz) Due: Week 8 Friday 11:59 pm AEST |
| Week 9 - 09 Sep 2024 | | |
| Module/Topic | Chapter | Events and Submissions/Topic |
| Ordinary Differential Equations | Chapter 19: Sections 19.1 to 19.4 | Textbook Exercises 19.2 to 19.4 and Week 9 Tutorial Exercises Handwritten Workbook Part B Due: Week 9 Friday 11:59 pm AEST |
| Week 10 - 16 Sep 2024 | | |
| Module/Topic | Chapter | Events and Submissions/Topic |
| Ordinary Differential Equations | Chapter 19: Sections 19.5 to 19.6 | Textbook Exercises 19.5 to 19.6 and Week 10 Tutorial Exercises |
| Week 11 - 23 Sep 2024 | | |
| Module/Topic | Chapter | Events and Submissions/Topic |
| Functions of Several Variables | Chapter 25: Sections 25.1 to 25.5 | Textbook Exercises 25.3 to 25.5 and Week 11 Tutorial Exercises Handwritten Workbook Part C Due: Week 11 Friday 11:59 pm AEST |
| Week 12 - 30 Sep 2024 | | |
| Module/Topic | Chapter | Events and Submissions/Topic |
| | | |

Revision

Competency Test 3 (Online Quiz) Due:
Week 12 Friday 11:59 pm AEST

Review/Exam Week - 07 Oct 2024

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

Exam Week - 14 Oct 2024

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

Final exam: There will be a single invigilated examination scheduled during the examination period (10th to 18th of October 2024)

Term Specific Information

Unit Coordinator: Dr Azad Rahman

email: a.rahman2@cqu.edu.au

Telephone (Office): 0749309313

Office: Rockhampton, North, CQUniversity, Building 30, First Floor, Room 1.10.

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

- Fifth Edition (2017)
- Authors: Anthony Croft, Robert Davison, Martin Hargreaves and James Flint

Supplementary Textbook: ESSENTIALS AND EXAMPLES OF APPLIED MATHEMATICS

- Edition: 2nd edn (2020)
- Authors: William Guo

Assessment Tasks

1 Handwritten Workbook

Assessment Type

Written Assessment

Task Description

This is an individual assignment. It must be only handwritten and uploaded after completing assigned tasks.

Students are reminded that all aspects of work submitted are to be the efforts of their own personal studies. Students are expected to complete assigned set of questions progressively each week and collate all answers and submit on or before the due date as a single pdf document.

Please see the unit Moodle site for the questions in this assignment. Assignment 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

The dates for handwritten workbook Part A, B and C are detailed in the Schedule of the Unit Profile.

Return Date to Students

We strive to release the assessment marks in 2 weeks after due date.

Weighting

Pass/Fail

Minimum mark or grade

Cumulative marks for Handwritten Workbook Part A, Part B and Part C need to be equal or more than 25% to Pass this Assessment.

Assessment Criteria

The handwritten workbook mark is based on Pass/Fail system. Responses to the 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.

Referencing Style

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

Submission

Online

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
- 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

2 Competency Tests

Assessment Type

Online Quiz(zes)

Task Description

This assessment item is a set of online quizzes that can be accessed via the unit Moodle site.

- The quizzes are an integral part of the study to test the key concepts and students need to complete three (3) online quizzes.
- Specific details of the assessment can be found on the unit Moodle site at the beginning of the term.
- Each quiz can be attempted three(3) times and the score for the quiz will be the score of the highest marks obtained in the attempts.
- If you encounter any network access issues during the quiz, the unit coordinator should be notified at your earliest convenience.
- Students are reminded that all aspects of work are to be the efforts of their own personal studies.

Please see the unit Moodle site for the questions for the quizzes. Quizzes will be available under the "Assessment" tile on the unit Moodle website, together with complete instructions for online submission.

Marks will be deducted for quizzes that are completed late without an extension request.

Number of Quizzes

3

Frequency of Quizzes

Other

Assessment Due Date

The dates for each quiz is detailed in the Schedule of the Unit Profile.

Return Date to Students

Your result will be automatically displayed on screen once you completed your final attempt.

Weighting

Pass/Fail

Minimum mark or grade

Cumulative marks for Competency Test 1, Test 2 and Test 3 need to be equal or more than 25% to Pass this Assessment.

Assessment Criteria

The quiz mark is based on Pass/Fail system. Responses to the 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.

Referencing Style

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

Submission

Online

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
- 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

Graduate Attributes

Examination

Outline

Complete an invigilated examination.

Date

During the examination period at a CQUniversity examination centre.

Weighting

0%

Length

180 minutes

Minimum mark or grade

50%

Exam Conditions

Restricted.

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

Learning Outcomes Assessed

Graduate Attributes

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