



The University of Southern Queensland

## Course specification

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: Engineering Mathematics 2

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
MAT	1502	91469	2, 2009	EXT	1.00	Toowoomba

<b>Academic group:</b>	FOSCI
<b>Academic org:</b>	FOS003
<b>Student contribution band:</b>	6
<b>ASCED code:</b>	010101

### STAFFING

Examiner: Oleksiy Yevdokimov  
Moderator: Ruth Mossad

### RATIONALE

Mathematical concepts and processes provide powerful descriptive and investigative tools for engineering and surveying. In particular, the techniques of calculus, matrices, vectors and complex numbers are fundamental for modelling and analysis in a wide range of applications. This course provides opportunity for students to advance their mastery of these topics, and explore their applications to engineering and surveying.

### SYNOPSIS

It is assumed that students entering this course already have well-established algebra, function, graphing and trigonometry competencies, and have already developed introductory level skills in matrices, vectors and calculus. This course advances conceptual and technical competencies in these fields by investigating limits, continuity, inverse functions, compositions, rational functions and implicit functions. Differentiation and integration are advanced and used in engineering applications and problem-solving. Vector algebra is extended and applied to the description of lines and planes in space. Matrix algebra is extended to determinants, and used for modelling and to solve systems of linear equations in a range of settings. Euler notation is used to represent complex numbers and functions.

### OBJECTIVES

On completion of this course students will be able to:

1. demonstrate advances in understanding of mathematical concepts that are essential for tertiary studies in engineering and surveying (Assignments, Exam);
2. demonstrate proficiency in the skills and competencies covered in this course (Assignments, Exam);
3. interpret and solve a range of authentic problems involving mathematical concepts relevant to this course and to engineering and surveying (Assignments, Exam);

4. effectively communicate the mathematical concepts, reasoning and technical skills contained in this course (Assignments, Exam);
5. use computing aids for computation, graphing, matrix manipulation, concept development and problem solving in algebra and calculus (Assignments, Exam).

## TOPICS

	Description	Weighting (%)
1.	Mathematical writing and communication.	10.00
2.	The library of common types of functions of one variable and their graphs; function concepts, and their applications.	20.00
3.	Calculus: higher derivatives and their applications; definite, indefinite and improper integrals, integration techniques; applications of calculus to engineering and science.	30.00
4.	Vector algebra and cross product, and application to describing lines and planes in space.	15.00
5.	Matrix algebra, inverse and determinants; applications to solving systems of linear equations in engineering and other contexts.	15.00
6.	Complex number applications, Euler form and complex functions.	10.00

## 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).

Matlab (any recent version). Matlab is freely accessible in the USQ computer laboratories.

Scientific calculator

Glyn James 2007, *Modern Engineering Mathematics*, 4th edn, Prentice Hall, Harlow.

Study Book 2009, *Course MAT1502, Engineering Mathematics 2*, USQ Distance Education Centre, Toowoomba.

## 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.

MATLAB (any recent version). Note that Matlab is freely accessible in the USQ computer laboratories.

Larson, R, Edwards, B & Falvo, D 2004, *Elementary linear algebra*, 5th edn, Houghton Mifflin, Boston, Massachusetts.

Larson, R & Edwards, B 2004, *Student solutions guide - elementary linear*, 5th edn, Houghton Mifflin, Boston.

Stewart, J 2005, *Calculus: concepts & contexts*, 3rd edn, Thomson Brooks/Cole, Belmont, Calif.

Student solutions guide for Stewart, J 2005, *Calculus: concepts & contexts*, 3rd edn,

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessments	26.00
Private Study	117.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg (%)	Due date
ASSIGNMENT 1	100.00	5.00	03 Aug 2009
ASSIGNMENT 2	100.00	15.00	07 Sep 2009
ASSIGNMENT 3	100.00	15.00	19 Oct 2009
2 HOUR OPEN EXAMINATION	120.00	65.00	END S2 (see note 1)

### NOTES

1. USQ will make the examination dates available during the semester. Students must refer to the official USQ examination timetable when it is published.

## IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:  
It is students' responsibility to study all the course materials, including those posted on the course website, in order to maximise their chance of meeting the course objectives. On-campus students (Semester 1 only) should participate responsibly in all scheduled activities: lectures, tutorials, computer laboratories.
- 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 of the examiner then a penalty of 5% of the total marks gained by the student for the assignment may apply for each working day late up to ten working days at which time a mark of zero may be recorded.
- 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:

An open examination is one in which candidates may have access to any printed or written material and a calculator during the examination.

- 7 Examination period when Deferred/Supplementary examinations will be held:  
Any Deferred or Supplementary examinations for this course will be held during the next examination period.
- 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**

- 1 Keeping informed of course-related activities and notices: All students must regularly check the course website and discussion group, and read emails sent to the address they gave USQ.
- 2 The due date for an assignment is the date by which a student must despatch the assignment to USQ.