

SYLLABUS: Robotics & Automation 2

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

SUBJECT: Robotics & Automation 2

1 Basic Information

1.01	Subject Name	Robotics & Automation 2
1.02	Semester	6
1.03	Level	2
1.04	SKS	2
1.05	Mandatory / Curriculum	D-02
1.06	Subject Code	ROB2
1.07	Subject Code	INE-D-ROB2-6226
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	Perquisite	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. Material Handling and identification. Single Station, Multiple Station Autonomous Manufacturing Cells. Group Technology and Coding, Flexible Manufacturing Cells and Systems.

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:

- Know and understand Support System for Manufacturing
- Perform Quality Control and integrated systems
- Design and develop single station autonomous cells

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	Overview of Manufacturing Systems: Components of a Manufacturing System. Types of Manufacturing Systems.	Ch13	
2	Single Station Manufacturing Cells: Single station manned cells. Single station automated cells. Application of Single station cells. Analysis of single station cells.	Ch14	
3	Manual Assembly Lines : Fundamentals of Manual Assembly Lines. Analysis of Single model Assembly Lines. Line Balancing Algorithm. Workstation Details. Other considerations in Assembly Line Design. Alternative Assembly Lines. Batch Model vs. Mixed Model Lines	Ch15	Quiz
4	Automated Production Lines : Fundamentals of Automated Production Lines. Applications of Automated Production Lines. Analysis of Transfer Line. Transfer Lines with Internal Storage	Ch16	
5	Automated Assembly Lines : Fundamentals of Automated Assembly Systems. Analysis of Automated Assembly Systems.	Ch17	
5	Group Technology and Cellular Manufacturing : Part Families and Machine Groups. Cellular Manufacturing. Application of Group Technology. Analysis of Cellular Manufacturing. Optiz Parts Classification and Coding Systems	Ch18	Quiz
6	Flexible Manufacturing Cells and Systems : What is a Flexible Manufacturing Systems. FMC/FMS Components. FMS Application Consideration. Analysis of Flexible Manufacturing Systems. Alternative Approaches to Flexible Manufacturing	Ch19	

7	Quality Programs for Manufacturing Quality in Design and Manufacturing. Traditional and Modern Quality Control. Process Variability and Process Capability. Statistical Process and Control. Six Sigma. Taguchi Methods in Quality Engineering. ISO 9000. Six Sigma DMAIC Procedures	Ch20	
8	MIDTERM SEMESTER BREAK		
9	Inspection Principles and Practices: Inspection Metrology. Conventional Measuring and Gaging Techniques. Coordinate Measuring Machines. Surface Measurement. Machine Vision. Other Optical Inspection Techniques. Geometric Feature Construction	Ch22	Quiz
10	Product Design and CAD/CAM in The Production System : Product Design and CAD. CAM, CAD/CAM, and CIM. Quality Function Deployment.	Ch23	
12	Process Planning and Concurrent Engineering : Process Planning. Computer Aided Process Planning. Concurrent Engineering and Design for Manufacturing. Advance Manufacturing Planning	Ch24	
13	Production Planning and Control Systems : Aggregate Production Planning and the Master Production Schedule. Material Requirements Planning. Capacity Planning. Shop Floor Control. Inventory Control. Manufacturing Resource Planning (MRP II). Enterprise Resource Planning (ERP)	Ch 25	Quiz
14	Just-in-Time and Lean Production : Lean Production and Waste in Manufacturing. Just-In-Time Production Systems. Autonomation. Worker Involvement.	Ch26	
15, 16	Review, Silent WEEK		
17, 18	Final Examination		