

1. Department, Course Number, and Course Title:

MECHANICAL ENGINEERING

**ME 428 AUTOMATION AND COMPUTER-AIDED
MANUFACTURING**

2. Designation: Required Elective
Lower Division Upper Division

3. Course Description: Automation of manufacturing processes, numerical control, computer-aided manufacturing, group technology, flexible manufacturing, applications of robots in industry.

4. Prerequisites: ME 327 (Manufacturing Processes)

5. Text and Materials: Automation, Production Systems, and Computer-Integrated Manufacturing, 2nd ed., M.P. Groover, Prentice-Hall, Inc.2001

6. Course Objectives: This course provide students with knowledge of manufacturing systems automation, computer aided manufacturing and management techniques utilized in modern manufacturing environment. In this The course also provides "hands-on" experience in computer aided manufacturing and rapid prototyping.

Course Outcomes

- the understanding of history of automation, impact of automation on society and global economy
- the knowledge of types of production, plant layout, production concepts and mathematical models,
- the ability to compute cost of manufacturing, break-even analysis, unit cost of production
- the basic understanding of fixed automation and methods of workpart transport and transfer
- the familiarization with assembly processes, manual and automatic. The knowledge of methods used in analysis of automated flow lines a) without storage, b) with storage buffers.
- the knowledge of balancing of assembly lines..
- the knowledge of principles used in the design for assembly and manufacturing
- the familiarization with Process Design methods: Pareto Analysis, Ishikawa diagrams
- the understanding of principles of Total Quality Management, Deming principals, Taguchi Loss Function, Quality Function Deployment, Just-in Time practices, Lean manufacturing
- the knowledge of statistical process analysis and control, process capability analysis
- the understanding of group technology, part families and production flow analysis
- the ability to analyze and design machine cells
- the familiarization with the numerical control production systems, NC machining and adaptive control
- the "hands-on" experience in programming using MASTER CAM and NC machining and rapid prototyping
- an ability to work in teams and to perform concurrent engineering
- an ability to communicate effectively in written, visual (CAD) and oral form
- the appreciation of ergonomics, environmental and socioeconomic constrains

7. Topics Covered: (in Order of Presentation)

- Automation Defined, Reason for Automating
- Production Systems Facilities, Plant Layout
- Manual labor in Production Systems Ten Strategies for Automation
- Manufacturing Operation, Manufacturing
- Production Rate, Cost of Manufacturing, Overhead rates
- Introduction to NC and CNC
- Material Handling.
- Material Transport Systems
- Intro to Manufacturing Systems
- Analysis of automated Flow Lines
- Single Station Manufacturing Cells
- Group Technology and Part Families
- Design of Manufacturing and Assembly cells

