**Description: Embedded Systems Design**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Cat-nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
<th>Campus</th>
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<tr>
<td>ELE</td>
<td>2303</td>
<td>30520</td>
<td>1, 2004</td>
<td>WEB</td>
<td>1.00</td>
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**Academic group:** FOENS  
**Academic org:** FOES04  
**Student contribution band:** 2  
**ASCED code:** 031305

**STAFFING**

Examiner: Mark Phythian  
Moderator: Mark Norman

**OTHER-REQUISITES**

Recommended Pre-requisite: ELE1301

**SYNOPSIS**

This course develops the techniques used in microcomputer design, interfacing and applications. It includes microcomputer architecture; assembly language programming; I/O methods and interface techniques for parallel and serial, synchronous and asynchronous systems; multiple interrupt I/O and DMA; interface examples involving RS232C, centronics and non standard microcomputer interfaces; bus standards including S100, VME and GPIB; and development of software for 8 bit and 16 bit microprocessors. A Microcomputer hardware and software design project is used to develop team design concepts.

**OBJECTIVES**

On completion of this course, students should be able to:

- select a microprocessor appropriate to a particular application;
- design, create, validate and document structured programs and software solutions to problems;
- select and use appropriate hardware and software development tools;
- design input/output hardware to meet the requirements of specific applications;
- compare and evaluate alternative systems to handle multiple interrupts;
- design an embedded microcomputer system to specification;
- co-operate in a team design environment to produce software and hardware solutions for embedded systems.
TOPICS

<table>
<thead>
<tr>
<th>Description</th>
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<tr>
<td>1. Computer Architectures</td>
<td>10.00</td>
</tr>
<tr>
<td>2. Assembly Language Programming</td>
<td>10.00</td>
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<tr>
<td>3. Computer I/O Techniques</td>
<td>20.00</td>
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<tr>
<td>4. Software Design and Documentation</td>
<td>10.00</td>
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<tr>
<td>5. Development Systems</td>
<td>10.00</td>
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<tr>
<td>6. Interrupts and DMA</td>
<td>15.00</td>
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<td>7. Bus Structures</td>
<td>10.00</td>
</tr>
<tr>
<td>8. Microcomputer Hardware Design</td>
<td>15.00</td>
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</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).

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>40.00</td>
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<tr>
<td>Directed Study</td>
<td>42.00</td>
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<tr>
<td>Examinations</td>
<td>3.00</td>
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<tr>
<td>Private Study</td>
<td>70.00</td>
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</table>
ASSESSMENT DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks out of</th>
<th>Wtg(%)</th>
<th>Due date</th>
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<tbody>
<tr>
<td>SOFTWARE DESIGN</td>
<td>200.00</td>
<td>20.00</td>
<td>26 Apr 2004</td>
</tr>
<tr>
<td>COMPUTER HARDWARE DESIGN</td>
<td>200.00</td>
<td>20.00</td>
<td>08 Jun 2004</td>
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<td>3 HOUR CLOSED EXAMINATION</td>
<td>600.00</td>
<td>60.00</td>
<td>END S1 (see note 1)</td>
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</table>

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 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 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 a passing grade, students must demonstrate, via the summative assessment items, that they have achieved the required minimum standards in relation to the objectives of the course by: (i) satisfactorily completing the examination and assignments; and (ii) obtaining at least 50% of the total weighted marks available for all summative assessment items. Students who do not qualify for a Passing grade may, at the discretion of the Examiner, be assigned additional work to demonstrate to the Examiner that they have achieved the required standard. It is expected that such students will have gained at least 45% of the total marks available for all 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. Grades above C will only be awarded when the student obtains at least 60% of the marks available in the examination.

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 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 - BothDeferred Examination and Deferred Make-up).
OTHER REQUIREMENTS

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