

COURSE OUTLINE

Faculty of Engineering and Information Technology

School of Engineering

2011ENG

Engineering Mathematics

1 Identifying Information

Course catalogue no:	2011ENG
Course title:	Engineering Mathematics
Field of Education Code	
Year and semester of offer:	2004, semester 1
Credit point value	10CP
Program/s for which course is designed	Bachelor of Engineering in Civil Engineering Convenor: Dr. S. Fragomeni Bachelor of Engineering in Coastal Engineering Convenor: Dr. C. Lemckert Bachelor of Engineering in Electronic Engineering Convenor: Mr. D. Edwards
Status of Course within program/s or academic plan/s	2 nd year course Core in: All BEng & Double Degrees
Prerequisites:	1012ENG Fundamentals of Engineering Mathematics
Course convenor	Dr. S. Fragomeni Room G09 1.29
Teaching team members:	Mr. Kevin Carmichael Room G09 1.20 Moderator: Dr. Hong Guan Room G09 1.10
Date course outline was last modified	4/12/03

2 Objectives

The main purpose of the course 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 course is a continuation of the mathematics undertaken in the first year of the engineering program and provides students with the necessary mathematical tools to solve analytical problems and adequately complete design tasks. The mathematical skills derived from this course form a necessary base to analytical and design concepts encountered in the program.

Upon successful completion of the course, 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.

3 Links with other Courses in the Program(s)

One of the desired skills of Engineers is the ability to solve differential equations and Integrate functions in two and three-dimensional space. The prescribed course will enable students to become familiar with the mathematical tools required to solve these and similar engineering related problems. The mathematical skills attained will be used for a number of courses in later years of their degree Program.

4 Brief Description

This course 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 and vector analysis. The mathematical skills derived from this course form a necessary base to analytical and design concepts encountered in the program. Assessment is by tutorial assignments and examinations.

5 Content

Module	Text Chapter	Week(s)	Weighting
1. <i>Differential Equations</i>		1-5	35%
- Review	(Ch 1)		
- Second Order and Higher Order	(Ch 2)		
- Systems of D.E.'s	(Ch 3, 6, 7)		
2. <i>Partial Differential Equations</i>	(Ch 11)	5- 8	35%
3. <i>Vector Analysis</i>		9-13	25%
- Dot/Cross Product, Grad, Div, Curl	(Ch 8)		
- Theorems of Green, Gauss & Stokes	(Ch 9)		

6 Generic Skills Development

This course aims to develop the generic skills indicated below using material relevant to the study of Engineering Mathematics.

Attribute	Taught	Practiced	Assessed	Developed through:
Oral communication				
Written communication				
Problem identification, formulation and solution	√	√	√	Tutorial exercises, assignments and exam
Analysis and critical evaluation		√	√	Tutorial exercises, assignments and exam
Ability to undertake independent lifelong learning				
Ability to initiate and lead enterprises				
Ability to work effectively as a member of a team				
Ability to assume responsibility		√	√	Tutorials and assignments

and make decisions				
High ethical standards.				

7 Flexible Learning

This course is mainly taught using the study materials available from the course website at Learning@Griffith and additional notes supplied during lectures. The textbook can be utilised as a supplementary aide. Addition information and correspondence is published on the web site.

8 Rationale for Content

One of the desired skills of Engineers is the ability to solve differential equations and Integrate functions in two and three-dimensional space. The prescribed course will enable students to become familiar with the mathematical tools required to solve these and similar engineering related problems. The mathematical skills attained will be used for a number of courses in later years of their degree Program.

9 Organisation and Teaching Methods

The contact hours in this course are:

ACTIVITY	HOURS
Lectures	52
Tutorials	13

These contact hours are delivered as 2x2 hour lectures and 1 hour tutorial per week.

10 Rationale for Teaching Methods

The lectures will provide the background, concepts and techniques required to solve mathematical problems, and provide worked examples. Problem solving exercises elaborating on the lecture material will be introduced during the tutorial time. Assignments will consist of textbook-based problems and also involve "real world" applications, and may also incorporate the use mathematical computer packages.

11 Assessment

NO	DESCRIPTION	WEIGHTING(%)
1	3 Tutorial Assignments	15
2	Mid-semester exam (Modules 1 to 2, week 8 or 9)	30
3	Final examination (all Modules, 3 hrs during exam period)	<u>55</u>
		100

To be eligible for a passing or higher grade for this course, 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%.

12 Rationale for Assessment

The **Assignments** will assess the ability of the student to bring together various aspects of the course material and apply that knowledge to particular real-world problems. **Students are encouraged to discuss assignments in groups before arriving at their own solutions.** The **Mid-semester and Final Examinations** will be closed book and assesses the students' **individual** understanding and knowledge of the range of topics covered in the course.

13 Texts and Supporting Materials

Prescribed Text (optional supplementary material)

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

Recommended Readings/References and Equipment

Washington, A.J., 1995, *Basic Technical mathematics with Calculus*, 6th Ed., Addison-Wesley.

James, G., 1992, *Modern Engineering Mathematics*, Addison-Wesley.

O'Neil, P.V., 1995, *Advanced Engineering Mathematics*, 4th Ed., PWS Publishing.

Reza M.M., 1998, *Advanced Engineering Mathematics (with Mathematica and MATLAB)* Vol I & II, Addison-Wesley.

Stroud, K.A., 1995, *Engineering Mathematics*, 4th Ed., Macmillan.

Stroud, K.A., 1995, *Further Engineering Mathematics*, 3rd Ed., Macmillan.

Strauss, W.A., 1992, *Partial differential Equations: An Introduction*, Wiley.

Thomas, G.B. & Finney, R.L., 1996, *Calculus*, 9th Ed., Addison-Wesley.

14 Course Evaluation

A formal survey of the students will be undertaken towards the end of the semester. The teaching team will discuss the results of survey and any necessary modifications to the course planned for the next offering.

15 Administration

Unless otherwise stated, the normal course administration policies and rules of the School of Engineering apply. See the School of Engineering Notice Board for details.

The attention of students is drawn to the University's Policy on Academic Misconduct. <http://www62.gu.edu.au/policylibrary.nsf/mainsearch/352f26aa1a1011e64a256bbb0062fd5f?op=endocument>. It is recommended that students read this policy.

The tutorial assignments will be allocated during lectures. Additional information will also be provided on the website on Learning@Griffith.

16 Course Communications

The Course Convenor is available for consultation at times that are displayed on the Convenor's office notice board (outside G09_1.29).