



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: Signal Processing

| Subject | Cat-nbr | Class | Term | Mode | Units | Campus |
|---------|---------|-------|---------|------|-------|-----------|
| ELE | 3107 | 90313 | 2, 2009 | ONC | 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

| | Description | Weighting (%) |
|----|---------------------------|---------------|
| 1. | Fourier analysis | 20.00 |
| 2. | Random processes | 20.00 |
| 3. | Digital signal processing | 50.00 |
| 4. | Information theory | 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).

ELE3107 Signal Processing External Study Package, USQ Publication,

MATLAB,

(Student Edition, Version 6 or later.)

'Signal Processing Course Notes' (Available: <http://www.usq.edu.au/users/leis/>).

Leis, J 2002, *Digital Signal Processing - A MATLAB-Based Tutorial Approach*, Research Studies Press Ltd, Baldock, Hertfordshire.

(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.

Oppenheim, A V & Schaffer, R W 1999, *Discrete Time Signal Processing*, 2nd edn, Prentice Hall, Upper Saddle River, NJ.

Papoulis, A. & Pillai, U. 2002, *Probability, Random Variables and Stochastic Processes*, 4th edn, McGraw Hill, New York.

STUDENT WORKLOAD REQUIREMENTS

| ACTIVITY | HOURS |
|---------------|-------|
| Assessments | 52.00 |
| Examinations | 2.00 |
| Lectures | 39.00 |
| Private Study | 62.00 |

ASSESSMENT DETAILS

| Description | Marks out of | Wtg (%) | Due date |
|---------------------------|--------------|---------|------------------------|
| ASSIGNMENT 1 | 200.00 | 20.00 | 04 Sep 2009 |
| ASSIGNMENT 2 | 200.00 | 20.00 | 23 Oct 2009 |
| 2 HOUR CLOSED EXAMINATION | 600.00 | 60.00 | 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:
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.
- 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 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:
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 UConnect for this course.
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