MATH12225 *Applied Computational Modelling*
Term 2 - 2020

Profile information current as at 04/05/2024 12:24 pm

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 approach 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 - 2020

- 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. **Take Home Exam**
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
Plots were missing in the tutorial videos.

Recommendation
Limitations of the video recording meant the plots on a different screen were not captured. New videos should be recorded to include the plots.

Feedback from Student evaluation

Feedback
Additional content to help students in the electrical major.

Recommendation
More content relevant to electrical engineering will be added to the unit.

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 - Take Home Exam - 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 - Take Home Exam - 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
If you prefer to study with a paper copy, they are available at the CQUni Bookshop here: http://bookshop.cqu.edu.au (search on the Unit code). eBooks are available at the publisher's website.

View textbooks at the CQUniversity Bookshop

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Microsoft Word AND Excel or equivalent Mac or Open Source packages
- MATHCAD and SIMULINK Software by MathWorks. (CQU is in negotiations with MathWorks in an attempt for students to access the software from home during this extended COVID period. Updates will be provided by your Unit Coordinator.)

Referencing Style

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

Teaching Contacts

Piet Janse Van Rensburg Unit Coordinator
p.jansevanrensburg@cqu.edu.au

Schedule

Week 1 - 13 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
MATLAB: getting started; Basic types and operations in MATLAB; Built-in functions.	Chapter 1 - Introduction to MATLAB.	Complete Exercise 1 (Chapter 1).

Week 2 - 20 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Arrays, vectors and matrices and their basic operation.	Chapter 2 - Arrays, vectors and matrices.	Complete Exercise 2 (Chapter 2).

Week 3 - 27 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Plotting and visualization; Input/output in MATLAB.	Chapter 3 - Plotting and input/output in MATLAB.	Complete Exercise 3 (Chapter 3).
Week 4 - 03 Aug 2020		
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.	Complete Exercise 4 (Chapter 4).
Week 5 - 10 Aug 2020		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
MATLAB implementations of linear and quadratic curve fitting.	Chapter 5 - Curve fitting by the least squares method	Complete Exercise 5 (Chapter 5).
Vacation Week - 17 Aug 2020		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Week 6 - 24 Aug 2020		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
MATLAB implementations of Lagrange interpolation; Newton interpolation and cubic splines.	Chapter 6 - Interpolation with MATLAB.	Complete Exercise 6 (Chapter 6).
Week 7 - 31 Aug 2020		
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.	Complete Exercise 7 (Chapter 7).
Week 8 - 07 Sep 2020		
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.	Complete Exercise 8 (Chapter 8). **Project Assignment A** - Due Wednesday 9 Sept. 2020 - 11:00 PM AEST
Week 9 - 14 Sep 2020		
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.	Complete Exercise 9 (Chapter 9).
Week 10 - 21 Sep 2020		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Project two: Modelling of RLC circuits using MATLAB.	Chapter 10 - Modelling of RLC electrical circuits using MATLAB.	Complete Exercise 10 (Chapter 10). **Theory Assignment** - Due Wednesday 23 Sept. 2020 - 11:00 PM AEST
Week 11 - 28 Sep 2020		
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).	Complete Exercise 11 (Chapter 11).
Week 12 - 05 Oct 2020		
Module/Topic	**Chapter**	**Events and Submissions/Topic**

Other applications of MATLAB in engineering mathematics.		Revision. **Project Assignment B** - Due Wednesday 7 Oct. 2020 - 11:00 PM AEST

Review/Exam Week - 12 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
		Exam time table to be released in due course.

Exam Week - 19 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

Changes to the 2020 assessment details of this unit (MATH1225):
As you are most probably aware, CQU has implemented certain decisions to facilitate distance learning during the COVID period.
In this unit, the only major change for Term 2, 2020 is a Take-Home Exam (instead of regular Exam). This take-home exam may be accompanied by a viva voce or a recorded video.
We believe that these decisions will help to accommodate students in difficult situations and also remove uncertainty around your studies during the extended COVID period.

Assessment Tasks

1 Theory Assignment

Assessment Type
Written Assessment

Task Description
This assessment covers MATLAB fundamentals and numeric methods, done in Weeks 1-8.
Individual work is mandatory - this is a take-home test. None of your steps or solutions may be discussed or divulged to a fellow student.
Please refer to the CQU plagiarism policy - a signed cover page declaring individual work is required.
The assignment questions will be released on the unit website at least 2 weeks before the assignment is due to be submitted.

Assessment Due Date

Please refer to unit profile schedule.

Return Date to Students

We strive to return assessments to students within 2 weeks.

Weighting
20%

Minimum mark or grade
A minimum of 50% must be attained for this Assignment in order to pass the unit.

Assessment Criteria
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 Project Assignment A and B

Assessment Type
Written Assessment

Task Description
Two Project tasks will be issued, the first one being an introductory project task and the second being a more technical discipline-specific task. Thus two professional reports will be submitted.
Team work is encouraged (only 2 persons per team), and only ONE combined report needs to be submitted by BOTH students for a complete Moodle record.
A CQU plagiarism statement and declaration of how the team work was shared, has to be signed by both team members.
It is expected that the 2 team members alternate tasks so that each student gets exposure to all types of tasks, including background research, code development and report writing. Include details on your cover page.
Team reports must be professional and typed, including references. In cases where an individual student cannot conveniently join up to form a team, a slightly reduced report specification will be issued.
Photographic evidence is required to prove that both team members were involved in the coding / modeling.
For this reason it is required that photo's of each team member's fingers are shown in front of the active MATLAB result windows.
(For national and international accreditation, we get audited by Engineers Australia, and this photographic proof makes it easy to satisfy the auditors that each student has fully participated in all projects.)
Project work is compulsory and all students must pass the Project assessment in order to pass the unit.
Details of the project tasks will be posted on the unit website at least 2 weeks before submission is due.

Assessment Due Date

Please refer to unit profile schedule.

Return Date to Students

We strive to return assessments to students within 2 weeks.

Weighting
30%

Minimum mark or grade
A minimum of 50% must be attained for this Assignment in order to pass the unit.

Assessment Criteria
Project Assessment will be graded using the following criteria:
Report style, language, uniformity, tidiness;
Background research done and proven with mini literature review and proper referencing;
Graphics content quality and usefulness;
Technical / theoretical content and correctness including calculations, analysis / design and thinking;
Code content: efficiency, correctness, tidiness / spacing, and commenting;
Photographic and other evidence that project was sufficiently modeled by the team;
Discussion and understanding of modeling results;

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
1) Official CQU declaration and complete typed report, combined as one .pdf file. 2) Matlab file/s

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

3 TAKE HOME EXAM

Assessment Type
Take Home Exam

Task Description
This assessment item covers the weekly Topics 1 - 12.
This will be an 'open resource' exam but you will be required to sign a declaration of individual work done and include this with your submission.
The take-home exam paper will be released on the unit website on the day of the exam. 5 Hours will be allowed, but this includes scanning and uploading. Late penalties will be deducted at 20% per hour (or proportional part).

Assessment Due Date

Official examination time table to be released in due course.

Return Date to Students

We strive to return assessments to students within 2 weeks.

Weighting
50%

Minimum mark or grade
A minimum of 50% must be attained for the Take-Home Exam in order to pass the unit.

Assessment Criteria
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

- Solve general problems in various disciplines using existing functions in MATLAB
- 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

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking

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