MATH12222 *Advanced Mathematical Applications*
Term 1 - 2017

Profile information current as at 01/05/2024 02:56 am

All details in this unit profile for MATH12222 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.

Corrections

Unit Profile Correction added on 09-01-17

Pearson, the textbook publisher, just informed that the new textbook prescribed for MATH12222 won't be available for Term 1 2017. Therefore, we will keep the 2016 edition of the textbook, "*Advanced Mathematics for Engineering and Applied Sciences* (3rd ed)" for MATH12222 in 2017.

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. You will 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 2*
Credit Points: *6*
Student Contribution Band: *7*
Fraction of Full-Time Student Load: *0.125*

Pre-requisites or Co-requisites

Pre-requisite: MATH11219
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 1 - 2017

- Bundaberg
- Cairns
- Distance
- Gladstone
- Mackay
- 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. **Group Work**
Weighting: 20%
3. **Group Work**
Weighting: 20%
4. **Examination**
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 From engineering staff

Feedback
Add a minimum pass percentage to the Exam

Recommendation
Will try achieving 40% or higher in the exam and an overall 50% or higher to pass this unit in 2017.

Action
Implemented and should keep it in the future.

Feedback from Students' and tutor's emails

Feedback
Would like to have weekly 2-hour lecture + 2-hour tutorial, rather than 2 x 1-hour lectures and tutorials each week.

Recommendation
Will try to deliver weekly 2-hour lecture + 2-hour tutorial in 2017.

Action
Tried weekly 2-hour lecture + 2-hour tutorial in T1 of 2017. More students preferred the old 2 x 1-hour lectures and tutorials each week.

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 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

— 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 - Group Work - 20%		•				•	•
3 - Group Work - 20%	•		•	•	•	•	•

Assessment Tasks	Learning Outcomes						
	1	2	3	4	5	6	7
4 - Examination - 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 - Group Work - 20%	•	•	•	•	•	•		•		
3 - Group Work - 20%	•	•	•	•	•	•		•		
4 - Examination - 40%	•	•	•					•		

Textbooks and Resources

Textbooks

MATH12222

Prescribed

Advanced Mathematics and Applications
(2017)
Authors: W.W. Guo & Y. Wang
Pearson
Sydney , NSW , Australia
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)

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 - 06 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Ordinary differential equations (ODEs) - 1	Sections 1.1-1.3	Exercises 1.1-1.3

Week 2 - 13 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Ordinary differential equations (ODEs) - 2	Section 1.4	Exercises 1.4

Week 3 - 20 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Ordinary differential equations (ODEs) - 3	Sections 1.5-1.6	Exercises 1.5-1.6

Week 4 - 27 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic

		Exercises 2.1-2.2
Laplace transforms - 1	Sections 2.1-2.2	**Written Assessment** Due: Week 4 Thursday (30 Mar 2017) 11:45 pm AEST
Week 5 - 03 Apr 2017		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Laplace transforms - 2	Sections 2.3-2.4	Exercises 2.3-2.4
Vacation Week - 10 Apr 2017		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Week 6 - 17 Apr 2017		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Linear algebra and applications - 1	Sections 3.1-3.3	Exercises 3.1-3.3
Week 7 - 24 Apr 2017		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Linear algebra and applications - 2	Section 3.4	Exercises 3.4
Week 8 - 01 May 2017		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
		Exercises 4.1-4.2
Numeric methods - 1	Sections 4.1-4.2	**Written Assessment** Due: Week 8 Thursday (4 May 2017) 11:45 pm AEST
Week 9 - 08 May 2017		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Numeric methods - 2	Sections 4.3-4.4	Exercises 4.3-4.4
Week 10 - 15 May 2017		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Fourier series - 1	Sections 5.1- 5.2	Exercises 5.1-5.2
Week 11 - 22 May 2017		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Fourier series - 2	Sections 5.3-5.4	Exercises 5.3-5.4
Week 12 - 29 May 2017		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
		Exercises 6.1
Partial differential equations (PDEs)	Sections 6.1-6.2 + Review	**Written Assessment** Due: Week 12 Thursday (1 June 2017) 11:45 pm AEST
Review/Exam Week - 05 Jun 2017		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Exam Week - 12 Jun 2017		
Module/Topic	**Chapter**	**Events and Submissions/Topic**

Assessment Tasks

1 Written Assessment

Assessment Type
Written Assessment

Task Description
Questions on ODEs covered in Weeks 1-3. Please see the course website for the questions in this assignment.

Assessment Due Date
Week 4 Thursday (30 Mar 2017) 11:45 pm AEST

Return Date to Students
Week 6 Thursday (20 Apr 2017)
marked assignments are expected to be returned 2 weeks after the submission deadline.

Weighting
20%

Assessment Criteria
This is an individual assignment.
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
Assignment 1 is submitted through Moodle.

Learning Outcomes Assessed

- 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
- Cross Cultural Competence
- Ethical practice

2 Written Assessment

Assessment Type
Group Work

Task Description
Questions on Laplace transforms, linear algebra and applications covered in Weeks 4-7. Please see the course website for the questions in this assignment.

Assessment Due Date
Week 8 Thursday (4 May 2017) 11:45 pm AEST

Return Date to Students
Week 10 Thursday (18 May 2017)
marked assignments are expected to be returned 2 weeks after the submission deadline.

Weighting
20%

Assessment Criteria
This is a group assignment. Groups of **up to** five (5) students are encouraged.
The final mark is out of 20. Questions are from contents covered in Weeks 4-7. 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 Group

Submission Instructions
Assignment is uploaded by only one student from each group as a single document on Moodle. Please use the cover sheet provided on the course site for this assignment.

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.
- 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
- Ethical practice

3 Written Assessment

Assessment Type
Group Work

Task Description
Questions on Numeric methods and Fourier series covered in Weeks 8-11. Please see the course website for the questions in this assignment.

Assessment Due Date
Week 12 Thursday (1 June 2017) 11:45 pm AEST

Return Date to Students

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

Weighting
20%

Assessment Criteria
This is a group assignment. Groups of **up to** five (5) students are encouraged.
The final mark is out of 20. Questions are from contents covered in Weeks 8-11. 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 Group

Submission Instructions
Assignment is uploaded by only one student from each group as a single document on Moodle. Please use the cover sheet provided on the course site for this assignment.

Learning Outcomes Assessed

- Apply interpolation and curve fitting techniques to support the modelling of 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.
- 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
- Ethical practice

Examination

Outline
Complete an invigilated examination.

Date
During the examination period at a CQUniversity examination centre.

Weighting
40%

Length
180 minutes

Minimum mark or grade
40%

Exam Conditions
Open Book.

Materials
Calculator - all non-communicable calculators, including scientific, programmable and graphics calculators are authorised
Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).

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