



The University of Southern Queensland

## Course Specification

### Description: Numerical Methods for Partial Differential Equations

Subject	Cat-Nbr	Class	Term	Mode	Units	Campus
MAT	4103	10369	1, 2002	ONC	1.00	TWMBA

<b>Academic Group:</b>	FOSCI
<b>Academic Org:</b>	FOS003
<b>HECS Band:</b>	2
<b>ASCED Code:</b>	010101

### STAFFING

Examiner: Chris Harman  
Moderator: Tony Roberts

### PRE-REQUISITES

Pre-requisite: MAT 3102

### RATIONALE

In modelling many physical processes such as fluid transfer, transport phenomena in fluids and solids the resulting partial differential equations are not usually amenable to direct analytic solution. Consequently numerical methods are of central importance in finding solutions.

### SYNOPSIS

This course introduces numerical techniques which are available for a wide range of partial differential equation models. Such models occur in a vast range of applications. Particular emphasis is on finite difference schemes, and smooth particle hydrodynamics applied to the description of heat transfer and transport phenomena in fluids and solids.

### OBJECTIVES

Upon completion of this course, students will be able to:

- demonstrate the ability to set up partial differential equation models for a wide range of applications including heat transfer and transport phenomena in fluids and solids;
- solve the corresponding partial differential equations using computational numerical techniques;
- analyse the accuracy and stability of solutions of the partial differential equation models.

## TOPICS

Description	Weighting (%)
1. Finite difference approximations	10.00
2. Convergence, consistency & stability	20.00
3. Solving the one-dimensional diffusion equation	10.00
4. Solving the one-dimensional advection equation	10.00
5. The one-dimensional transport equation	20.00
6. The transport equation in multi-dimensional space	20.00
7. Smooth particle hydrodynamics	10.00

## TEXT and MATERIALS required to be PURCHASED or ACCESSED:

Books can be ordered by fax or telephone. For costs and further details use the 'Book Search' facility at <http://bookshop.usq.edu.au> by entering the author or title of the text.

To Be Advised

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessment	47
Examinations	3
Private Study	97
Tutorial	26

## ASSESSMENT DETAILS

Description	Marks Out of	Wtg(%)	Required	Due Date
ASSIGNMENT 1	20.00	20.00	Y	04 Mar 2002 (see note 1)
ASSIGNMENT 2	20.00	20.00	Y	04 Mar 2002 (see note 2)
3 HOUR OPEN EXAMINATION	60.00	60.00	Y	END S1 (see note 3)

### NOTES:

1. Further details about the due dates are detailed in the assessment section of the Course Specifications.
2. Further details about the due dates are detailed in the assessment section of the Course Specifications.
3. Examination dates will be available during the Semester. Please refer to Examination timetable when published.

## **OTHER REQUIREMENTS**

- 1 Attendance Requirements: It is the student's responsibility to attend classes to ensure that they have the best chance to meet the objectives of the course and to be informed of course-related activities and administration.
  - 2 Minimum Requirements to Pass the Course: To be certain of a passing grade in this course, students must gain at least 50% of the marks available for each assessment item.
  - 3 Supplementary and Deferred Examinations: Any supplementary or deferred examinations for this course will be held at the first available opportunity.
  - 4 Assignments: In accordance with University's Policy on Assignments (Regulation 5.6.1), the examiner of a course may grant an extension of the due date of an assignment in extenuating circumstances. This policy may be found in the USQ Handbook, the Distance Education Student Guide and the Faculty of Sciences' Orientation Handbook for new on-campus students. All students are advised to study and follow the guidelines associated with this policy.
  - 5 Examinations: Open Examination - an open examination indicates that the candidate may have access to any material during the examination except the following: electronic communication devices, bulky material, devices requiring mains power and material likely to disturb other students.
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