The University of Southern Queensland

Course Specification

Description: Mechatronic Practice

<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>
</tr>
</thead>
<tbody>
<tr>
<td>ENG</td>
<td>3905</td>
<td>14658</td>
<td>2, 2002</td>
<td>EXT</td>
<td>0.00</td>
<td>TWOLBA</td>
</tr>
</tbody>
</table>

Academic Group: FOENS
Academic Org: FOES02
HECS Band: 2
ASCED Code: 030799

STAFFING
Examiner: John Billingsley
Moderator: Bob Fulcher

SYNOPSIS
In mechatronics, mechanical, electrical and computing elements are combined to form an integrated whole. This course draws together mechanical, electrical, software and interfacing aspects of a mechatronic system through a progressive sequence of experiments. A motor is connected to a computer through a power amplifier, while another motor in tandem is monitored through an analogue interface to determine its speed. A line or two of code makes speed control possible. A belt drives a 'trolley' of which the position is monitored and some more effort including some nonlinear strategies results in a 'crisp' position controller of an industrial standard. An inverted pendulum is added to the trolley and the student devises a control scheme to keep it balanced. Several further, brief experiments give familiarity with pneumatic positioning, simple vision interfacing and a hydraulic robot. This course will round off the formation of a mechatronics engineer.

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

- devise or select sensors for measuring the motion of a dynamic system;
- describe and be familiar with the operation of an analogue interface;
- select sensors for system control and interface them;
- understand and write programs for the application of on-line digital control;
- analyse a dynamic system in terms of discrete time equations;
- devise and apply on-line control algorithms and test them.
TOPICS

Description Weighting (%)  
1. Analogue to digital interfacing 20.00  
2. Computer controlled velocity 20.00  
3. Nonlinear computer position control 20.00  
4. Computer control of an inverted pendulum 20.00  
5. Familiarisation with pneumatic control, simple vision systems and a multi-axis hydraulic robot. (See Practice Book for further details for all topics listed.) 20.00  

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.

*ELE3105 Computer Controlled Systems External Study Package*, USQ Publication,  
*MEC2301 Design of Machine Elements External Study Package*, USQ Publication,  
*ENG4406 Robotics and Machine Vision External Study Package*, USQ Publication,  

STUDENT WORKLOAD REQUIREMENTS

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directed Study</td>
<td>9</td>
</tr>
<tr>
<td>Laboratory or Practical Classes</td>
<td>24</td>
</tr>
<tr>
<td>Private Study</td>
<td>17</td>
</tr>
</tbody>
</table>

ASSESSMENT DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
<th>Required</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDIVIDUAL SKILLS COMPETENCY</td>
<td>500.00</td>
<td>50.00</td>
<td>Y</td>
<td>07 Oct 2002</td>
</tr>
<tr>
<td>GROUP SKILLS COMPETENCY</td>
<td>500.00</td>
<td>50.00</td>
<td>Y</td>
<td>07 Oct 2002</td>
</tr>
</tbody>
</table>

OTHER REQUIREMENTS

1. Attendance at a minimum of 80% of practical and/or residential school sessions is compulsory for a passing grade to be awarded in this course.
2. The only final grades awarded in this course are Pass (P) or Fail (F) grades.
3. A minimum standard of communication skills must be demonstrated in order for a passing grade to be achieved.
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.

Students must retain a copy of each item submitted for assessment. This must be produced within five days if requested by the Examiner.

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.

If students submit assignments after the due date without prior approval then a penalty of up to 20% of the total marks for the assignment will apply for each working day late.

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.

The Faculty of Engineering and Surveying will NOT accept submission of hand written 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.

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.

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).