



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: System Design

| Subject | Cat-nbr | Class | Term    | Mode | Units | Campus    |
|---------|---------|-------|---------|------|-------|-----------|
| MEC     | 3303    | 90337 | 2, 2009 | EXT  | 1.00  | Toowoomba |

|                                   |        |
|-----------------------------------|--------|
| <b>Academic group:</b>            | FOENS  |
| <b>Academic org:</b>              | FOES02 |
| <b>Student contribution band:</b> | 2      |
| <b>ASCED code:</b>                | 030701 |

### STAFFING

Examiner: Chris Snook  
Moderator: Bob Fulcher

### REQUISITES

Pre-requisite: MEC2301 or Students must be enrolled in one of the following Programs: GCEN or GDET or METC

### SYNOPSIS

Most engineering products form part of a system which can be broken down into sub systems, assemblies and components. A considerable amount of design synthesis and analysis has to be done on the system as a whole before a product or process design specification can be drawn up. It is therefore important that the engineer is able to recognise what forms a system, a subsystem and a component, and how the performance of the whole system is affected by the performance of its constituent parts. In systems design, the engineer considers the widest implications of a product, project or process at the design stage, including not only the technical interactions of the various subsystems, but also the political, sociological and socio-economic implications. This course leads the student to an understanding of the philosophy and methodology of the design process in the context of systems which embrace political, sociological, economic, technical and ergonomic aspects. It then provides practice through assignments and workshops in developing the student's ability to discern the relevant factors and design accordingly, to interact within a design team, and to communicate ideas and concepts through oral and written presentation. An essential skill for the design engineer is to be able to work across disciplines and therefore they often have to "learn" new specialisations. In this course the student is introduced to a number of specialist topics not covered elsewhere in their course of study. This is a senior course and it is assumed that the student has the maturity, knowledge and skills base commensurate with having completed the first two years of their undergraduate course.

## 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. identify, review and evaluate design projects that require the system design approach; (Assignment 1; Assignment 2; Exam)
2. develop a design brief and plan and manage a system design; (Assignment 1)
3. apply methodologies of design; (Assignment 1; Exam)
4. optimise and rationalise a design in the wider engineering environment of statutes, ecology, common law, ergonomics, social acceptability, marketing etc; (Assignment 1; Assignment 2; Exam)
5. explain the relationship between the design function and the corporate environment; (Assignment 1; Exam)
6. transfer and apply the use of appropriate computer techniques/packages; (Assignment 1)
7. apply specialist knowledge and evaluative skills in a number of new areas within the discipline of mechanical engineering; (Assignment 1; Exam)
8. co-operate in a teamwork environment; (Assignment 1; Assignment 2)

## TOPICS

|    | Description   | Weighting (%) |
|----|---|---------------|
| 1. | Design Philosophy   | 5.00          |
|    | 1.1. Design criteria, designing for performance, strength, rigidity, life.  |               |
|    | 1.2. Statistical nature of loads and functional properties, design factor.  |               |
| 2. | System Reliability  | 10.00         |
| 3. | System Identification   | 5.00          |
|    | 3.1. Definition of function, single and multi function, required life, determination of constraints, breakdown into subsystems and components |               |

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|----|--|-------|
| 4. | The Design Process   | 40.00 |
|    | 4.1. Synthesis, range of options, modelling and simulation, functional analysis, value analysis, optimisation, creativity, aesthetics                      |       |
|    | 4.2. Cost, technology, statutes, Government Policy, public opinion, Trades Union and Professional Association policy, pressure groups, ergonomics, ecology |       |
|    | 4.3. Market analysis, costing, community costs, promotion, company policy and image, product line  |       |
|    | 4.4. Objective function, system versus sub system optimisation. Operations research methods  |       |
|    | 4.5. Anthropometric data, noise and vibration discomfort criteria, visual acuity   |       |
| 5. | Engineering Specialisations  | 40.00 |
|    | 5.1. Engineering noise control   |       |
|    | 5.2. Hydraulic and pneumatic design  |       |

### **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).

Ertas, A & Jones, JC 1996, *The Engineering Design Process*, 2nd edn, Wiley, New York.

### **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.

Bies, DA & Hansen, CH 2003, *Engineering Noise Control*, 3rd edn, E & FN Spon, London.

### **STUDENT WORKLOAD REQUIREMENTS**

| ACTIVITY       | HOURS |
|----------------|-------|
| Directed Study | 52.00 |
| Examinations   | 2.00  |
| Private Study  | 26.00 |
| Project Work   | 75.00 |

## ASSESSMENT DETAILS

| Description             | Marks out of | Wtg (%) | Due date               |
|-------------------------|--------------|---------|------------------------|
| MAJOR DESIGN            | 600.00       | 60.00   | 26 Oct 2009            |
| ASSIGNMENT              | 100.00       | 10.00   | 30 Oct 2009            |
| 2 HOUR OPEN EXAMINATION | 300.00       | 30.00   | END S2<br>(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.
- 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 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 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).
- 10 This is a communication benchmark course and a major component of the assessment of this course will be associated with the demonstration of communication skills.

## **OTHER REQUIREMENTS**

- 1 Students will require access to e-mail and internet access to UConnect for this course.
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