MATH11219 *Applied Calculus*

Term 3 - 2020

Profile information current as at 25/04/2024 08:15 pm

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. 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 - 2020

- 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. **Take Home Exam**
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
Additional visualisations in lecture materials to assist student learning.

Recommendation
Review and embed additional visualisations in lecture materials to assist student learning.

Feedback from Student unit and teaching evaluation

Feedback
Students appreciated a well structured, well resourced unit that was easy to follow and had helpful teaching 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 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.

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
1 - Written Assessment - 20%	•	•				•	•
2 - Written Assessment - 20%			•	•	•	•	•
3 - Take Home Exam - 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 - Take Home Exam - 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
MATH11219

Supplementary

ESSENTIALS AND EXAMPLES OF APPLIED MATHEMATICS
Edition: 1st edn (2018)
Authors: William Guo
Pearson Australia
Melbourne , VIC , Australia
ISBN: 9781488623820
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 speaker and microphone or a headset (for participating in Zoom Videoconferencing link up: Lecturers and Tutorials)
- Access to a document scanner and/or pdf converter (all assessment submitted electronically as pdf file)
- Access to a webcam (for participating in Zoom Videoconferencing link up: Lecturers and Tutorials)
- Access to a printer (for printing assessment and tutorial materials)

Referencing Style

All submissions for this unit must use the referencing style: Harvard (author-date)
For further information, see the Assessment Tasks.

Teaching Contacts

Clinton Hayes Unit Coordinator
c.hayes@cqu.edu.au

Schedule

Week 1 - 09 Nov 2020

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 - 16 Nov 2020

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 - 23 Nov 2020

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 - 30 Nov 2020

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 - 07 Dec 2020

Module/Topic	Chapter	Events and Submissions/Topic

Week 5 - 14 Dec 2020

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 **Assignment 1** Due: Week 5 Friday (18 Dec 2020) 5:00 pm AEST

Week 6 - 21 Dec 2020

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 - 28 Dec 2020

Module/Topic	Chapter	Events and Submissions/Topic

Week 7 - 04 Jan 2021

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 - 11 Jan 2021

Module/Topic	Chapter	Events and Submissions/Topic
Textbook Sections 15.1 to 15.3, and Resource Materials	Chapter 15: Applications of Integration, and Further Topics in Integration	Textbook Exercises 15.2 to 15.3, Resource Material Exercises and Week 8 Tutorial Exercises

Week 9 - 18 Jan 2021

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 **Assignment 2** Due: Week 9 Friday (22 Jan 2021) 5:00 pm AEST

Week 10 - 25 Jan 2021

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 - 01 Feb 2021

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 - 08 Feb 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Revision		Week 12 Tutorial Exercises
Exam Week - 15 Feb 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
		The Take Home Exam is completed during exam week. See Moodle for exact details.

Term Specific Information

Unit Coordinator:
Dr Clinton Hayes
(07) 49309246
c.hayes@cqu.edu.au
Rockhampton North Campus 32/G.39

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 have been released.

Assessment Due Date
Week 5 Friday (18 Dec 2020) 5:00 pm AEST

Return Date to Students

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 errors, 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 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
- 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 have been released.

Assessment Due Date
Week 9 Friday (22 Jan 2021) 5:00 pm AEST

Return Date to Students

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 errors, 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 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
- Ethical practice

3 Take Home Exam

Assessment Type
Take Home Exam

Task Description
You will be able to access the take home exam paper from the Moodle website for MATH11219, under the Assessment block. To complete this Take Home Exam paper, you will need access to a printer and a scanner.
Completion of this take home exam paper is limited to a duration of 24 hours. This duration will allow you to:

- print the assessment
- develop solutions to the posed questions
- scan the solutions to PDF file
- upload and submit to the Term 2, 2020 MATH11219 Moodle site

The 24 hour duration is a strict deadline. Submission of this take home exam paper will not be accepted once this deadline has passed.
Your submission may be subject to additional verification in the form of an oral defence through interview with the Unit Coordinator (or nominee). Students who are unable to satisfactorily answer questions about their submitted solution(s) will receive no marks for those solution(s).
This is an individual assignment. Students are reminded that all aspects of work submitted are to be the results of their own personal studies.
Further details on the availability and submission of the take home exam paper will be available on MATH11219 Moodle website.

Assessment Due Date

The Take Home Exam will be scheduled during the examination period. The specific date and time to be advised via Moodle.

Return Date to Students

The results will be made available on Certification of Grades day. Like a regular exam, your marked answer script will not be returned to you, unless you apply to see it as part of the first step of the review of grade process.

Weighting
60%

Minimum mark or grade
Students must score a minimum of 50% of the marks available on the Take Home Exam.

Assessment Criteria
This assessment task is open book. You can reference all notes and study materials. Any submission after the deadline will not be accepted. You are required to do your own work, maintaining academic integrity with all honesty. Your submission may be subject to additional verification in the form of an oral defence through interview with the Unit Coordinator (or nominee). Students unable to satisfactorily answer questions about their submitted solution(s) will receive no marks for these solutions(s).
Answered questions are awarded the full marks allocated 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. 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

Submission Instructions
The Take Home Exam 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
- 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

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

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