

ACE Network Subject Information Guide

Advanced Numerical Analysis

Semester 2, 2021

Administration and contact details

Host Department	Mathematics
Host Institution	University of Newcastle
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Subject details

Handbook entry URL	Click here to enter text.		
Subject homepage URL	Click here to enter text.		
Honours student hand-out URL	Click here to enter text.		
Start date:	July 19, 2021		
End date:	Oct 29, 2021		
Census date:	13 August		
Contact hours per week:	2		
Lecture day and time:	To be decided later		
Description of electronic access arrangements for students (for example, WebCT)	To be decided later I used Dropbox to share the course materials in the past. I will see if there is a better alternative.		

Subject content

1. Subject content description



Data interpolation and fitting, numerical differentiation and integration, numerical solutions of ordinary and partial differential equations (ODEs and PDEs)

2. Week-by-week topic overview

Week 1-2: Data interpolation and fitting Week 3: Numerical integration and differentiation Week 4: Boundary value problem for ODEs: Shooting method Week 5: Finite difference method for linear and non-linear ODEs Week 6-7: Finite difference method for partial differential equations Week 8: Weak formulation of partial differential equations Week 9: Sobolev spaces, existence and uniqueness of the solution Week 10-12: Finite element method and its implementation

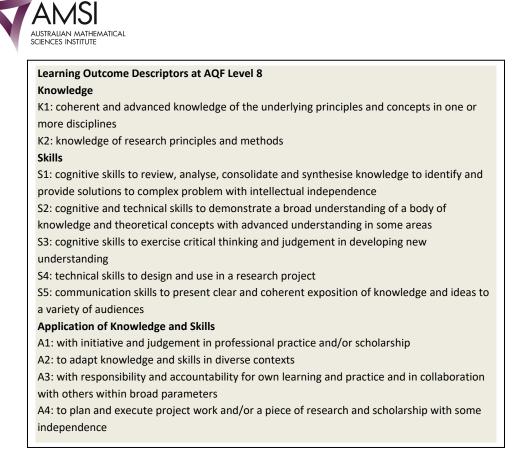
3. Assumed prerequisite knowledge and capabilities

Second year level analysis and differential equations. MATLAB.

- 4. Learning outcomes and objectives
 - 1. Apply numerical techniques to approximate functions, their derivatives and integrals arising from problems in science, mathematics and engineering.
 - 2. Develop numerical algorithms for differential equation problems, implement them in a computer, visualise and interpret their solutions.
 - 3. Apply the idea of accuracy, consistency, stability and convergence in numerical approximation techniques.

AQF Program Learning Outcomes addressed in this subject	Associated AQF Learning Outcome Descriptors for this subject		
Insert Program Learning Outcome here	Choose from list below		
Insert Program Learning Outcome here	Choose from list below		
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Insert Program Learning Outcome here	Choose from list below		
Insert Program Learning Outcome here	Choose from list below		
Insert Program Learning Outcome here	Choose from list below		

AQF specific Program Learning Outcomes and Learning Outcome Descriptors (if available):



3. Learning resources

R.L. Burden and J.D. Faires, Numerical Analysis, 9th edition, Brooks and Cole **Lecture notes will be provided for the course.**

4. Assessment

Exam/assignment/classwork breakdown						
Exam	50 %	Assignment	50%	Class work	Enter 0%	
Assignment due dates		Week 5	Week 9	Click here to	Click here to	
				enter a date.	enter a date.	
Approxima	te exam date					
				Monday 8 Nov	Friday 26 Nov 2021	

Institution Honours program details

Weight of subject in total honours assessment at host department	Click here to enter text.
Thesis/subject split at host department	Click here to enter text.
Honours grade ranges at host department:	
H1	Enter range %
H2a	Enter range %
H2b	Enter range %
Н3	Enter range %