Description: Engineering Problem Solving 3

Subject  Cat-nbr  Class  Term  Mode  Units  Campus
ENG       3103    44988  2, 2005  EXT   1.00   Toowoomba

Academic group: FOENS
Academic org: FOENSV
Student contribution band: 2
ASCED code: 039999

STAFFING
Moderator: Mark Porter

REQUISITES
Pre-requisite: ENG2102 and MAT1102

OTHER-REQUISITES
Recommended prior or concurrent study: MAT2100

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 MATLAB. The student will undertake a range of numerical computation exercises using MATLAB. 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
On completion of this course, students should be able to:

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

TOPICS

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

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,
Chapman, S J 2004, Matlab Programming for Engineers, 3rd edn, Thomson,
Etter, D M 1997, Engineering Problem Solving with Matlab, 2nd edn, Prentice Hall,
Kreyszig, E 1999, Advanced Engineering Mathematics, 8th edn, Wiley,
STUDENT WORKLOAD REQUIREMENTS

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS</th>
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<tbody>
<tr>
<td>Directed Study</td>
<td>48.00</td>
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<tr>
<td>Examinations</td>
<td>3.00</td>
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<tr>
<td>Online Discussion Groups</td>
<td>38.00</td>
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<tr>
<td>Project Work</td>
<td>66.00</td>
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ASSESSMENT DETAILS

<table>
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<tr>
<th>Description</th>
<th>Marks out of</th>
<th>Wtg(%)</th>
<th>Due date</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMA ASSIGNMENT</td>
<td>50.00</td>
<td>5.00</td>
<td>12 Aug 2005</td>
</tr>
<tr>
<td>ASSIGNMENT 1</td>
<td>200.00</td>
<td>25.00</td>
<td>09 Sep 2005</td>
</tr>
<tr>
<td>ASSIGNMENT 2</td>
<td>300.00</td>
<td>0.00</td>
<td>21 Oct 2005</td>
</tr>
<tr>
<td>3 HOUR OPEN EXAMINATION</td>
<td>450.00</td>
<td>70.00</td>
<td>END S2</td>
</tr>
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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 prior approval then a penalty of 5% of the total marks gained by the student for the assignment will apply for each working day late.

4. Requirements for student to be awarded a passing grade in the course:
   To be assured of receiving a passing grade a student must attempt all of the summative assessment items, achieve at least 50% in the examination, achieve an aggregated mark of at least 40% in the total marks allocated for the assignments, and at least 50% of the available weighted marks for the summative assessment items.

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:
In an Open Examination, candidates may have access to any material during the examination except the following: electronic communication devices, bulky materials, devices requiring mains power and material likely to disturb other students.

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 USQConnect for this course.
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.