



MATH12225 *Applied Computational Modelling*

Term 2 - 2017

Profile information current as at 10/05/2024 10:22 pm

All details in this unit profile for MATH12225 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

This unit furthers students' understanding of and ability in mathematical modelling of scientific and engineering problems using MATLAB. It is designed to substantiate students' mathematical knowledge and techniques gained from completing previous units through utilising existing functions and tools in MATLAB to solve general problems in various disciplines. Students will also learn programming in MATLAB to create and test programs for obtaining useful solutions both analytically and numerically to problems with complex conditions. Coursework leads students to approaching posed problems in a way that demonstrates a clear, logical and systematic procedure of modelling through integrating mathematical and programming knowledge and techniques learnt.

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: MATH12222 or MATH13218

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 - 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. **Practical and Written Assessment**

Weighting: 30%

2. **Practical and Written Assessment**

Weighting: 30%

3. **Practical and Written Assessment**

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 students evaluation

Feedback

Emphasise more on actual programming, and less on the theory of the math.

Recommendation

Just briefly review some basic math and then focus more on actual programming

Unit Learning Outcomes

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

1. Use existing functions in MATLAB to solve general problems in various disciplines.
2. Apply programming skills in solving complicated problems in the MATLAB environment.
3. Utilise existing tools in MATLAB to manipulate and visualize input/output data for supporting interpretation of real applications.
4. Formulate and implement procedures of mathematical modelling for real situations where analytical solutions exist.
5. Design and realise procedures of numeric modelling to develop useful solutions to complex applications.
6. Document the solution to posed problems in a way that demonstrates a clear, logical and systematic procedure of modelling.

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
1 - Practical and Written Assessment - 30%	•	•	•	•	•	•
2 - Practical and Written Assessment - 30%	•	•	•	•	•	•
3 - Practical and Written Assessment - 40%	•	•	•	•	•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
1 - Communication						•
2 - Problem Solving	•	•	•	•	•	•

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
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 - Practical and Written Assessment - 30%		•		•		•				
2 - Practical and Written Assessment - 30%		•	•	•		•				
3 - Practical and Written Assessment - 40%	•	•	•	•	•	•	•	•		

Textbooks and Resources

Textbooks

There are no required textbooks.

Additional Textbook Information

There are no required textbooks

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

Yucang Wang Unit Coordinator
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Schedule

Week 1 - 10 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
MATLAB: getting started ; Basic types and operations in MATLAB; Built-in functions	Part 1.1- 1.4 in study guide	

Week 2 - 17 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
Arrays, vectors and matrices and their basic operations	Part1.5 in study guide	

Week 3 - 24 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
plotting and visualization; input/output in MATLAB ;	Part1.6 in study guide	

Week 4 - 31 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
M-files and user-defined functions; Flow controls ;	Part 1.7-1.8 in study guide	

Week 5 - 07 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
MATLAB implementations of Lagrange interpolation, Newton interpolation and cubic splines ;	Part 2.1-2.2 in study guide	Written Assessment Due: Week 5 Friday (11 Aug 2017) 11:00 pm AEST

Vacation Week - 14 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
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Week 6 - 21 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
MATLAB implementations of curve fitting ;	Part 2.3 in study guide	

Week 7 - 28 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
MATLAB implementations of Euler method, improved Euler method and Runge-Kutta method ;	Part 2.4 in study guide	

Week 8 - 04 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Interpolating data using MATLAB built- in functions; Curve fitting using MATLAB built-in functions; Solving differential equations using MATLAB built-in functions;	Part 2.5 in study guide	

Week 9 - 11 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Project one: Modelling of vibrations of a system with single degree of freedom using MATLAB;	Part 3 in study guide	Written Assessment Due: Week 9 Friday (15 Sept 2017) 11:00 pm AEST
Week 10 - 18 Sep 2017		
Module/Topic	Chapter	Events and Submissions/Topic
Project two: Modelling of RLC circuits using MATLAB;	Part 4 in study guide	
Week 11 - 25 Sep 2017		
Module/Topic	Chapter	Events and Submissions/Topic
Project three: Modelling of vibrations of a system with multiple degree of freedom using MATLAB;	Part 5 in study guide	
Week 12 - 02 Oct 2017		
Module/Topic	Chapter	Events and Submissions/Topic
Other applications of MATLAB in engineering mathematics		Written Assessment Due: Week 12 Friday (6 Oct 2017) 11:00 pm AEST
Review/Exam Week - 09 Oct 2017		
Module/Topic	Chapter	Events and Submissions/Topic
Exam Week - 16 Oct 2017		
Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Written Assessment

Assessment Type

Practical and Written Assessment

Task Description

Questions on MATLAB fundamentals covered in Weeks 1-4. Please see the unit website for the questions in this assignment.

Assessment Due Date

Week 5 Friday (11 Aug 2017) 11:00 pm AEST

Return Date to Students

Week 7 Friday (1 Sept 2017)

Marked assignments are expected to be returned 2 weeks after the submission deadline.

Weighting

30%

Assessment Criteria

The final mark is out of 30. Questions are from contents covered in Weeks 1-4. Questions are awarded the 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

Learning Outcomes Assessed

- Use existing functions in MATLAB to solve general problems in various disciplines.

- Apply programming skills in solving complicated problems in the MATLAB environment.
- Utilise existing tools in MATLAB to manipulate and visualize input/output data for supporting interpretation of real applications.
- Formulate and implement procedures of mathematical modelling for real situations where analytical solutions exist.
- Design and realise procedures of numeric modelling to develop useful solutions to complex applications.
- Document the solution to posed problems in a way that demonstrates a clear, logical and systematic procedure of modelling.

Graduate Attributes

- Problem Solving
- Information Literacy
- Information Technology Competence

2 Written Assessment

Assessment Type

Practical and Written Assessment

Task Description

Questions on numeric methods using MATLAB covered in Weeks 4-8. Please see the unit website for the questions in this assignment.

Assessment Due Date

Week 9 Friday (15 Sept 2017) 11:00 pm AEST

Return Date to Students

Week 11 Friday (29 Sept 2017)

Marked assignments are expected to be returned 2 weeks after the submission deadline.

Weighting

30%

Assessment Criteria

The final mark is out of 30. Questions are from contents covered in Weeks 5-8. Questions are awarded the 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

Learning Outcomes Assessed

- Use existing functions in MATLAB to solve general problems in various disciplines.
- Apply programming skills in solving complicated problems in the MATLAB environment.
- Utilise existing tools in MATLAB to manipulate and visualize input/output data for supporting interpretation of real applications.
- Formulate and implement procedures of mathematical modelling for real situations where analytical solutions exist.
- Design and realise procedures of numeric modelling to develop useful solutions to complex applications.
- Document the solution to posed problems in a way that demonstrates a clear, logical and systematic procedure of modelling.

Graduate Attributes

- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

3 Written Assessment

Assessment Type

Practical and Written Assessment

Task Description

Assignment 3 is a group project for different disciplines based on lectures and tutorials during weeks 9-12. Each group needs to complete the assigned project using skills and knowledge gained from this unit and other units. Please see the unit website for the questions in this assignment.

Students can take one of three projects according to their specialties. This is a group work (up to 3-4 people in each group) .

Assessment Due Date

Week 12 Friday (6 Oct 2017) 11:00 pm AEST

Return Date to Students

Exam Week Friday (20 Oct 2017)

The marked projects will be returned to the students after the certification date.

Weighting

40%

Assessment Criteria

Marks will be allocated on project design, methods chosen and implied, process control, discussions and conclusions.

Referencing Style

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

Submission

Online Group

Submission Instructions

This group assignment is to be submitted by one student (Team Lead) on behalf of all team members with consensus using the cover sheet provided on Moodle.

Learning Outcomes Assessed

- Use existing functions in MATLAB to solve general problems in various disciplines.
- Apply programming skills in solving complicated problems in the MATLAB environment.
- Utilise existing tools in MATLAB to manipulate and visualize input/output data for supporting interpretation of real applications.
- Formulate and implement procedures of mathematical modelling for real situations where analytical solutions exist.
- Design and realise procedures of numeric modelling to develop useful solutions to complex applications.
- Document the solution to posed problems in a way that demonstrates a clear, logical and systematic procedure of modelling.

Graduate Attributes

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