Fall 2019

MNE 601-101: Computerized Manufacturing Systems

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NEWARK COLLEGE OF ENGINEERING

MNE601: Computerized Manufacturing Systems

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COURSE DESCRIPTION

This course provides a comprehensive description of the concepts of manufacturing systems, manufacturing metrics and economics with variety of examples on them.

Robot anatomy, the control system and robotic programming are discussed as well as PLC programming. Fundamental and application of automated material transport and storage systems are discussed and different types of automated storage systems are provided in the slides.

The lab experiments of the course focus on two fundamental objectives: 1) PLCs programing and troubleshooting, using simulator and HMI which train students to execute real world projects, 2) Programming and troubleshooting techniques necessary to run industrial robots.

Moreover during the class students will gain exposure to quantitative methodologies and algorithms to analyze the automated manufacturing systems.

MOODLE

The course will make extensive use of the Moodle system to optimize student-instructor communication. All course materials including lecture slides will be distributed through Moodle. All submission projects and assignments will also be through Moodle. To access the system please go to http://moodle.njit.edu, you will need a valid UCID to login.

GRADING

Based in individual and team performance as follows:

15% Project Presentation	40% Lab Experiments
20% Midterm Exam	25% Final Exam

LECTURE SLIDES AND SUGGESTED READINGS

MNE601, Computerized Manufacturing Systems lectures slides will be distributed electronically through Moodle.

Textbook: Automation, Production Systems and Computer-Integrated Manufacturing, 4th Edition, by Mikell P. Groover, Pearson.

LAB EXPERIMENTS

The lab experiments will be completed in teams of students. Each team is assigned two SIMENS PLC projects, two IDEC PLC projects and one robotic project. At the end of each project, every team needs to have a short report of the project submitted through Moodle.

PROJECT PRESENTATION

Each student will be assigned a unique manufacturing and automation project, in which student is required to review and discuss the assigned case and create a detailed PowerPoint report which focuses on given tasks. Each student will make a 15-20 minute presentation to the class. Presentations will be scheduled and announced and have to be submitted through Moodle.

COURSE OUTLINE

WKS	*CHAPTER*	*TOPIC*
Learning Module 1: Overview of Manufacturing, Automation and Control Technologies		
Week 1,2	1,2	**Overview of Manufacturing**
		Manufacturing System
		Manufacturing Support Systems
		Automated Manufacturing Systems
		Manufacturing Operations
Week 3	3	**Manufacturing Metrics and Economics**
		Production Rate
		Availability
		Production and Plant Capacity
		Utilization
		Lab Experiments
Learning Module 2: Industrial Robotics		
Week 4,5	8	**Industrial Robotics**
		Robot Anatomy and Related Attributes
		Robot Control Systems
		End Effectors
		Applications of Industrial Robots
		Robot Programming
		Robot Accuracy and Repeatability
		Lab Experiments
Week 6,7	4,5	**Automation and Control Technologies**
		Basic and Advanced Automation Functions
		Industrial Control Systems

		Lab Experiments
Learning Module 3: Programmable Logic Controllers		
Week 8	9	**Overall PLC System ***(MIDTERM)***
		Definition of the PLC System
		Major Components of a Common PLC
		Application of PLC
		PLC Cycle of Operation
		Ladder Diagram
		AND, OR and NOT Logics
		Lab Experiments
Week 9,10	9	**PLC Programming Methods**
		More examples on AND, OR and NOT Logics
		Timers (Timer on-delay and off-delay)
		Counter (Count-up Counter and Count-down Counter)
		Lab Experiments
Week 11	9	**Advanced PLC Programming Methods**
		Latches
		Latches Timing Diagram
		Applications of Combinations of Timer, Counter and Latches
		Lab Experiments
Learning Module 3: Automated Material Handling		
Week 12	10,11,12	**Analysis of Automated Material Transport and Storage Systems**
		Material Transport Equipment
		Automated Storage Systems
		Radio Frequency Identifications
		Lab Experiments
Week 13,14		**Project Presentation**
Week 15		***Final Exam***