

**LAGUARDIA COMMUNITY COLLEGE**  
**CITY UNIVERSITY OF NEW YORK**  
**MATHEMATICS ENGINEERING & COMPUTER SCIENCE**  
**DEPARTMENT**

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**MAE 107: Manufacturing Processes**

3 Credits, 5 Hours

2 Classroom Hours, 3 Lab hours

**CATALOG DESCRIPTION**

Pre-Requisite: HUA104

Co-Requisite: MAE100, ENG 101

The goal of this course is to introduce students to general concepts in manufacturing. Different materials, tools and fabrication processes will be presented, with emphasis on the lathe and drilling, milling and grinding machines. Welding materials, techniques and symbols are introduced. Programming of Computerized Numerical Control (CNC) machines is also included, complemented with robotic programming for flexible manufacturing of components.

**Course goals for the student:**

1. To develop familiarity with and understanding of a broad range of manufacturing processes.
2. To gain hands-on experience with basic hand tools and basic machine tools such as lathes, mills, drill presses, etc.
3. To understand how to use machine tools and hand tools in a safe and proper manner.
4. To familiarize students with welding equipment, CNC machines
5. To gain practical experience in applying knowledge gained in the course through a hands-on project.

**Learning objectives for the student:**

1. Demonstrate safe and proper use of machine and hand tools
2. Demonstrate proper use of common metrology tools such as dial calipers, micrometers, etc.
3. Set up and use the lathe to make a part to specified dimensions and tolerances
4. Set up and use the mill to make a part to specified dimensions and tolerances
5. Given a part or artifact, describe the manufacturing processes that were used in its manufacture
6. Given the drawing and requirements for a particular part, specify and be able to justify the selection of manufacturing processes to produce the part
7. Program CNC machines to manufacture parts.

## Evaluation

Test #1	10%
Test #2	10%
Midterm Project	40%
Final Project	40%

**Textbook:** Manufacturing Engineering and Technology, 6<sup>th</sup> Ed. by Serope Kalpakjian and Steven R. Schmidt

## **WEEKS**

## **TOPICS**

1	Basic concepts. Shop safety; Measurement terminology and systems. Measurement instruments, cleaning, lubrication. <b>Lab:</b> Shop safety. Precision measurement tools
2	Engineering Materials for manufacturing. Appropriate material for the process: ferrous alloys and non-ferrous alloys, polymers, ceramics, composites, and surface treatments. Cutting Tool Materials. <b>Lab:</b> Types of manufacturing systems, hand tools, metrology,
3	Types of steel and their commercial designations. <b>Lab:</b> identification of different types of materials. Cutting, Drilling. Start of project 1
3& 4	Heat treatment and casting processes: casting, die casting <b>Lab:</b> Broaching, Sawing, casting
5	Forming and shaping processes; forging, drawing, bending <b>Lab:</b> <b>Machine tools</b> Presses
6	Sheet metal processes. Project 1 completed. <b>Lab:</b> Project Presentation, processes and tooling
7	General machining practice and parameters. <b>Lab:</b> Introduction to operating manual lathe, mills. Project 2 Start Test 1.

- 8&9 Mill: Establishing Zero Straight Line Moves Turning, milling and grinding, lapping, honing  
Lathe: Establishing Zero, Coordinate Systems, Feeds, and Speeds, Simple Turning, Threading, Offsets  
**Lab:** Hands-on practice
- 10 CNC Controls and Machine Components, CNC Machine Safety, CNC programming, Speed and Feed Calculations, CNC Tooling and Fixturing  
**Lab:** Introduction to CNC machines and programming
- 11&12 Planning for Creation of a CNC Program, CNC and flexible manufacturing.  
**Lab:** CNC Machines and Programming Cont.
- 13 Presentation of final project.