FIRST SEMESTER 2016-2017
Course Handout (Part II)

Date: 02/08/2016

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. : **MF C319/ MF F311**
Course Title : **MECHATRONICS AND AUTOMATION**
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 and Automation. 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. Also, mechatronics has been applied to manufacturing and other industrial automation: robotic automation found in car automated production lines, such as welding, and assembly line in computer integrated manufacture etc. Thus, the manufacturing system is greatly enhanced by the application of mechatronics.

This course will develop overall background of the student in interdisciplinary mechatronic technology and a broad introduction to the issues encountered and techniques required in developing mechatronic products and automation systems.

2. Text Book: Bolton W., *Mechatronics*, 3rd Ed., Pearson, 2004. [1]

Reference Books:

(i) M.P. Groover, "Automation, Production systems, and Computer-Integrated Manufacturing", PHI, 2008. [2]

(ii) Stadler, W., *Analytical Robotics and Mechatronics*, McGraw Hill, 1995. [3]

(iii) *Mechatronics*, HMT Ltd., TMH, 1998. [4]

3. Lecture Plan

Lect. No.	Topic(s)	Book-Chapter
1	Introduction	1-1
2	Mechatronic system paradigms	4-1
3-4	Mechatronic systems – Examples	1-1
5	Key issues, Approach to Mechatronics	1-1, 4-1
6-8	Sensors and Instrumentation: Sensor functions, Characteristics, Applications, Specifications & Selection	1-2, 1-3, 3-5
9-11	Actuation Systems: Pneumatic and hydraulic actuation systems	1-5
12-14	Mechanical actuation and systems	1-6, class notes
15-17	Electrical Actuators	1-7, 4-3, class notes
18-20	Drives & Transmission, Motion convertors, Performance & Selection of actuation system	class notes
21	Digital electronics, Digital logic	1-14
22-23	Microprocessors, programming	1-15
24	Introduction to automation	class notes
25-28	Numerical control machine tools, numerical control part programming, Tool Monitoring System	2-7, 4-2, 4-5

29-31	Basic control concepts: open, close, proportional derivative, integral, multivariable, digital, adaptive control systems	1-13, class notes
32-33	Programmable logic controllers, programming, selection	1-19
34-35	PLC based automation systems	1-21, class notes
36-37	industrial robots; basics and application, man-machine Interface	class notes
38-40	Automated material handling systems, Automatic identification and data capture, Automated production lines & assembly systems	2-10, 2-12,2-16,4-6

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:

Component	**Duration**	**Weightage**	**Date & Time Venue**	**Remarks**
Mid-Sem. Test	90 min.	30%	6/10 2:00 - 3:30 PM	
Assignments/Quiz/ Practical/proj.		25%		Scheduled Practical in CRIS and Hydraulics and Pneumatics Lab
Comprehensive	3 hrs.	45%	9/12 FN	

- Makeup request will not be entertained unless prior permission is taken. Students are expected to attend regular class and practical.

6. Chamber Consultation Hour: To be announced in class.

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

MF C319/ MF F311
Instructor-in-charge