MATH11219 *Applied Calculus*
Term 3 - 2018

Profile information current as at 28/04/2024 07:46 am

General Information

Overview

In this unit students apply the essential calculus concepts, processes and techniques to develop mathematical models for science and engineering problems. These include use of the Fundamental Theorem of Calculus to illustrate the relationship between the derivative and the integral of a function, and to apply the theorem to problems involving definite integrals. Differential calculus is used to construct mathematical models which investigate a variety of rate of change and optimisation problems. The standard rules and techniques of integration are included. Differential equations are introduced and applied to investigate more interesting science and engineering problems. Other important elements of this unit are the communication of results, concepts and ideas using mathematics as a language, being able to document the solution to problems in a way that demonstrates a clear, logical and precise approach, and communicating, working and learning in peer learning teams where appropriate. Mathematical software is also used to analyse and solve most problems studied in the unit. Note: If you have completed units MATH12223 or MATH12224 then you cannot take this 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 - 2018

- Distance
- 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. **Written Assessment**
Weighting: 10%
4. **Examination**
Weighting: 50%

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 Engineering program committee.

Feedback
Embed additional applied engineering disciplinary examples in the unit.

Recommendation
Liaise with the engineering discipline leads for additional applied engineering examples to embed in unit learning materials.

Feedback from Student feedback from the unit evaluation.

Feedback
Strong student feedback was received on the assessment, Moodle site layout and available resources, lecturing style and examples presented, and the level of support offered by staff.

Recommendation
Continue to foster the current learning and teaching environment.

Unit Learning Outcomes

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

1. Interpret the derivative as a rate of change and use the rules of differentiation to investigate rates of change of functions.
2. Use differential calculus to construct mathematical models to investigate optimisation problems.
3. Carry out the process of integration as the inverse operation of differentiation.
4. Apply standard rules and techniques of integration, 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. Select appropriate mathematical methods, use them to investigate and solve problems, and interpret the results.
7. Use mathematics as a language to communicate results, concepts and ideas in context.
8. Document the solution to problems in a way that demonstrates a clear, logical and precise approach.
9. Communicate, work and learn together in peer learning teams where appropriate.
10. Use mathematical software to visualise, analyse, validate and solve problems.

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	10
1 - Written Assessment - 20%	•	•			•	•	•	•		•
2 - Written Assessment - 20%		•	•		•	•	•	•		•

Assessment Tasks	Learning Outcomes									
	1	2	3	4	5	6	7	8	9	10
3 - Written Assessment - 10%				•	•	•	•	•	•	•
4 - Examination - 50%	•	•	•	•	•	•	•	•		

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes									
	1	2	3	4	5	6	7	8	9	10
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 - Written Assessment - 10%	•	•	•	•	•	•	•	•		
4 - Examination - 50%	•	•	•	•		•		•		

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
MATH11219

Supplementary

ESSENTIALS AND EXAMPLES OF APPLIED MATHEMATICS
Edition: 1st edn (2018)
Authors: William Guo
Pearson Australia
Melbourne , VIC , Australia
ISBN: 9781488623820
Binding: Paperback

Additional Textbook Information
Note: The prescribed text for this unit is the same text used in MATH11218 Engineering Foundation Mathematics, the prerequisite unit.
Additional resources will be from the supplement textbook by W Guo. You may not need to buy the supplementary textbook only for covering the additional resources in this unit as THIS PART will be provided as a free pdf by the author to the class. The supplementary textbook is closely connected to the textbook of MATH12222 that will be offered to engineering students in their second-year study.

View textbooks at the CQUniversity Bookshop

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
w.guo@cqu.edu.au

Schedule

Week 1 - 05 Nov 2018

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 - 12 Nov 2018

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

Week 3 - 19 Nov 2018

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 - 26 Nov 2018

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 **Assignment 1** Due: Week 4 Friday (30 Nov 2018) 11:55 pm AEST

Vacation Week - 03 Dec 2018

Module/Topic	Chapter	Events and Submissions/Topic

Week 5 - 10 Dec 2018

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

Week 6 - 17 Dec 2018

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

Week 7 - 31 Dec 2018

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 - 07 Jan 2019

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 15.1 to 15.3, and Resource Materials	Chapter 15: Applications of Integration Supp textbook Section 13.2: Applications of Definite Integration (pdf copy of this section will be provided on Moodle)	Textbook Exercises 15.2 to 15.3, and Week 8 Tutorial Exercises **Assignment 2** Due: Week 8 Friday (11 Jan 2019) 11:55 pm AEST

Week 9 - 14 Jan 2019

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 16.3 to 16.5, and 17.1 to 17.3	Chapter 16: Further Topics in Integration, and Chapter 17: Numerical Integration	Textbook Exercises 16.3 to 16.5, 17.2 to 17.3 and Week 9 Tutorial Exercises

Week 10 - 21 Jan 2019

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 10 Tutorial Exercises

Week 11 - 28 Jan 2019

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 **Assignment 3** Due: Week 11 Friday (1 Feb 2019) 11:55 pm AEST
Week 12 - 04 Feb 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Revision		Week 12 Tutorial Exercises
Exam Week - 11 Feb 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**

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" block 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 which are submitted late without prior permission or adequate explanation. Assignments will receive NO marks if submitted after the solutions are released.

Assessment Due Date
Week 4 Friday (30 Nov 2018) 11:55 pm AEST

Return Date to Students
Week 6 Thursday (20 Dec 2018)
Usually within two weeks of the due date; through the unit Moodle site.

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 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 full working is required to obtain maximum credit for solutions.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Assignment 1 is uploaded as a single document at 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 and use the rules of differentiation to investigate rates of change of functions.
- Use differential calculus to construct mathematical models to investigate optimisation problems.
- 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.
- Select appropriate mathematical methods, use them to investigate and solve problems, and interpret the results.
- Use mathematics as a language to communicate results, concepts and ideas in context.
- Document the solution to problems in a way that demonstrates a clear, logical and precise approach.

- Use mathematical software to visualise, analyse, validate and solve problems.

Graduate Attributes

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

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" block 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 which are submitted late without prior permission or adequate explanation. Assignments will receive NO marks if submitted after the solutions are released.

Assessment Due Date
Week 8 Friday (11 Jan 2019) 11:55 pm AEST

Return Date to Students
Week 10 Friday (25 Jan 2019)
Usually within two weeks of the due date; through the unit Moodle site.

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 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 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 document at the unit Moodle site for MATH11219. Full details are provided on the unit Moodle site.

Learning Outcomes Assessed

- Use differential calculus to construct mathematical models to investigate optimisation problems.
- Carry out the process of integration as the inverse operation of differentiation.
- 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.
- Select appropriate mathematical methods, use them to investigate and solve problems, and interpret the results.
- Use mathematics as a language to communicate results, concepts and ideas in context.
- Document the solution to problems in a way that demonstrates a clear, logical and precise approach.
- Use mathematical software to visualise, analyse, validate and solve problems.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

3 Assignment 3

Assessment Type
Written Assessment

Task Description
This is an optional group assignment. Assignment 3 will be available for download under the "Assessment" block 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 which are submitted late without prior permission or adequate explanation. Assignments will receive NO marks if submitted after the solutions are released.

Assessment Due Date
Week 11 Friday (1 Feb 2019) 11:55 pm AEST

Return Date to Students

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

Weighting
10%

Assessment Criteria
The final weighted result is out of 10. Questions are awarded full marks 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.

Referencing Style

- Harvard (author-date)

Submission
Online Group

Submission Instructions
A group can have up to three (3) students. Assignment 3 is uploaded as a single document at the unit Moodle site for MATH11219. Full details are provided on the unit Moodle site.

Learning Outcomes Assessed

- Apply standard rules and techniques of integration, 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.
- Select appropriate mathematical methods, use them to investigate and solve problems, and interpret the results.
- Use mathematics as a language to communicate results, concepts and ideas in context.
- Document the solution to problems in a way that demonstrates a clear, logical and precise approach.
- Communicate, work and learn together in peer learning teams where appropriate.
- Use mathematical software to visualise, analyse, validate and solve problems.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

Examination

Outline
Complete an invigilated examination.

Date
During the examination period at a CQUniversity examination centre.

Weighting
50%

Length
180 minutes

Minimum mark or grade
50% (25 marks or higher out of the 50 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