

SYLLABUS: sample

Date / Revision 23 May 2015 / 02 May 2017 / PP
Faculty Engineering
Study Programm Industrial Engineering (INE)

SUBJECT: Robotics & Automation 1

1 Basic Information

1.01	Subject Name	Robotics & Automation 1
1.02	Semester	5
1.03	Level	1
1.04	SKS	2
1.05	Mandatory / Curriculum	D-02
1.06	Subject Code	ROB1
1.07	Subject Code	INE-D-ROB1-5124
1.08	Year	2017 (7)
1.09	Quality Control	Final Test, OFSE, see evaluation
1.10	Limitations	Min 12 and Max 32 students in one class
1.11	Combined with	01:MEE; 02:MTE
1.12	Prerequisite	Electrical Engineering, Algorithm Programming, Manufacturing Processes, Control Technique, Programmable Logic Controller, Operation Management, Pneumatic - Hydraulics, Kinematics-Dynamics, Sensor & Instrumentation, Production Planning and Inventory Control
1.13	Responsible	To BE ASSIGNED
1.14	Revision	15-05-2017/pp

2 Description of Subject

The subject introduces manufacturing system's automation with the components of automation systems such as robots, programmable logic controller, automation control, application / implementation of control theory, programming of automated components, kinematics and dynamics of mechanical systems, sensory feedback, signal processing, data collecting and mining, CNC Programming and Technology, and many more into the manufacturing applications.

3 Objectives

- Explain basic automation of manufacturing systems
- Reasons why automation and robot is important to manufacturing systems
- Programming automated components such as robot and CNC machine tools (G-code, APT-programs)
- Using PLC for automated components

4 Competency

After having the course, students are expected to:

- Able to use ladder logic program for automated component
- Design simple automated system in manufacturing environment
- Integrate robot into automation system
- Measure pre- and post-automation metrics

5 Learning Approach / Methodology

- Lectures/ Class contact (time-tabled) supplemented with interactive questions and answers;
- Circuit simulation using Electronic Workbench Software;
- Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing;
- Student Study Effort: homework/assignment; preparation for test/quizzes/ examination.

6 Evaluation

5.1	Absence maximum	25%
5.2	Participation in Discussion	05 Points
5.3	Homework / Classwork	05 Points
5.4	Presentation /Simulation	10 Poin
5.5	Daily Quiz	20 Points
5.6	Final Examination	60 Points
	Total	100 Points

7 Text Book and Reference

- 1 **Main Text Book:**
"Automation, Production Systems and Computer Integrated Manufacturing, 5th edition, 2016",

	Authors: Mikell P. Groover, Publisher: Pearson Education, ISBN: 978-0-292-07611-9
2	Supplement Textbooks: <ul style="list-style-type: none"> • <i>“Pneumatics Textbook - Basic Level”</i>, Authors: P. Croser, F. Ebel, Publisher: FESTO Didactic GmbH & Co. • <i>“HydraulicsTextbook - Basic Level”</i>, Authors: P. Croser, F. Ebel, Publisher: FESTO Didactic GmbH & Co.

8	Content / Topics of Lecture
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Week	Content/ Topics of Lecturing	Text Book	Remark
1	Introduction to Basic Concept of Industrial Automation: Introduction to manufacturing systems, automation in manufacturing systems, manual labor in manufacturing system	Ch1	
2	Manufacturing Operations: Manufacturing industries and products, manufacturing operations, facilities, product/manufacturing relationship	Ch2	
3	Manufacturing Models and Metrics : Mathematical models of manufacturing performance, manufacturing cost	Ch3	Quiz
4	Introduction to Automation : Basic elements of automation systems, advanced automation function, levels of automation	Ch4	
5	Industrial Control System: Process Industries vs. Discrete manufacturing industries, continuous vs. Discrete control, computer process control	Ch5	
5	Hardware components for automation and process control : Sensors, Actuators. Analog-Digital Conversions. Input/Output Devices for Discrete Data Introduction to main industrial prime movers - pneumatics vs. Hydraulics vs. Electrical system, pneumatics actuators, pneumatics control valve, sensors and switches used in pneumatics system	Ch6, [2]	Quiz
6,7	Numerical Control, Fundamentals of NC Technology, Computer Numerical Control, Direct/Distributed Numerical Control, Applications of CNC, CNC Part Programming, Engineering Analysis of CNC Positioning Systems	Ch7	
8	MIDTERM SEMESTER BREAK		

9-10	Industrial Robotics: Robot anatomy and related attributes. Robot Control Systems. End Effectors. Sensors in Robotics. Industrial Robot Applications. Robot Programming. Engineering Analysis of Industrial Robots. Robot Accuracy and Repeatability	Ch8	Quiz
11-12	Discrete Control and Programmable Logic Controller : Discrete Process Control. Ladder Logic Diagrams. Programmable Logic Controllers. Personal Computers and Programmable Automation Controller	Ch9	
13	Material Transport Systems : Overview of Material Handling. Material Transport Equipment. Analysis of Material Transport Systems.	Ch10	
14-15	Automatic Identification and Data Capture : Overview of Automatic Identification Methods. Bar Code Technology, Radio Frequency Identification. Other AIDC Technologies.	Ch 12	Quiz
16	Silent WEEK		
17, 18	Final Examination		