

Semester:	8				
Course Code:	EE5630				
Course Name:	Industrial Automation				
Credit Value:	3 (Notional hours: 150)				
Pre-requisites:	EE3010 or ME 3010				
Core/Optional	Optional				
Hourly Breakdown	Lecture	Tutorial	Practical	Assignment	Independent Learning & Assessment
	20	7	18	18	87

Course Aim: To provide an overall understanding of the industrial automation process from concept to implementation and validation.

Intended Learning Outcomes:

On successful completion of the course, the students should be able to:

- **apply** automation principles to automate a given process.
- **model** process automation using ladder logic.
- **design** and integrate industrial sensor circuits for process automation applications.
- **design** actuator systems for process automation applications.
- **implement** automation process using state of the art tools.

Course Content:

➤ **Process Automation**

Fundamentals of process automation, automation versus automation, realities of modern manufacturing, manufacturing approaches, production system, manufacturing support systems, computer integrated manufacturing, automation principles and strategies.

➤ **Process modelling for automation**

Process modelling using logic diagrams, converting logic diagrams to ladder logic.

➤ **Industrial Sensors**

Industrial sensor types (temperature, pressure, flow, acceleration, velocity, position, lux, flux, current and voltage sensors), sensor interfacing to processors using current output and voltage output, overview of analog to digital converters, design specifications of industrial sensors, sensor calibration.

➤ **Actuators and Controllers**

Electric actuators (solenoids, servo motors, stepper motors, permanent magnet synchronous motors, brushless dc motors), hydraulic actuators, pneumatic actuators, soft actuators.

➤ **Automation using PLC, SCADA, DCS & HMI**

PLC processor scan, ladder logic evaluation, architecture, components, topologies, key functions and applications of SCADA, DCS and HMI.

➤ **Industrial communication using fieldbus systems**

Hierarchical models in industrial communication, communication requirements and constraints, popular industrial networks, Ethernet TCP/IP, Industrial Ethernet.

➤ **Industry 4.0**

Industrial evolution, cyber physical systems, design principles of Industry 4.0, building blocks of Industry 4.0, Industry 4.0 applied in manufacturing and power industries.

Teaching /Learning Methods:

Lectures, Tutorials, Practical work, and Assignments

Assessment Strategy:

Continuous Assessment	Final Assessment		
60%	40%		
Details: Assignments 30% Practical Work 30%	Theory (%) 40	Practical (%)	Other (%)

Recommended Reading:

- Industrial Automation: Hands On, Frank Lamb, McGraw Hill Professional Publishers
- Standard Handbook of Industrial Automation, Douglas M. Considine, Glenn D. Considine, Chapman and Hall Advanced Industrial Technology Series
- Industrial Process Automation Systems: Design and Implementation, 1st Edition, B.R. Mehta Y. Jaganmohan Reddy, Butterworth-Heinemann Printers