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Module Code: 3ACM0052

Title of Module

Full Title: Instrumentation and Control Systems

Short Title: Inst & Cont Sys

MODULE

3ACM0052 (A 05/6)

Instrumentation and ...

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Version: 1

Credit Points: 15

Level / ECTS Level: 3

First Offered: 1/9/2002 00-00-00

6. Home Department:

AAD

7. Departments(s) contributing to teaching:

9. Module Aims:

- * introduce control systems and components in engineering applications
- * introduce and develop fundamental control theory
- * develop an appreciation and understanding of control systems in auto/motorsport/aero applications

10a. Learning Outcomes: Knowledge and Understanding:

- * have a knowledge and understanding of instrumentation techniques
- * have a knowledge and understanding of standard control terminology
- * have a knowledge and understanding of basic control strategies
- * have a knowledge and understanding of transducer selection criteria and operating principles
- * have a knowledge and understanding of aero/auto/motorsport control applications
- * have a knowledge and understanding of control system stability and error

10b. Learning Outcomes: Skills and Attributes:

- * select appropriate transducers, actuators and instrumentation systems
- * recognise applications suitable for control and apply an appropriate control strategy
- * setup open, feed forward and closed loop systems

- * tune PID controllers
- * simulate control systems using computers

11. Module Content

11a Module Content:

Sensors, instrumentation systems, actuators, selection criteria, signal conditioning. Analogue and digital systems. A to D and D to A conversion. Open loop, feedforward and closed loop control. Error, stability and controller gain, frequency response and time domain methods. Tuning PID controllers, Z/N continuous cycling method, digital control strategies.

11b. Further details on how the learning outcomes of the module will be achieved:

Lectures will cover the theory and practice of basic linear control systems in a largely descriptive fashion. The emphasis will be on treating control theory as a tool for achieving the most out of systems rather than the more traditional analytical approach. The important practical issues will be highlighted and many examples and case studies described. Workshop, Laboratory and site visits will be used to show controlled systems and controllers and students will be able to study, observe and work with these systems. Formative assessments will be based for example on a Building Energy Management System, a Formula student racing car and a servo system. Tutorials will support the above by a mix of questions, problem solving, group work and simulation. In-course, summative assessment will be based on a simulation study of control for multiple order systems and the examination will test the candidates knowledge, skills and understanding of the work covered in this module.

12. Language of Delivery:

English

13. Language of Assessment:

English

14. Assessment Details (Academic):

Coursework: 30

Exam: 70

Other: In-course assessment consists of 2 individual assignments

Passes are required in both elements of assessment

Assessment Notes:

15. Locations(s):

UH HATFIELD

16. Pre and Co-Requisite:

Pre-Requisite

Co-Req

Prohibited

17. Subject Board of Examiner/s:

AERO/CIVIL/MECH ENG L2/3

18. Comments

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