Description: Real Time Systems

<table>
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<tr>
<th>Subject</th>
<th>Cat-Nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
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<td>2, 2002</td>
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Academic Group: FOENS
Academic Org: FOES04
HECS Band: 2
ASCED Code: 031305

STAFFING
Examiner: Mark Phythian
Moderator: John Grant-Thomson

PRE-REQUISITES
Pre-requisite: ELE 1301

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:

- discuss the concept of event driven control in real time systems;
- create real time system specifications utilizing design techniques and tools;
- create real time kernels including polled loop, interrupt driven, state driven and phase driven code;
- design, create, compile and evaluate C and C++ programs;
- create and utilize algorithms and data structures;
- 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.
TOPICS

<table>
<thead>
<tr>
<th>Description</th>
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<tr>
<td>1. Real Time Concepts</td>
<td>7.00</td>
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<td>2. Real Time Software Design</td>
<td>15.00</td>
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<td>3. Programming Languages for Real Time Applications</td>
<td>15.00</td>
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<td>4. Coding Techniques and Algorithms</td>
<td>15.00</td>
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<td>5. Multi Tasking</td>
<td>15.00</td>
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<td>6. Interprocess Communication</td>
<td>15.00</td>
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<td>7. Process Synchronisation and Timing</td>
<td>10.00</td>
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<td>8. Real Time Application</td>
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</table>

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.

Various manufacturers' data books to be advised during course.

Adams, P. M. & Tondo, C. 1990, Writing DOS Device Drivers in C, Prentice Hall,
Alexandridis, N. 1993, Design of Microprocessor - Based Systems, Prentice Hall,
Brey, B. 1994, The Intel Microprocessors 80 x 86 Architecture, Programming and Interfacing, 3rd edition, Maxwell MacMillan,
Kauler, B. 1993, Windows Assembly Language and Systems Programming: Object Oriented and Low-Level Systems Programming in Assembly Language for Windows 3.x, 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

ACTIVITY                        HOURS
Assessment                      52
Directed Study                  66
Examinations                    3
Private Study                   20
Tutorial                        14

ASSESSMENT DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
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<th>Due Date</th>
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<tr>
<td>ASSIGNMENT 1</td>
<td>200.00</td>
<td>20.00</td>
<td>Y</td>
<td>09 Sep 2002</td>
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<td>ASSIGNMENT 2</td>
<td>200.00</td>
<td>20.00</td>
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<td>28 Oct 2002</td>
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<td>3 HOUR CLOSED EXAMINATION</td>
<td>600.00</td>
<td>60.00</td>
<td>Y</td>
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NOTES:
3. Student Administration will advise students of the dates of their examinations during the semester.

OTHER REQUIREMENTS

1. Students must obtain 50% in each assignment, and 50% for the final examination, in order to achieve a pass in the course.
2. A minimum standard of communication skills must be demonstrated in order for a passing grade to be achieved.
3. The due date for an assignment is the date by which a student must submit the assignment to the USQ. The onus is on the student to provide proof of the submit date, if requested by the Examiner.
4. Students must retain a verbatim copy of each item submitted for assessment. This must be produced within five days if required by the Examiner.
5. 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.
6. If students submit assignments after the due date without prior approval then a penalty of up to 10% of the total marks for the assignment will apply for each working day late.
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. The Faculty of Engineering and Surveying will NOT accept submission of handwritten or typed assignments by facsimile, e-mail or computer diskette. Students
in remote locations who do not have regular access to postal services may be given special consideration.

9 The final grades for students will be assigned on the basis of the aggregate of the marks obtained for each of the assessments in the course and by considering the student's level of achievement of the objectives of the course.

10 A closed examination is an examination where the candidates are allowed to bring only writing and drawing instruments into the examination.

11 The Faculty of Engineering and Surveying does not offer supplementary examinations.

12 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 the temporary grade: IM (Incomplete - Make up). An IM 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.

13 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); IDSM (Incomplete Deferred Examination and Make-up).