

Course Type	Course Code	Name of the Course	L	T	P	Credit
DE	OMED601	AUTOMATION IN MANUFACTURING	3	0	0	3

Prerequisites
Bachelor/Master/PhD students having background in Mechanical Engineering/Production Engineering/Manufacturing Technology
Course Objectives
At the end of the course, the students will be able to: 1. Understand design and development of automated systems in manufacturing. 2. Know various automated systems being used in the manufacturing industry. 3. Familiarize with the building blocks of a typical automated system. 4. Understand the concept, operation and construction details of sensors/transducers, actuators, drives and mechanisms, hydraulic and pneumatic systems. 5. Know the applications of microprocessor technology, programming and CNC technology in the manufacturing industries.
Learning Outcome
On successful completion of this course students will be able to 1. Know the basics of automation with examples. 2. Know different components and their structure for automation system. 3. Understand microprocessor technology and its control mechanism. 4. Understand the applications of various control mechanisms for automation. 5. Understand the design and components of hydraulic systems. 6. Understand the design and components of pneumatic systems. 7. Understand CNC technology and programming

Unit No.	Topics to be covered	No. of lecture videos	Video time (Minutes)	Learning Outcomes
1	Introduction: Importance of automation in the manufacturing industry. Use of mechatronics. Systems required.	2	95	On successful completion of this unit students will be able to know the basics of automation with examples.
2	Design of an automated system: Building blocks of an automated system, working principle and examples.	3	90	On successful completion of this unit students will be able to know the basics of automation with examples.
3	Fabrication: Fabrication or selection of various components of an automated system. Specifications of various elements. Use of design data books and catalogues.	4	151	On successful completion of this unit students will be able to know different components and their structure for automation system.
4	Sensors: study of various sensors required in a typical automated system for manufacturing. Construction and principle of operation of sensors.	4	159	On successful completion of this unit students will be able to understand the concept of liquid additive manufacturing.

5	Microprocessor Technology: signal conditioning and data acquisition, use of microprocessor or micro controllers. Configurations. Working.	5	218	On successful completion of this unit students will be able to know different components and their structure for automation system.
6	Drives: electrical drives – types, selection criteria, construction and operating principle.	2	142	On successful completion of this unit students will be able to understand the applications of various control mechanism for automation.
7	Mechanisms: Ball screws, linear motion bearings, cams, systems controlled by camshafts.	3	146	On successful completion of this unit students will be able to understand the concept of wire additive manufacturing.
8	Mechanisms: Electronic cams, indexing mechanisms, tool magazines, and transfer systems.	3	136	On successful completion of this unit students will be able to understand the applications of various control mechanism for automation.
9	Hydraulic systems: hydraulic power pack, pumps, valves.	2	107	On successful completion of this unit students will be able to understand the design and components of hydraulic systems.
10	Hydraulic systems: designing of hydraulic circuits.	3	162	On successful completion of this unit students will be able to understand the concept of power additive manufacturing.
11	Pneumatic systems: configurations, compressors, valves, distribution and conditioning.	3	173	On successful completion of this unit students will be able to understand the design and components of pneumatic systems.
12	CNC technology: basic elements, interpolators and programming.	3	251	On successful completion of this unit students will be able to understand CNC technology and programming.
Total No. of Video lectures & Video time		37	1830	

Textbooks:

1. HMT Ltd. Mechatronics, Tata McGraw-Hill, New Delhi, 1988.
2. Boltan, W., Mechatronics: electronic control systems in mechanical and electrical engineering, Longman, Singapore, 1999.
3. Regtien, P. P. L., Sensors for mechatronics, Elsevier, USA, 2012.

Reference Books

1. Rothbart, H. A., CAM Design Handbook, McGraw-Hill, 2004. • Norton, R. L., Cam Design and Manufacturing Handbook, Industrial press Inc, 2002.
2. Mechatronics, HMT, Tata McGraw-Hill Education, 1998.
3. Groover, M. P., Automation, Production Systems, and Computer-Integrated Manufacturing, Prentice Hall, 2001.