MODULE DESCRIPTION FORM

ME501 SYSTEMS ENGINEERING 1

Module Registrar: Dr C Maddock
cardie.maddock@strath.ac.uk

Taught To (Course): Cohorts for whom class is compulsory / optional

Other Lecturers Involved:

Credit Weighting: 10 (ECTS 5)

Semester: 1

Assumed Prerequisites: MA115 Core Engineering Mathematics 1, MA215 Engineering Mathematics, 16232 Engineering Mechanics 2, 16361 Dynamics and Control

Compulsory class

Academic Level: 5

Module Format and Delivery (hours):

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Tutorial</th>
<th>Laboratory</th>
<th>Groupwork</th>
<th>External</th>
<th>Online</th>
<th>Project</th>
<th>Assignments</th>
<th>Private Study</th>
<th>Total</th>
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<tbody>
<tr>
<td>24</td>
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Educational Aim

This module aims to introduce concepts of modelling and control design for engineering systems. The approach is to present an engineering methodology that, while based on mathematical fundamentals, stresses physical systems modelling and practical control systems design with realistic system specifications. In particular, the aim is to study the performance, characteristics and advantages of feedback control systems, and to introduce control design techniques based on steady state and transient response specifications. Use of Simulink as a standard software tool will enhance the understanding and the ability to simulate and design.

Learning Outcomes

On completion of the module the student is expected to be able to

LO1 understand how engineering systems can be modelled as mathematical equations
LO2 become skilled in the manipulation of block diagrams to obtain transfer functions
LO3 understand the form of response of systems to differing forms of input
LO4 understand how system response can be improved.

Syllabus

The module will teach the following:

Introduction to engineering systems, system modelling, block diagram models, control systems design, simulation of systems using Matlab/Simulink, second order systems, transient response of control systems, feedback control systems characteristics.

Assessment of Learning Outcomes

Criteria

For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning:

LO1-2:
Students should demonstrate an ability to develop a mathematical model of a system by being able to:
C1: Find the a set of linearised differential equations to model the system dynamics,
C2: Use these equations to determine the system transfer function form,
C3: Represent the mathematical model as a block diagram.

These skills will be assessed through the problem-based sections of the assignments and the exam.

LO3-4:
Students should be able to assess the performance of a system by:
By using analytic equations to determine the input and output of the system.

By modelling the system using software to numerically predict the performance of the system.

This will be assessed through the project and computer simulation sections of the assignments.

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

12 Principles of Assessment and Feedback
(on Learning & Teaching web pages: www.strath.ac.uk/learnteach/informationforstaff/staff/assessfeedback/12principles/)

Formal, summative feedback will be provided by the return of examination marks to students after assessment (note: exam scripts will not be returned to students and no individual or collective discussion of exam performance will be facilitated).

Informal feedback will be provided at regular tutorial sessions primarily through verbal discussion with individuals or groups on tutorial exercises attempted in advance by students (note: to receive this feedback students should participate in these tutorials but attendance is not mandatory).

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>L/Outcomes</th>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
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<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Month(s)</td>
<td>Duration</td>
</tr>
<tr>
<td>L01, L02</td>
<td>1</td>
<td>January</td>
<td>2hrs</td>
</tr>
</tbody>
</table>

Indicate which learning outcomes (L01, L02 etc) are to be assessed by exam/coursework/project as required.

Coursework / Submissions deadlines:
Assignment deadlines: Week 6, 9, 12.

Resit Assessment Procedures:
2 hr examination in August.

PLEASE NOTE:
Students need to gain a summative mark of 50% to pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of an exam.

Recommended Reading

****Purchase essential; ***Purchase recommended; **Highly recommended reading;
*Simply for reference (do NOT purchase)

**** “Modern Control Systems, International Edition (12e)” by Bishop and Dorf, Addison Wesley
** “Feedback Control of Dynamic Systems” by G Franklin, J Powell and A Emani-Naeini

Additional Student Feedback
(Please specify details of when additional feedback will be provided)

Session: 2014/15

Approved:

Course Director Signature: [Signature]

Date of Last Modifications: 26/08/2014
# MODULE TIMETABLE

**Module Code:** ME501  
**Module Title:** Systems Engineering 1

## Brief Description of Assessment:

Final exam (2 hours) = 55%
Coursework: Assignment 1 (A1) = 15%, Assignment 2 (A2) = 15%, Assignment 3 (A3) = 15%

## Assessment Timing:-

Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment(s).

<table>
<thead>
<tr>
<th>Semester</th>
<th>WK1</th>
<th>WK2</th>
<th>WK3</th>
<th>WK4</th>
<th>WK5</th>
<th>WK6</th>
<th>WK7</th>
<th>WK8</th>
<th>WK9</th>
<th>WK10</th>
<th>WK11</th>
<th>WK12</th>
<th>Exam Period</th>
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<td>Submit A3</td>
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<td>Start A2</td>
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<td>Submit A2</td>
<td>Start A3</td>
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<td>2 hour exam January</td>
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<th>Semester</th>
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