MATH12225 *Applied Computational Modelling*
Term 2 - 2019

Profile information current as at 02/05/2024 11:41 am

General Information

Overview

Applied Computational Modelling will further your understanding of and ability in mathematical modelling of scientific and engineering problems. You will use built-in MATLAB functions to solve general problems in various disciplines. You will also learn to program in MATLAB to obtain solutions to complex problems, through both analytical and numerical approaches. This unit will teach you to approach problems in a way that demonstrates a clear, logical and systematic procedure of modelling through integrating mathematical and programming knowledge and techniques. You will also learn how to document problems and findings. Course work leads you 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 - 2019

- Bundaberg
- Cairns
- Gladstone
- Mackay
- 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: 30%
3. **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 Student evaluation

Feedback
Examples used are difficult to relate to as they are not about engineering.

Recommendation
Liaise with engineering staff to develop realistic examples in various engineering disciplines.

Feedback from Student evaluation

Feedback
Some students do not like the final exam.

Recommendation
The final exam is necessary to reduce plagiarism.

Unit Learning Outcomes

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

1. Solve general problems in various disciplines using existing functions in MATLAB
2. Program in MATLAB to solve complicated problems
3. Manipulate and interpret input/output data utilising existing tools in MATLAB
4. Formulate and implement procedures of mathematical modelling for authentic situations where analytical solutions exist
5. Design and implement 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

— 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
1 - Written Assessment - 20%		•	•	•	•	•
2 - Written Assessment - 30%	•	•			•	•
3 - Examination - 50%	•		•	•		

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
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 - 30%	•	•	•	•		•				
3 - Examination - 50%	•	•	•							

Textbooks and Resources

Textbooks

MATH12225

Prescribed

Applied Computational Modelling with MATLAB
1st edition (2018)
Authors: Yucang Wang, William W Guo
Pearson
Melbourne , VIC , Australia
ISBN: 9781488624780
Binding: Paperback

Additional Textbook Information
Copies can be purchased from the CQUni Bookshop here: http://bookshop.cqu.edu.au (search on the Unit code)

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

Yucang Wang Unit Coordinator
y.wang2@cqu.edu.au

Schedule

Week 1 - 15 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
MATLAB: getting started ; Basic types and operations in MATLAB; Built-in functions	Chapter 1 Introduction to MATLAB	Do questions in exercise 1 in Chapter 1

Week 2 - 22 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Arrays, vectors and matrices and their basic operations	Chapter 2 Arrays, vectors and matrices	Do questions in exercise 2 in Chapter 2

Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
plotting and visualization; input/output in MATLAB ;	Chapter 3 Plotting and input/output in MATLAB	Do questions in exercise 3 in Chapter 3

Week 4 - 05 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
M-files and user-defined functions; Flow controls ;	Chapter 4 M-files, scripts, user-defined functions and flow controls	Do questions in exercise 4 in Chapter 4

Week 5 - 12 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
MATLAB implementations of linear and quadratic fitting ;	Chapter 5 Curve fitting by the least squares method	Do questions in exercise 5 in Chapter 5

Vacation Week - 19 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 26 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
MATLAB implementations of Lagrange interpolation, Newton interpolation and cubic splines ;	Chapter 6 Interpolation with MATLAB	Do questions in exercise 6 in Chapter 6

Week 7 - 02 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
MATLAB implementations of Euler method, improved Euler method and Runge-Kutta method ;	Chapter 7 Numerical methods for solving ODEs	Do questions in exercise 7 in Chapter 7

Week 8 - 09 Sep 2019

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;	Chapter 8 Numerical methods using MATLAB built-in functions	Do questions in exercise 8 in Chapter 8

Week 9 - 16 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Project one: Modelling of vibrations of a system with single degree of freedom using MATLAB;	Chapter 9 Modelling of mechanical vibrations using MATLAB	Do questions in exercise 9 in Chapter 9 **Written Assessment 1** Due: Week 9 Wednesday (18 Sept 2019) 11:45 pm AEST

Week 10 - 23 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Project two: Modelling of RLC circuits using MATLAB;	Chapter 10 Modelling of RLC electrical circuits using MATLAB	Do questions in exercise 10 in Chapter 10

Week 11 - 30 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Project three: Modelling of vibrations of a system with multiple degree of freedom using MATLAB;	Chapter 11 MATLAB modelling of mechanical vibrations with multiple degrees of freedom (MDOF)	Do questions in exercise 11 in Chapter 11

Week 12 - 07 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
Other applications of MATLAB in engineering mathematics; Hints for assignment 3; Reviews for the final exam.		Finish Assignment 3 and prepare for the final exam. **Written Assessment 2** Due: Week 12 Wednesday (9 Oct 2019) 11:45 pm AEST

Review/Exam Week - 14 Oct 2019		
Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 21 Oct 2019		
Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Written Assessment 1

Assessment Type
Written Assessment

Task Description
Questions on MATLAB fundamentals and numeric methods covered in Weeks 1-8. Please see the unit website for the questions in this assignment.

Assessment Due Date
Week 9 Wednesday (18 Sept 2019) 11:45 pm AEST

Return Date to Students
Week 11 Wednesday (2 Oct 2019)
Marked assignments are expected to be returned 2 weeks after the submission deadline.

Weighting
20%

Assessment Criteria
The final mark is out of 20. Questions are from contents covered in Weeks 1-8. 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

- Program in MATLAB to solve complicated problems
- Manipulate and interpret input/output data utilising existing tools in MATLAB
- Formulate and implement procedures of mathematical modelling for authentic situations where analytical solutions exist
- Design and implement 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 2

Assessment Type
Written Assessment

Task Description
Assignment 2 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 4 people in each group) .Each group only needs to submit one copy with names of all members on the cover page.

Assessment Due Date
Week 12 Wednesday (9 Oct 2019) 11:45 pm AEST

Return Date to Students
Review/Exam Week Wednesday (16 Oct 2019)
Marked assignments are expected to be returned 2 weeks after the submission deadline.

Weighting
30%

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

Referencing Style

- Harvard (author-date)

Submission
No submission method provided.

Learning Outcomes Assessed

- Solve general problems in various disciplines using existing functions in MATLAB
- Program in MATLAB to solve complicated problems
- Design and implement 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
- Information Technology Competence

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%

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