



The University of Southern Queensland

## Course specification

This version produced 7 Jul 2008.

The current and official versions of the course specifications are available on the web at  
<<http://www.usq.edu.au/coursespecification/current>>.

Please consult the web for updates that may occur during the year.

### Description: Numerical Methods for Partial Differential Equations

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
MAT	8103	67364	2, 2007	ONC	1.00	Toowoomba

<b>Academic group:</b>	FOSCI
<b>Academic org:</b>	FOS003
<b>Student contribution band:</b>	2
<b>ASCED code:</b>	010101

### STAFFING

Moderator: Sergey Suslov

### REQUISITES

Pre-requisite: CSC2409

### RATIONALE

In modelling many physical processes such as heat 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 applied to the description of heat transfer and transport phenomena in fluids and solids. This course is normally offered only in even years.

### OBJECTIVES

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

1. set up partial differential equation models for a wide range of applications including heat transfer and transport phenomena in fluids and solids; (Assignments 1, 2, 4)
2. solve the corresponding partial differential equations using computational numerical techniques; (Assignments 1, 2, 4)
3. analyse the accuracy and stability of solutions of the partial differential equation models; (Assignments 1, 2, 4)
4. show the ability to independently investigate and report on an unfamiliar topic in finite difference modelling of partial differential equations. (Assignment 3)

## 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	10.00
7.	An independent investigation of advanced finite difference schemes for a choice of either elliptic or hyperbolic partial differential equations. The choice will be made by the student in consultation with the Examiner.	20.00

## TEXT and MATERIALS required to be PURCHASED or ACCESSED

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at <http://bookshop.usq.edu.au> click 'Semester', then enter your 'Course Code' (no spaces).

To Be Advised

## REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessment	47.00
Examinations	3.00
Private Study	97.00
Tutorials	26.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg(%)	Due date
ASSIGNMENT 1	20.00	20.00	12 Apr 2006
ASSIGNMENT 2	20.00	20.00	28 May 2006
ASSIGNMENT 3	20.00	20.00	02 Jul 2006 (see note 1)
ASSIGNMENT 4	40.00	40.00	07 Jul 2006 (see note 2)

### NOTES

1. Independent investigation.
2. Assignment 4 will comprise of questions on complete course material which will have to be submitted by the end of the examination period.

## IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:  
It is the students' responsibility to attend and participate appropriately in all activities (such as lectures, tutorials, laboratories and practical work) scheduled for them, and to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.
- 2 Requirements for students to complete each assessment item satisfactorily:  
To complete each of the assessment items satisfactorily, students must obtain at least 50% of the marks available for each assessment item.
- 3 Penalties for late submission of required work:  
If students submit assignments after the due date without prior approval then a penalty of 20% of the total marks available for the assignment will apply for each working day late.
- 4 Requirements for student to be awarded a passing grade in the course:  
To be assured of receiving a passing grade a student must achieve at least 50% of the total weighted marks available for the course.
- 5 Method used to combine assessment results to attain final grade:  
The final grades for students will be assigned on the basis of the weighted aggregate of the marks obtained for each of the summative assessment items in the course.
- 6 Examination information:  
There is no examination in this course.
- 7 Examination period when Deferred/Supplementary examinations will be held:  
As there are no examinations in this course, there will be no deferred or supplementary examinations.
- 8 University Regulations:  
Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL <http://www.usq.edu.au/corporateservices/calendar/part5.htm> or in the current USQ Handbook.

## **ASSESSMENT NOTES**

- 9 The examiner may grant an extension of the due date of an assignment in extenuating circumstances.