London South Bank University

Module Guide

Machine Drives and Mechatronics

Module Reference: ENG _ 5 _445

School of Engineering

Academic Year: 2018/2019

Level 5

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1. MODULE DETAILS

Module Title:	Machine Drives and Mechatronics
Module Level:	5
Module Reference Number:	ENG_5_445
Credit Value:	20
Student Study Hours:	200 Hours
Contact Hours:	78 Hours
Private Study Hours:	122 Hours
Pre-requisite Learning (If applicable):	Appropriate level 4 modules
Co-requisite Modules (If applicable):	None
Course(s):	Mechanical Engineering
Year and Semester	2018-2019, Semester 2
Module Coordinator:	Dr. Shyamal Mondal
MC Contact Details (Tel, Email, Room)	Ext. 7175, mondals@lsbu.ac.uk, T402
Teaching Team & Contact Details (If applicable):	
Subject Area:	Division of Mechanical and Design
Summary of Assessment Method:	70% - Exam , 30% course work
External Examiner appointed for module:	

2. SHORT DESCRIPTION

This Module provides the fundamental; theory and calculations behind essential elements of mechanical and mechatronics design e.g. mechanical drives, transmission systems, electrical actuation systems, sensors and microcontrollers to control devices. Students will learn by the laboratory experiments about the hardware components and subsystems used in the mechanical and mechatronics control in advanced engineering applications.

3. AIMS OF THE MODULE

This module's aims are as follows

- To extend the student's knowledge and understanding of machine drives and transmission systems.
- To enhance the student's depth of understanding of selecting appropriate sensors, actuators and control techniques for a variety of engineering systems.
- To foster and develop the student's capacity for conceiving innovative mechanical and mechatronics design solutions through the use of laboratory experiments and workshops.

4. LEARNING OUTCOMES

4.1 Knowledge and Understanding

Students will be able to

- Make realistic calculations of motor parameters and understand different type of sensors
- Carry out analysis of internal mechanism of hand drill machines and design parameters for the new gear boxes

4.2 Intellectual Skills

Students will be able to

- Work with laboratory equipment and use science based method to solve problems

4.3 Practical Skills

Students will be able to

- Understanding of mechanical drive mechanism and actuator systems through the drill machine exercises
- Acquire hardware, software, measurements, simulation and microcontroller skills through the laboratory experiments.

4.4 Transferable Skills

Students will have the ability to

- Use analytical and numerical skills to solve machine drives and mechatronics problems

5. ASSESSMENT OF THE MODULE

There are two elements of assessment:

- Examination -70%
  One written examination at the end of the module carrying 70% of the mark.
- Coursework – 30%
  Coursework component worth 30% comprising of both mechanical and mechatronics workshop. This includes design, demonstration and presentation of a hand drill machine.

The submission deadline of the assessment is Friday, 17th May 2018.

Progression
In order to pass this module you must achieve a minimum pass mark of 40%.

Late Submission of work will be penalised in accordance with the Registrar's Standing Memorandum. Specific details on the University regulations regarding assignments can be found in the student handbook.

6. FEEDBACK

Feedback will normally be given to students 15 working days after the submission of the assignments.
At the conclusion of the module there will be a MEQ. This is designed to give you the opportunity module to relate your experiences and opinions of the module performance

and provides the teaching team with valuable data on how the programme reflects the ideals set out in this module guide.

7. INTRODUCTION TO STUDYING THE MODULE

7.1 Overview of the Main Content

Lectures

- Power transmission - gears
- Belt, chain drives, clutches and bearings
- Machine drive techniques for robotics
- Digital machine system, Logic gate and timer function
- Sensor technology, displacement and proximity sensors, eddy current, hall effect , velocity and motion , and temperature sensors
- Optical encoder – incremental and absolute encoder, binary and gray code
- Actuator and control techniques such as electric motors

Practical laboratory works

- Analysis of existing geared drill machine – torque and speed
- Formulate system parameters to bearing , shaft and clutches
- Simulate circuit and analyse output results
- Reading sensor input and take appropriate action by the actuator
- Display data on LCD
- Speed and direction control for servo motors and stepper motors

7.2 Overview of Types of Classes

Teaching will consist of an integrated program of lectures, laboratory works, tutorials and computer programming. These sessions will be supported by demonstrations, audio-visual aids and hands-on experience.

7.3 Importance of Student Self-Managed Learning Time

The student should spend the appropriate amount of time in their private study hours on each topic in order to broaden the material given in formal lectures and labs.

7.4 Employability

In studying this module along with the concepts, tools, and techniques are suitable for students who intend to work in organisations that involve design and testing for machine drives and mechatronics.

8. THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT

Length of module: one semester, lectures (1.5 hours), lab sessions (1.5hours) and one hour tutorial and one to one support at surgery hour.

Refer to the weekly teaching guide for a breakdown of the schedule.

9. STUDENT EVALUATION

See MEQ responses.

10. LEARNING RESOURCES

10.1 Core Materials

Robert L. Mott , Machine Elements in Mechanical Design, Pearson, 2013, ISBN 0-13-197644-3

Bolton W, Mechatronics 4th edition, Pearson, 2013, ISBN 978-0-13-240763-2

Austin Hughes, Electric motors and drives,3rd edition, Elsvier,2006, ISBN 978-0-7506-4718-2

R.S. Khurmi and J.K. Gupta " A text book of Machine Design; Chand publisher;2016

10.2 Optional Materials

Arduino Cookbook, Michael Margolis, 2nd edition, 2012, ISBN: 1449313876
Theodore Wildi, Electrical machines, drives and power systems, Sperika Enterprises Ltd, 2006,ISBN-10:0131776916
Augie Hand, Electric Motor Maintenance and troubleshooting,2011, ISBN: 978-0-07-176395-0

NOTES
Lecture notes on the Moodle