



MATH13218 *Advanced Applications of Mathematics*

Term 2 - 2020

Profile information current as at 29/04/2024 07:53 pm

All details in this unit profile for MATH13218 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

Techniques of advanced mathematics and applications are developed through a selection of various methods to solve linear and non-linear differential equations in science and engineering. Students study interpolation, curve fitting, and utilise the concepts of linear transformations and interpretation of eigenvalues to analyse a variety of scientific and engineering problems. Numerical methods for solving ordinary differential equations, the Fourier Analysis of periodic and non-periodic functions and partial differential equations with initial and boundary conditions are included. 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 working in peer learning teams also feature as appropriate.

Details

Career Level: *Undergraduate*

Unit Level: *Level 3*

Credit Points: 6

Student Contribution Band: 7

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

Prerequisites: MATH12224 Calculus and Linear Algebra B or MATH11219 Applied Calculus

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 - 2020

- 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. **Written Assessment**

Weighting: 20%

4. **Take Home Exam**

Weighting: 40%

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 Student evaluation

Feedback

Assignment feedback could have been delivered in a more timely fashion.

Recommendation

Unit Coordinator to ensure all marks and work returned within two weeks of submission.

Feedback from Student evaluation

Feedback

Students had positive remarks on Assessment Requirements and Unit Expectations

Recommendation

Continue to provide the current learning and teaching supports

Feedback from Unit Coordinator reflection

Feedback

Provide additional supporting communications to students.

Recommendation

Additional weekly communications highlighting unit resources, their availability and expectations for mathematics study will be provided.

Unit Learning Outcomes

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

1. Apply interpolation and curve fitting techniques to support the modelling of scientific and engineering applications
2. Utilise the concepts of linear transformation and interpretation of eigenvalue problems to analyse problems
3. Use numerical methods to solve ordinary differential equations
4. Apply Fourier Analysis to periodic and non-periodic functions in the solution of scientific and engineering problems
5. Solve simple partial differential equations with initial and boundary conditions
6. Use mathematics as a language to communicate results, concepts and ideas in context
7. Communicate, work, and learn together in peer learning teams where appropriate.

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%		•				•	

Assessment Tasks	Learning Outcomes						
	1	2	3	4	5	6	7
3 - Written Assessment - 20%	•		•	•	•	•	
4 - Take Home Exam - 40%	•	•	•	•		•	

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 - Written Assessment - 20%	•	•	•	•		•		•		
4 - Take Home Exam - 40%	•	•	•					•		

Textbooks and Resources

Textbooks

There are no required textbooks.

Additional Textbook Information

New teaching materials will be provided on Moodle weekly.

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 - 13 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Unit introduction Introduction to the new Queensland Mathematics Syllabus Topic 1: Solving Nonlinear Equation by Newton's Method	New Queensland Mathematics Syllabus Solving Nonlinear Equation by Newton's Method	Read notes for Topic 1; Complete Week 1 Exercises

Week 2 - 20 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Topic 2: Interpolations	Interpolations	Read notes for Topic 2; Complete Week 2 Exercises

Week 3 - 27 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Topic 3: Curve Fitting by the Least Squares Method	Curve Fitting by the Least Squares Method	Read notes for Topic 3; Complete Week 3 Exercises

Week 4 - 03 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Topic 4: Introduction to Ordinary Differential Equations (ODEs)	Introduction to Ordinary Differential Equations (ODEs)	Read notes for Topic 4; Complete Week 4 Exercises
		Written Assessment Due: Week 4 Friday (7 Aug 2020) 11:59 pm AEST

Week 5 - 10 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
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Topic 5: First-Order Ordinary Differential Equations	First-Order Ordinary Differential Equations	Read notes for Topic 5; Complete Week 5 Exercises
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Vacation Week - 17 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
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Week 6 - 24 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Topic 6: Numeric Methods for Ordinary Differential Equations	Numeric Methods for Ordinary Differential Equations	Read notes for Topic 6; Complete Week 6 Exercises

Week 7 - 31 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Topic 7: 2nd-Order Constant-Coefficient Homogeneous Linear ODEs	2nd-Order Constant-Coefficient Homogeneous Linear ODEs	Read notes for Topic 7; Complete Week 7 Exercises Written Assessment Due: Week 7 Friday (4 Sept 2020) 11:59 pm AEST

Week 8 - 07 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Topic 8: 2nd-Order Constant-Coefficient Inhomogeneous Linear ODEs	2nd-Order Constant-Coefficient Inhomogeneous Linear ODEs	Read notes for Topic 8; Complete Week 8 Exercises

Week 9 - 14 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Topic 9: Introduction to Mathematical Modelling	Introduction to Mathematical Modelling	Read notes for Topic 9; Complete Week 9 Exercises

Week 10 - 21 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Discussion: Principles and Good Practices of Effective Teaching in Mathematics	Selected articles in effective teaching in mathematics	Read the selected articles; participate in online discussions Written Assessment Due: Week 10 Friday (25 Sept 2020) 11:59 pm AEST

Week 11 - 28 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Discussion: Strategies and Good Practices in Mathematical Learning Assessment	Selected articles in effective mathematical learning assessment	Read the selected articles; participate in online discussions

Week 12 - 05 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
Exam Preview and Preparation		

Review/Exam Week - 12 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
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Exam Week - 19 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
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Assessment Tasks

1 Written Assessment

Assessment Type

Written Assessment

Task Description

Questions on topics covered in Weeks 1-3. Please see the unit website for the questions in this assignment.

Assessment Due Date

Week 4 Friday (7 Aug 2020) 11:59 pm AEST

Return Date to Students

Week 6 Friday (28 Aug 2020)

It is envisaged that feedback and solutions will be available in two weeks, or as soon as the process is completed.

Weighting

20%

Assessment Criteria

The final mark is out of 20. Questions are from contents covered in Weeks 1-3. Questions are awarded the full marks allocated 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

Submission Instructions

Submit one PDF file through the Moodle website.

Learning Outcomes Assessed

- Use mathematics as a language to communicate results, concepts and ideas in context
- Communicate, work, and learn together in peer learning teams where appropriate.

Graduate Attributes

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

2 Written Assessment

Assessment Type

Written Assessment

Task Description

Questions on topics covered in Weeks 4-6. Please see the unit website for the questions in this assignment.

Assessment Due Date

Week 7 Friday (4 Sept 2020) 11:59 pm AEST

Return Date to Students

Week 9 Friday (18 Sept 2020)

It is envisaged that feedback and solutions will be available in two weeks, or as soon as the process is completed.

Weighting

20%

Assessment Criteria

The final mark is out of 20. Questions are from contents covered in Weeks 4-6. Questions are awarded the full marks allocated 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

Submission Instructions

Submit one PDF file through the Moodle website.

Learning Outcomes Assessed

- Utilise the concepts of linear transformation and interpretation of eigenvalue problems to analyse problems
- Use mathematics as a language to communicate results, concepts and ideas in context

Graduate Attributes

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

3 Written Assessment

Assessment Type

Written Assessment

Task Description

Questions on topics covered in Weeks 7-9. Please see the unit website for the questions in this assignment.

Assessment Due Date

Week 10 Friday (25 Sept 2020) 11:59 pm AEST

Return Date to Students

Week 12 Friday (9 Oct 2020)

It is envisaged that feedback and solutions will be available in two weeks, or as soon as the process is completed.

Weighting

20%

Assessment Criteria

The final mark is out of 20. Questions are from contents covered in Weeks 7-9. Questions are awarded the full marks allocated 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

Submission Instructions

Submit one PDF file through the Moodle website.

Learning Outcomes Assessed

- Apply interpolation and curve fitting techniques to support the modelling of scientific and engineering applications
- Use numerical methods to solve ordinary differential equations
- Apply Fourier Analysis to periodic and non-periodic functions in the solution of scientific and engineering problems
- Solve simple partial differential equations with initial and boundary conditions
- Use mathematics as a language to communicate results, concepts and ideas in context

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking

- Information Literacy
- Information Technology Competence
- Ethical practice

4 Take Home Exam

Assessment Type

Take Home Exam

Task Description

Due to uncertainties of recovery post the COVID-19 pandemic, the Standard Examination for Term 2 of 2020 MATH13218 is temporarily replaced by a Take Home Exam. You are given 24 hours to work on the Take Home Exam. During the 24-hour timeframe, you will need to download the exam from the unit's Moodle website, complete it and upload it back. Detailed instructions for the Take Home Exam will be communicated near the end of Term 2.

Assessment Due Date

The Take Home Exam will be scheduled during the Exam Week.

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

40%

Minimum mark or grade

20 (50% of 40 marks)

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 the question(s).

Answered questions are awarded the full marks allocated 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

Submission Instructions

Submit one file through the Moodle website.

Learning Outcomes Assessed

- Apply interpolation and curve fitting techniques to support the modelling of scientific and engineering applications
- Utilise the concepts of linear transformation and interpretation of eigenvalue problems to analyse problems
- Use numerical methods to solve ordinary differential equations
- Apply Fourier Analysis to periodic and non-periodic functions in the solution of scientific and engineering problems
- Use mathematics as a language to communicate results, concepts and ideas in context

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- 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