



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 4

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
ENG	4104	90621	2, 2009	ONC	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: Chris Snook  
Moderator: Alexander Kist

## REQUISITES

Pre-requisite: ENG3103 or Students must be enrolled in one of the following Programs: GCEN or GDET or METC or MEPR

## RATIONALE

This course is intended for Bachelor of Engineering students. It forms the capstone to the Engineering Problem Solving strand in the Bachelor of Engineering program. In this course the student will be introduced to the complexity of the real world, the interactivity that occurs between engineering systems, and a range of problem solving philosophies. Students must realize that the work of the professional engineer can rarely be confined within the boundaries of a single problem: the solution to one problem often causes or exacerbates another adjacent problem. The student must also realise that the world is rarely linear in nature, and most of the problems to be analysed show non-linear behaviour. These aspects will be explored against a background of increasing computer-programming skills. As in 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.

## SYNOPSIS

This course introduces the student to the treatment of real world engineering systems. Advanced numerical techniques and programming skills for the handling of non linearity and partial differential equations will be learnt. In addition, the student is required to explore the philosophical approaches to engineering problem solving and evaluate the "downstream" consequences of specific solutions to the problems.

## 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. describe and apply a range of problem solving methodologies; (Assignment 1; Assignment 2; Assignment 3)
2. develop an appropriate approach to solve an engineering problem; (Assignment 1; Assignment 2; Assignment 3)
3. apply numerical techniques to analyse a system represented by ordinary and/or partial differential equation; (Assignment 1; Assignment 2; Assignment 3)
4. apply numerical techniques to analyse a non-linear system; (Assignment 1; Assignment 2; Assignment 3)
5. develop a computer simulation program to assist in the analysis of an engineering problem; (Assignment 1; Assignment 2; Assignment 3)
6. evaluate the solutions to an engineering problem using a general-purpose numerical/simulation software package; (Assignment 1; Assignment 2; Assignment 3)
7. apply highly developed team skills to the application of solutions to engineering problems. (Assignment 1; Assignment 2; Assignment 3)

## TOPICS

	Description	Weighting (%)
1.	Problem Solving Philosophies	10.00
2.	Problems solving case studies in engineering, drawn from areas such as mechanics, thermodynamics, structures, geomechanics, hydraulics and mechatronics, that would involve mathematical modelling of engineering systems with non-linearity and which require application of numerical analysis using Matlab programming	90.00

## 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 Academic Licence

## 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.

Etter, DM 2006, *Engineering problem solving with Matlab*, 3rd edn, Prentice Hall,

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

Lumsdaine, E & Lumsdaine, M 1995, *Creative problem solving - thinking skills for a changing world*, McGraw-Hill,

Palm, WJ 2005, *Introduction to Matlab 7 for engineers*, 2nd edn, McGraw-Hill,

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessments	33.00
Directed Study	58.00
Lectures	26.00
Tutorials or Workshops	38.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg (%)	Due date
ASSIGNMENT 1	250.00	25.00	19 Aug 2009
ASSIGNMENT 2	500.00	50.00	14 Oct 2009
ASSIGNMENT 3	250.00	25.00	28 Oct 2009

## 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. Students must participate in their assigned group activities.
- 2 Requirements for students to complete each assessment item satisfactorily:  
To satisfactorily complete an individual assessment item a student must achieve at least 50% of the marks or a grade of at least C-. (Depending upon the requirements in Statement 4 below, students may not have to satisfactorily complete each assessment item to receive a passing grade in this course.)
- 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 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 (or grades) 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:

N/A

- 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 email 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. 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.