Description: Signal Processing

Subject  Cat-nbr  Class  Term  Mode  Units  Campus
ELE  3107  66394  2, 2007  EXT  1.00  Toowoomba

Academic group:  FOENS
Academic org:  FOES04
Student contribution band:  2
ASCED code:  031399

STAFFING
Examiner: John Leis
Moderator: Mark Phythian

OTHER REQUISITES
Recommended prior or concurrent study: ELE2103

SYNOPSIS
Signal processing is the treatment of signals to enable detection, classification, transmission or enhancement. Such signals may, for example, be the apparent noise generated by a mechanical process, music, speech or other audio, or a video image. This course aims to give the student a thorough grounding in the theoretical and practical aspects of digital signal processing. Practical applications of signal processing are emphasised via directed experimentation and assignment work.

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. distinguish clearly between a deterministic and a random or stochastic signal (Assignment 2 and Exam);
2. describe any signal probabilistically in terms of amplitude and spatial, frequency or temporal functions (Assignment 1 and Exam);
3. calculate the functions as indicated in 2 above for any deterministic signal (Exam);
4. collect sufficient and appropriate data from a range of physical systems and analyse this data to make predictions about the system (Assignment 1, Assignment 2 and Exam);
5. apply the methods of mathematical statistics to solve appropriate problems of an engineering nature (Assignment 1, Assignment 2 and Exam);
6. explain the basic concepts of information theory (Exam);
7. deduce appropriate digital filter algorithms for a signal conditioning problem (Assignment 1, Assignment 2 and Exam);
8. exploit the conversion of signals to and from the frequency domain (Assignment 2 and Exam);
9. extend the foregoing concepts to multidimensional signal processing (Assignment 1 and Exam);
10. be able to implement signal processing algorithms using a programming language (Assignment 1, Assignment 2 and Exam).

TOPICS

<table>
<thead>
<tr>
<th>Description</th>
<th>Weighting (%)</th>
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<tbody>
<tr>
<td>1. Fourier analysis</td>
<td>20.00</td>
</tr>
<tr>
<td>2. Random processes</td>
<td>20.00</td>
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<tr>
<td>3. Digital signal processing</td>
<td>50.00</td>
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<tr>
<td>4. Information theory</td>
<td>10.00</td>
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</tbody>
</table>

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,
(Student Edition, Version 6 or later.)
(ISBN 0-86380-276-1)

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.

STUDENT WORKLOAD REQUIREMENTS

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS</th>
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<tbody>
<tr>
<td>Assessment</td>
<td>52.00</td>
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<tr>
<td>Examinations</td>
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<tr>
<td>Private Study</td>
<td>101.00</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>
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<tbody>
<tr>
<td>ASSIGNMENT 1</td>
<td>200.00</td>
<td>20.00</td>
<td>07 Sep 2007</td>
</tr>
<tr>
<td>ASSIGNMENT 2</td>
<td>200.00</td>
<td>20.00</td>
<td>26 Oct 2007</td>
</tr>
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<td>2 HOUR CLOSED EXAMINATION</td>
<td>600.00</td>
<td>60.00</td>
<td>END S2 (see note 1)</td>
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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.

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 prior approval then a penalty of 10% of the total marks available 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 achieve at least 30% in all of the weighted assessment items, achieve at least 45% in the examination and 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:
   In a Closed Examination, candidates are allowed to bring only writing and drawing instruments into 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 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 The Faculty will normally only accept assessments that have been written, typed or printed
on paper-based media.

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.