

Spring 2024

MnE 602-002: Flex and Comp Integ Manufacturing

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MNE602: Flexible & Computer Integrated Manufacturing

Spring 2024

Instructor: Evens Aristilde

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Office hours: Mondays 1pm-2:30pm or by appointment

COURSE DESCRIPTION

This course provides a comprehensive description of the concepts, principles, and the analysis of manufacturing systems, including single station manufacturing cells and manual assembly lines versus automated production and transfer lines as well as cellular manufacturing and flexible manufacturing systems (FMS). Moreover, during the class students will gain exposure to quantitative methodologies and algorithms to analyze the automated manufacturing systems. The lab experiments of the course focus on two fundamental objectives: 1) Programming and troubleshooting techniques necessary to run industrial robots, 2) PLCs programming and troubleshooting which train students to execute real world projects.

Canvas

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

GRADING

Based in individual and team performance as follows:

30% Lab Experiments - 25% Mid Term - 30% Final Exam - 15% Project Presentation

LECTURE SLIDES AND SUGGESTED READINGS

MNE602, Flexible & Computer Integrated Manufacturing lectures slides will be distributed electronically through Canvas.

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 PLC projects as well as robotic projects. At the end of each project, every team needs to have a short report of the project submitted through Canvas.

PROJECT PRESENTATION

Each student will be assigned a unique flexible 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 Canvas.

COURSE OUTLINE

<i>WKS</i>	<i>CHAPTER</i>	<i>TOPIC</i>
Learning Module 1: Manufacturing Systems		
Week 1,2	13	Overview of Manufacturing System
		Components and Types of Manufacturing Systems
		Types of Manufacturing Systems
Week 3,4	14	Single-Station Manufacturing Cells
		Single-station Manned Cells
		Single-station Automated Cells
		Applications and Analysis of Single-station Cells
Learning Module 2: Automated Production Lines		
Week 5,6	15	Manual Assembly Lines
		Fundamental of Manual Assembly Line
		Line Balancing Algorithm
		Workstation Details
		Batch-Model and Mix-Model Lines
		<i>Lab Experiments</i>
Week 7,8	16	Automated Production Lines
		Fundamental of Automated Production Lines
		Applications of Automated Production Lines
		<i>Lab Experiments</i>
Week 9	17	Automated Assembly Systems
		Fundamental of Automated Assembly Systems
		Applications of Automated Assembly Systems

		<i>Lab Experiments</i>
Learning Module 3: Group Technology, Cellular Manufacturing and Flexible Manufacturing Cells		
Week 10	18	Group Technology and Cellular Manufacturing
		Part Families and Cellular Manufacturing
		When to Use GT and Cellular Manufacturing
		Composite Part Concept
		Analysis of Cellular Manufacturing
		<i>Lab Experiments</i>
Week 11,12	19	Flexible Manufacturing Cells and Systems
		Fundamentals, Components and Applications of FMS/FMC
		Analysis of FMS/FMC
		Alternative Approaches to FMS/FMC
		<i>Lab Experiments</i>
Week 13,14		<i>Project Presentations</i>
Week 15		<i>Final Exam</i>