Description: Mechatronic Practice

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<th>Subject</th>
<th>Cat-Nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
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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

ACTIVITY HOURS  
Directed Study 9  
Laboratory or Practical Classes 24  
Private Study 17

ASSESSMENT DETAILS

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<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
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<tr>
<td>INDIVIDUAL SKILLS COMPETENCY</td>
<td>500.00</td>
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<td>GROUP SKILLS COMPETENCY</td>
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IMPORTANT ASSESSMENT INFORMATION

1. Attendance requirements:  
This course requires attendance at a residential school. It is the students' responsibility to attend and participate appropriately in all activities (such as lectures, tutorials, laboratories and practical work) scheduled for them, and 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. Students must attend and complete the requirements of the Workplace Health and Safety training program for this course before they are able to undertake any practical work in the electrical laboratories.

2 Requirements for students to complete each assessment item satisfactorily:
   To complete the practical component satisfactorily, students must submit, by the due date, a practical report which meets the requirements of the assessment scheme.

3 Penalties for late submission of required work:
   Practical reports submitted after the due date will not be assessed.

4 Requirements for student to be awarded a passing grade in the course:
   To be assured of receiving a passing grade students must complete at least 80% of the practical and other activities at a satisfactory standard at the Residential School for the course, as stated in 2 above.

5 Method used to combine assessment results to attain final grade:
   As P is the only passing grade available for this course, all students who are qualified for a passing grade, under the requirements in 4 above, will be given a grade of P. Other students will be given either a Failing grade or an Incomplete grade.

6 Examination information:
   There is no examination in this course.

7 Examination period when Deferred/Supplementary examinations will be held:
   Not applicable.

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/SECARIAT/calendar/Part5/ or in the printed version of the current USQ Handbook.