Description: Real Time Systems

<table>
<thead>
<tr>
<th>Subject</th>
<th>Cat-nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
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<tr>
<td>ELE</td>
<td>3307</td>
<td>34563</td>
<td>2004</td>
<td>EXT</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: John Leis

REQUISITES
Pre-requisite: ELE1301

SYNOPSIS
Many engineering systems today involve the integration of computer hardware and software in the form of embedded algorithms and device controllers, particularly those operating in real time. Examples include digital signal processors (DSP's) for telecommunications systems, real time process control and device driver software to control hardware devices. This course aims to give students exposure to concepts related to real time systems and event driven programming, together with practical experience in the design of advanced engineering computer applications using low level operating system functions and hardware devices.

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

1. discuss the concept of event driven control in real time systems;
2. create real time system specifications utilizing design techniques and tools;
3. create real time kernels including polled loop, interrupt driven, state driven and phase driven code;
4. design, create, compile and evaluate C programs;
5. create and utilize algorithms and data structures;
6. design and implement software solutions requiring multiple processes and/or threads, inter-process communications and synchronization to meet the requirements of a real time system specification.
<table>
<thead>
<tr>
<th>TOPICS</th>
<th>Description</th>
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<tbody>
<tr>
<td>1.</td>
<td>Real Time Concepts</td>
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<td>2.</td>
<td>Real Time Software Design</td>
<td>15.00</td>
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<td>3.</td>
<td>Programming Languages for Real Time Applications</td>
<td>15.00</td>
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<td>4.</td>
<td>Coding Techniques and Algorithms</td>
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<td>5.</td>
<td>Multi Tasking</td>
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<td>6.</td>
<td>Interprocess Communication</td>
<td>15.00</td>
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<td>7.</td>
<td>Process Synchronisation and Timing</td>
<td>10.00</td>
</tr>
<tr>
<td>8.</td>
<td>Real Time Application</td>
<td>8.00</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.

Adams, P. M. & Tondo, C. 1990, *Writing DOS Device Drivers in C*, Prentice Hall,
Alexandridis, N. 1993, *Design of Microprocessor - Based Systems*, Prentice Hall,
Norton, D. A. 1992, *Writing Windows Device Drivers*, Addison-Wesley,
Pietrek, M. 1993, Window Internals: The Implementation of the Windows Operating System, Addison-Wesley,

Williams, A. 1993, DOS and Windows Protected Mode: Programming with DOS Extenders in C, Addison-Wesley,

STUDENT WORKLOAD REQUIREMENTS:

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS</th>
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<tr>
<td>Assessment</td>
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<tr>
<td>Directed Study</td>
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<tr>
<td>Examinations</td>
<td>3.00</td>
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<tr>
<td>Private Study</td>
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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>ASSIGNMENT 1</td>
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<td>20.00</td>
<td>13 Sep 2004</td>
</tr>
<tr>
<td>ASSIGNMENT 2</td>
<td>200.00</td>
<td>20.00</td>
<td>25 Oct 2004</td>
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<td>3 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:
   (i) To complete each of the assignments satisfactorily, students must obtain at least 50% of the marks available (or at least a grade of C-) for each assignment. (ii) To complete the examination satisfactorily, students must obtain at least 50% of the marks available (or at least a grade of C-) for the examination.

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.

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.