



SECOND SEMESTER 2015-2016
Course Handout (Part II)

Date: 06/01/2016

In addition to part I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No. : **MSE G511**
Course Title : **MECHATRONICS**
Instructor-in-charge : Shyam Sunder Yadav

1. Scope and Objective of the Course:

This course is intended to a comprehensive knowledge of the technology related to mechatronics. The necessity of integrating and embedding electronics and microprocessor into mechanical systems have been long felt, due to rapid progress in microprocessor computer based technology, in domestic products to manufacturing systems.

Mechatronics is a recently defined engineering field that builds on the traditional mechanical engineering studies, combines it with technologies from the electrical, electronics, computer and control fields, using techniques such as simultaneous engineering to provide solutions in manufacturing applications.

The course will develop overall background of the student in interdisciplinary mechatronic technology with emphasis on integration of mechanical engineering with electronics and computer. In depth study of sensors and transducer, signal conditioning, drives and actuators, micro-controllers, microprocessors, interfacing etc. will be discussed from the applications point of view. Mechatronic system design concepts will be discussed through case studies.

2. Text Book: Bolton W., *Mechatronics*, 4th Ed., Pearson, 2014. [1]

Reference Books:

- (i) Bradley, D.A. et.al., *Mechatronics*, Chapman & Hall, 1991. [2]
- (ii) Stadler, W., *Analytical Robotics and Mechatronics*, McGraw Hill, 1995. [3]
- (iii) *Mechatronics*, HMT Ltd., TMH, 1998. [4]
- (iv) Anthony Esposito, *Fluid Power*, Prentice Hall [5]

3. Lecture Plan

Lect. No.	Topic(s)	Book-Chapter
1	Introduction	1-1
2	Mechatronic system paradigms	4-1
3	Mechatronic systems – Examples	1-1
4	Examples/ Case Studies	1-1, 2-1
5	Examples/ Case Studies	1-1, 3-1
6	Key issues, Approach to Mechatronics	1-1, 4-1
7	Mechatronics in Manufacturing Systems:	4-2
8	NC-CNC, Tool Monitoring System	
9	Sensors and Instrumentation:	1-2, 1-3, 3-5
10	Sensor functions, Characteristics,	
11	Applications, Specifications & Selection	
12	Mechanical Actuation, Hydraulics, Pneumatics	1-7, 1-8, 4-3, 5
13	Electrical Actuators	1-7, 3-7
14	Mechatronic Drives & Transmission	1-7, 2-16
15	Motion convertors: Linear, rotational	2-18, 19



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16	Performance & Selection of actuation system	2-20
17	Electronic elements, models	1-3, 1-8
18	Op Amps, Applications	1-3, 2-8
19	Digital electronics, Digital logic	1-14, 3-4, 4-3
20	Applications of logic gates, sequential logic	1-14
21	Signal conditioning, I/o, interfacing	1-3, 1-18
22	Digital signal processing, interfacing	1-3, 1-20
23	Data acquisition and presentation	1-3, 1-4
24	Control concepts	1-13
25	Multivariable control	1-13
26	Digital control, adaptive control	1-13
27	Mechatronic mechanical elements:	4-5, 2-21
28	Issues, friction, design considerations, anti-friction	2-22, 2-23,
29	Guide ways	2-24
30	Electronics can replace mechanical:	1-2
31	Concepts, feasibility, approach, examples	
32	Mechatronic system design: function	1-22, 4-5
33	Approach, integrated systems,	
34	Integrated mechanisms, man-machine	
35	Interface	
36	Microprocessors, programming	1-15
37	Microcontrollers, PLC	1-15, 1-19
38	PLC, programming, selection, examples	1-19
39	Case study	-
40	Case study	-

4. Assignments:

There will be class assignments, home assignments, and case studies. Each student has to workout the given assignments & work on a case assigned. The case will culminate with a written report and presentation of the case.

5. Evaluation:

<u>Component</u>	<u>Duration</u>	<u>Weightage</u>	<u>Date & Time</u>	<u>Venue</u>	<u>Remarks</u>
Mid SemTest	2 hrs.	30%	14/3 4:00- 5:30 PM		
Close Book					
Assignments/Project/Case/Lab		30%			
Compree	3 hrs.	40%	4/5 AN		Open Book

6. Chamber Consultation Hour: 4-5 PM.

7. Notices: All notices will be put up on ME Group Notice Board only.

MSE G511
Instructor-in-charge



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