COMP350

Special Topics in Computing and Information Systems

S2 Day 2015

Dept of Computing

Contents

General Information

Unit convenor and teaching staff
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Credit points
3

Prerequisites
Permission of Executive Dean of Faculty

Corequisites

Co-badged status

Unit description
This unit is a special topic unit that may be offered from time to time in new areas of computing and information systems, or as a special project under the supervision of a member of staff.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

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

Understand how engineering problems can be solved using basic mathematical models and numerical methods.

Ability to identify risk associated with floating point computations and perform error analysis.

Ability to develop techniques for accurate and efficient solution of models based on linear and nonlinear equations, ordinary differential equations and partial differential equations.

Demonstrate skill in Matlab as the tool to implement numerical analysis for practical engineering problems.

General Assessment Information

The following conditions apply for assessments:

In the event that an assessment task is submitted late, the following penalties will apply; 0 to 24 hours - 25%, 24 hours to 48 hours - 50%, greater than 48 hours will result in no mark being awarded.

For both the midterm and final examinations, not following instructions as indicated may result in the affected questions not being marked.

It is a requirement of the course that students perform satisfactorily in the final examination.

Assignments (4)

Four individual assignments will test the student's understanding of the course material taught up to the point each assignment is distributed. The student is expected to solve problems which test both the concepts taught as well as the technical capabilities of the students in doing numerical analysis. These assignments must be completed individually.

Tutorial (3)

Three individual tutorial problems will test the student's numerical skill in solving practical engineering problems. These assignments must be completed individually.

Mid Term Test (1)

An in-class 1hr test assessing material delivered between weeks 1 and 6.

Final Examination (1)

Final examination assessing all material delivered throughout the course

Assessment Tasks

Name	Weighting	Due
Assignments	20%	Week 3, 5, 7, and 11
Tutorial Problem Solving	15%	Week 4, Week 8, Week 12
Mid term Test	15%	Week 7
Final Examination	50%	During Exam Period

Assignments

Due: **Week 3, 5, 7, and 11**

Weighting: **20%**

4 Assignments based on problem solving

On successful completion you will be able to:

- Understand how engineering problems can be solved using basic mathematical models and numerical methods.
- Ability to identify risk associated with floating point computations and perform error analysis.
- Ability to develop techniques for accurate and efficient solution of models based on linear and nonlinear equations, ordinary differential equations and partial differential equations.
- Demonstrate skill in Matlab as the tool to implement numerical analysis for practical engineering problems.

Tutorial Problem Solving

Due: **Week 4, Week 8, Week 12**
Weighting: **15%**

Tutorial Problem Solving

On successful completion you will be able to:

- Understand how engineering problems can be solved using basic mathematical models and numerical methods.
- Ability to develop techniques for accurate and efficient solution of models based on linear and nonlinear equations, ordinary differential equations and partial differential equations.
- Demonstrate skill in Matlab as the tool to implement numerical analysis for practical engineering problems.

Mid term Test

Due: **Week 7**
Weighting: **15%**

Mid term Examination

On successful completion you will be able to:

- Ability to develop techniques for accurate and efficient solution of models based on linear and nonlinear equations, ordinary differential equations and partial differential equations.

Final Examination

Due: **During Exam Period**

Weighting: **50%**

3 Hour Final Exam, Closed book.

On successful completion you will be able to:

- Ability to develop techniques for accurate and efficient solution of models based on linear and nonlinear equations, ordinary differential equations and partial differential equations.

Delivery and Resources

There is no single core text for this course. However the following texts are recommended:

“Applied Numerical Methods for Engineers and Scientists” by Singiresu S. Rao

“Computational Fluid Dynamics: A Practical Approach” by J Tu, GH Yeoh and C Liu.

Unit Schedule

Week	Topic	Lecturer	Laboratory/Tutorial	Assessments
1	Introduction to numerical methods	Dr. Lee	No tutorial	
2	Applied Matlab programming	Dr. Lee	Matlab programming	
3	Nonlinear equation	Dr. Lee	Linear and nonlinear problems	Assignment 1 due
4	System of linear equation, Elimination methods, LU factorization	Dr. Lee	Linear and nonlinear problems	Tutorial problem 1 due
5	Interpolation and polynomial approximation, curve fitting	Dr. Lee	Problem sets on interpolation	Assignment 2 due
6	Numerical differentiation	Dr. Lee	Vibration analysis	
7	Numerical integration Trapezoidal rule, simpson’s rule	Dr. Lee	Vibration analysis	Assignment 3 due
8	Euler method, Runge-Kutta method	Dr. Lee	Thermofluid problems	Tutorial problem 2 due
9	Boundary value ordinary differential equations	Dr. Lee	Thermofluid problems	
10	Partial differential equations	Dr. Lee	ODE and PDE problem sets	
11	Method of solutions	Dr. Lee	CFD pre processing	Assignment 4 due

12	Computational Fluid Dynamics	Dr. Lee	CFD analysis	Tutorial problem 3 due
13	Revision	Dr. Lee	CFD post processing	

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students

- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://informatics.mq.edu.au/help/.

When using the University's IT, you must adhere to the Acceptable Use Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- Ability to develop techniques for accurate and efficient solution of models based on linear and nonlinear equations, ordinary differential equations and partial differential equations.
- Demonstrate skill in Matlab as the tool to implement numerical analysis for practical engineering problems.

Assessment task

- Assignments

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Understand how engineering problems can be solved using basic mathematical models and numerical methods.
- Demonstrate skill in Matlab as the tool to implement numerical analysis for practical engineering problems.

Assessment tasks

- Assignments
- Tutorial Problem Solving
- Mid term Test
- Final Examination

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Ability to identify risk associated with floating point computations and perform error analysis.
- Ability to develop techniques for accurate and efficient solution of models based on linear and nonlinear equations, ordinary differential equations and partial differential equations.
- Demonstrate skill in Matlab as the tool to implement numerical analysis for practical engineering problems.

Assessment tasks

- Assignments
- Tutorial Problem Solving
- Mid term Test
- Final Examination

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative

in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Ability to identify risk associated with floating point computations and perform error analysis.
- Ability to develop techniques for accurate and efficient solution of models based on linear and nonlinear equations, ordinary differential equations and partial differential equations.
- Demonstrate skill in Matlab as the tool to implement numerical analysis for practical engineering problems.

Assessment tasks

- Assignments
- Tutorial Problem Solving