The University of Southern Queensland

Course Specification

Description: Robotics and Machine Vision

<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>4406</td>
<td>10608</td>
<td>1, 2002</td>
<td>WEB</td>
<td>1.00</td>
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Academic Group: FOENS
Academic Org: FOES02
HECS Band: 2
ASCED Code: 030799

STAFFING
Examiner: John Billingsley
Moderator: Paul Wen

PRE-REQUISITES
Pre-requisite:ELE2103

SYNOPSIS
Robotics and machine vision are specialised aspects of mechatronics, the fusion of digital control with electronics and mechanisms to realise an application of value to manufacturing and other industries. Mechatronic control system design requires the ability to embrace nonlinearities in both the system and the controller. Kinematic methods are taught for the design and analysis of robot manipulators and similar mechanisms. Aspects of control theory cover modelling and synthesis of nonlinear controllers such as the saturating drives demanded for real life actuator systems. The vision syllabus ranges over the variety of image acquisition systems now available, leading on to methods of image analysis. Image filtering and edge detection are compared with more pragmatic methods and examples are taken from research outcomes such as the vision guidance system now being implemented on agricultural tractors.

OBJECTIVES
On mastering this course the student should be conversant with:

- Kinematics and positional control of articulated manipulators.
- Design techniques for controlling mechanical systems.
- Basics of machine vision concepts applicable to robotics.
TOPICS

Description Weighting (%)  
1. Kinematics and inverse kinematics for robots 35.00 
2. Control for robots 25.00 
3. Robot programming principles 5.00 
4. Introduction to sensing for robots 10.00 
5. Machine vision for robots 25.00 

TEXT and MATERIALS required to be PURCHASED or ACCESSED:

Books can be ordered by fax or telephone. For costs and further details use the 'Book Search' facility at http://bookshop.usq.edu.au by entering the author or title of the text.

MATLAB Student Edition, Version 5 or later.

Please note: Online Students do not have access to hardcopy Library material and will be expected to purchase any set textbooks. Textbooks may be purchased through the USQ Bookshop web site: http://bookshop.usq.edu.au/.


STUDENT WORKLOAD REQUIREMENTS

ACTIVITY HOURS
Private Study 60

ASSESSMENT DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
<th>Required</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>ASSIGNMENT 1</td>
<td>250.00</td>
<td>25.00</td>
<td>Y</td>
<td>04 Mar 2002</td>
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<tr>
<td>ASSIGNMENT 2</td>
<td>250.00</td>
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<td>3 HOUR CLOSED EXAMINATION</td>
<td>500.00</td>
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NOTES:
1. Further details about the due dates are detailed in the assessment section of the Course Specifications.
2. Further details about the due dates are detailed in the assessment section of the Course Specifications.
3. Further details about the due dates are detailed in the assessment section of the Course Specifications.
OTHER REQUIREMENTS

1. In order to complete this course successfully, a student must normally obtain 50% of the marks in the individual assessments.

2. Grading scheme: HD: normally 90% overall and 90% in examination; A: normally 80% overall and 80% in examination; B normally 65% overall and 65% in examination.

3. Students are to retain a verbatim copy of all assignment work submitted, for submission in the event that the original is lost or damaged.

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

5. 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.

6. 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.

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

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

9. 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.

10. 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).

11. A minimum standard of communication skills must be demonstrated in order for a passing grade to be achieved.