



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 Problem Solving 3

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
ENG	3103	90586	2, 2009	EXT	1.00	Toowoomba

<b>Academic group:</b>	FOENS
<b>Academic org:</b>	FOENSV
<b>Student contribution band:</b>	2
<b>ASCED code:</b>	039999

### STAFFING

Examiner: Andrew Wandel  
Moderator: Chris Snook

### REQUISITES

Pre-requisite: (ENG2102 and MAT1502) or Students must be enrolled in one of the following Programs: GCEN or GDET or METC or MEPR

### OTHER REQUISITES

Recommended prior or concurrent study: MAT2500

### SYNOPSIS

This is the third in a sequence of four courses that use a 'problem based learning approach' to extend the students knowledge of the complex world of engineering. In this course the student will build on the problem solving skills developed in earlier courses whilst acquiring, mastering and assimilating new knowledge and techniques into their chosen field of study. Of particular importance to the engineer is the ability to develop an appropriate model to describe the behavior of an engineering system, and then to analyze that behavior and apply engineering judgement in the interpretation of the results of that model. Often this model will be of a mathematical nature and the engineer requires the ability to solve such numerical problems. The student will be required to develop skills in programming using a scripting language. The student will undertake a range of numerical computation exercises using a scripting language. As in the previous courses of this strand, the student is to develop skills in problem solving within an engineering context. A number of real world problems and case studies provide the basis for meeting this objective.

### OBJECTIVES

The course objectives define the student learning outcomes for a course. The assessment item(s) that may be used to assess student achievement of an objective are shown in parenthesis. On completion of this course, students should be able to:

1. apply well developed team skills to the application of solutions to engineering problems (Assignment 1, Assignment 2);
2. develop an appropriate mathematical model of an engineering problem (CMA, Assignment 1, Assignment 2, Exam);
3. develop a logical and well structured computer program (CMA, Assignment 1, Assignment 2, Exam);
4. discuss and use the concepts of debugging a computer program (CMA, Assignment 1, Assignment 2, Exam);
5. use a range of numerical computing techniques to develop an appropriate model from available data (CMA, Assignment 1, Assignment 2, Exam)
6. demonstrate a knowledge of and make appropriate use of a range of methods in the design and analysis of engineering experiments (CMA, Assignment 1, Assignment 2, Exam);
7. analyse the behaviour of an engineering system using a general purpose numerical software package (CMA, Assignment 1, Assignment 2, Exam).

## TOPICS

	Description	Weighting (%)
1.	Engineering problem solving methodologies and mathematical modelling	20.00
2.	Problem solving case studies in engineering, drawn from areas such as mechanics, thermodynamics, structures, geomechanics, hydraulics and electromagnetics, that involve solving equations by iteration; solving sets of linear algebraic equations; regression and interpolation; and numerical calculus and differential equations. MATLAB will be the main tool employed in the solution of the case studies and emphasis will be given to problems that enhance the programming skills of students and that require the application of array and matrix operations; files, functions and data structures; and plotting.	80.00

## 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 V7.1 Release 14 + Simulink, Student Version

Palm, WJ 2005, *Introduction to Matlab 7 for Engineers*, McGraw-Hill, Dubuque, IA.

## 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.

Austin, M & Chancogne, D 1999, *Introduction to engineering programming: in C, Matlab and Java*, Wiley, New York.

Chapman, SJ 2004, *Matlab programming for engineers*, 3rd edn, Thomson, Australia.

Etter, DM 1997, *Engineering problem solving with Matlab*, 2nd edn, Prentice Hall, Upper Saddle River, NJ.

Kincaid, D & Cheney, W 2001, *Numerical analysis: mathematics of scientific computing*, 3rd edn, Brooks/Cole, Pacific Grove, CA.

Kreuzig, E 2006, *Advanced engineering mathematics*, 9th edn, Wiley, Hoboken, NJ.

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Directed Study	48.00
Examinations	2.00
Online Discussion Groups	39.00
Project Work	66.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg (%)	Due date
CMA ASSIGNMENT	50.00	5.00	07 Aug 2009
ASSIGNMENT 1	200.00	20.00	11 Sep 2009
ASSIGNMENT 2	300.00	30.00	23 Oct 2009
2 HOUR RESTRICTED EXAMINATION	450.00	45.00	END S2 (see note 1)

### NOTES

1. Student Administration will advise students of the dates of their examinations during the semester.

## IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:  
There are no attendance requirements for this course. However, it is the students' responsibility 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. Students must participate in their assigned group activities through their USQ electronic discussion group for the course on at least a weekly basis.
- 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 (or at least a grade of C-) for each assessment item.
- 3 Penalties for late submission of required work:  
If students submit assignments after the due date without extenuating circumstances then a penalty of 5% of the assigned mark may apply for each working day late up to a maximum of ten working days at which time a mark of zero can be recorded for that assignment.
- 4 Requirements for student to be awarded a passing grade in the course:

- To be assured of receiving a passing grade in a course a student must obtain at least 50% of the total weighted marks 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 (or grades) obtained for each of the summative assessment items in the course.
  - 6 Examination information:  
Candidates are allowed access only to specific materials during a Restricted Examination. The only materials that candidates may use in the restricted examination for this course are: writing materials (non-electronic and free from material which could give the student an unfair advantage in the examination); calculators which cannot hold textual information (students must indicate on their examination paper the make and model of any calculator(s) they use during the examination); and paper-based textbooks and notes.
  - 7 Examination period when Deferred/Supplementary examinations will be held:  
Any Deferred or Supplementary examinations for this course will be held during the examination period at the end of the semester of the next offering of this course.
  - 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 The due date for an assignment is the date by which a student must despatch the assignment to the USQ. The onus is on the student to provide proof of the despatch date, if requested by the Examiner.
- 2 Students must retain a copy of each item submitted for assessment. This must be despatched to USQ within 24 hours if required by the Examiner.
- 3 In accordance with University's Assignment Extension Policy (Regulation 5.6.1), the examiner of a course may grant an extension of the due date of an assignment in extenuating circumstances.
- 4 In this course students may submit assignments electronically in the format specified in the assignment requirements.
- 5 The Faculty will NOT accept submission of assignments by facsimile.
- 6 Students who do not have regular access to postal services or who are otherwise disadvantaged by these regulations may be given special consideration. They should contact the examiner of the course to negotiate such special arrangements.
- 7 In the event that a due date for an assignment falls on a local public holiday in their area, such as a Show holiday, the due date for the assignment will be the next day. Students are to note on the assignment cover the date of the public holiday for the Examiner's convenience.
- 8 Students who have undertaken all of the required assessments in a course but who have failed to meet some of the specified objectives of a course within the normally prescribed time may be awarded one of the temporary grades: IM (Incomplete - Make up), IS (Incomplete - Supplementary Examination) or ISM (Incomplete -Supplementary Examination and Make up). A temporary grade will only be awarded when, in the opinion of the examiner, a student will be able to achieve the remaining objectives of the course after a period of non directed personal study.

- 9 Students who, for medical, family/personal, or employment-related reasons, are unable to complete an assignment or to sit for an examination at the scheduled time may apply to defer an assessment in a course. Such a request must be accompanied by appropriate supporting documentation. One of the following temporary grades may be awarded IDS (Incomplete - Deferred Examination); IDM (Incomplete Deferred Make-up); IDB (Incomplete - Both Deferred Examination and Deferred Make-up).

## **OTHER REQUIREMENTS**

- 1 Students will require access to e-mail and internet access to UConnect for this course.
  - 2 This course employs a team based approach to learning in which students are expected to participate in small groups towards the solution of a number of engineering problems. To be awarded a passing grade in this course students must complete at least 80% of the practical and other activities in the course. External students are expected to participate in their assigned groups activities through the USQ electronic discussion group for the course on a weekly basis. Contributions to this group will be monitored.
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