GRIFFITH UNIVERSITY GOLD COAST CAMPUS

SCHOOL OF ENGINEERING

ENG2011 ENGINEERING MATHEMATICS

Subject Outline

1.0 SUBJECT IDENTIFICATION

Year/Semester(s): 2001/Semester I

Subject Level: 2nd Year

Course(s) Status: Core Subject, BEng (All courses)

Credit Value: 10CP

Prerequisite(s): ENG1012 Fundamentals of Engineering Mathematics

Teaching Team:

Convenor: Dr. Sam Fragomeni	**Room No:**ENG1.29
Other Staff: Mr. Kevin Carmichael	**Room No:**ENG1.20
Moderator: Dr. Hong Guan	**Room No:** ENG1.10

2.0 OBJECTIVES

2.1 The main purpose of the subject is to provide students with skills in algebra and calculus which would enable them to devise engineering solutions for given situations they may encounter in their profession. This subject is a continuation of the mathematics undertaken in the first year of the engineering course and provides students with the necessary mathematical tools to solve analytical problems and adequately complete design tasks. The mathematical skills derived from this subject form a necessary base to analytical and design concepts encountered in the course.

2.2 Upon successful completion of the subject, the student should be familiar with and be able to:

- solve first and higher order differential equations and apply them to realistic problems.
- solve systems of differential equations.
- solve first and second order partial differential equations.
- find derivatives and integrals of vector-valued functions.
- use vector analysis to calculate distances, relative positions, projections and work.
- evaluate integral theorems of Green, Gauss & Stokes to find lines, surfaces & volumes.
- define and calculate derivatives of real-valued functions in two or more variables
- estimate values of functions of two or more variables

3.0 BRIEF DESCRIPTION

This subject deals with more advanced Engineering Mathematics topics which provide students with the relevant mathematical tools required in the analysis of problems in engineering and scientific professions. The topics covered include ordinary differential and partial differential equations; vector analysis; and multivariable calculus. The mathematical skills derived from this subject form a necessary base to analytical and design concepts encountered in the course. Assessment is by tutorial assignments and examinations.

4.0 CONTENT

	Weeks	*(Text Ref.)*	*Weighting*
Differential Equations	1-4		35%
- Review		(Ch 1)	
- Second Order and Higher Order		(Ch 2&3)	
- Systems of D.E.'s		(Ch 4)	
Partial Differential Equations	5- 8	(Ch 11)	30%
Vector Analysis	9-12		25%
- Dot/Cross Product, Grad, Div, Curl		(Ch 8)	
- Theorems of Green, Gauss & Stokes		(Ch 9)	
Multivariate Calculus	13-14		10%
- F^{ns} of several variables, directional deriv.		(Ch 8.8 & 8.9)	
- Partial derivatives, the chain rule, Lagrange		(Ch 8.8 & 8.12)	

5.0 ORGANISATION AND TEACHING METHODS

ACTIVITY	**CONTACT HOURS**
Lectures (14 weeks, 4 hrs per week)	56
Tutorials (14 weeks, 1 hr per week)	14

6.0 ASSESSMENT

6.1 Assessment items

NO.	**DESCRIPTION**	**WEIGHTING %**
1	5 Tutorial Assignments (due weeks 3, 5, 7, 10, 12)	15
2	Mid-semester exam (on week 1-7 material, week 8)	30
3	Final examination (all work)	55
		100

Assessment criteria

Mid-semester examination: This closed book assessment will be of 1.5 hr duration.

Tutorial Assignments: Assignments will consist of textbook type problems and extend to "real world" problem solving. It is anticipated that approximately 4 hrs preparation time for each assignment is appropriate.

Final examination: This closed book final assessment will be of 3 hr duration. It will mainly comprise of written answer items.

Other Requirements

To be eligible for a passing or higher grade for this subject, students are required to:

- satisfactorily attempt all items of assessment,
- achieve at least 45% or better in each of the following assessment items: Mid-semester and final examination,
- and gain an overall total mark of at least 50%.

6.2 Assessment rationale

The **Assignments** will assess the ability of the student to bring together various aspects of the subject material and apply that knowledge to particular real-world problems.

The **Mid-semester and Final Examinations** will assess the students' understanding and knowledge of the range of topics covered in the subject.

7.0 TEXTS AND SUPPORTING MATERIALS

7.1 Specified Texts

Kreyszig, E. *Advanced Engineering Mathematics*, 8th Edition, 1999, Wiley

7.2 Support Materials Required

None

7.3 Recommended Readings/References and Equipment

Washington, A.J. *Basic Technical mathematics with Calculus*, 6th Ed., 1995,Addison-Wesley.
James, G. *Modern Engineering Mathematics*, 1992, Addison-Wesley.
McCallum, W.G., Hughes-Hallet, D & Gleason, A. Multivariable Calculus, 1997, Wiley.
O'Neil, P.V. *Advanced Engineering Mathematics*, 4th Ed., 1995, PWS Publishing.
Reza M.M. *Advanced Engineering Mathematics (with Mathematica and MATLAB)* Vol I & II, 1998, Addison-Wesley.
Stroud, K.A. *Engineering Mathematics*, 4th Ed., 1995, Macmillan.
Stroud, K.A. *Further Engineering Mathematics*, 3rd Ed., 1995, Macmillan.
Strauss, W.A. *Partial differential Equations: An Introduction*, 1992, Wiley.
Thomas, G.B. & Finney, R.L. *Calculus*, 9th Ed., 1996, Addison-Wesley.

8.0 ADMINISTRATION

Unless otherwise stated, the normal policies and rules of the University apply. See School of Engineering noticeboard for details.