



## MECH 131

### Introduction to Automated Manufacturing

#### Course Information

Division	Applied Science and Engineering Technology
Contact Hours	60.0
Total Credits	4.0

**Prerequisites:** RDG 090 or qualifying scores on accepted placement tests.

#### Course Description

This is a survey course for the world of automation. Included will be automation safety, justification, design and classification, applications, end-of-arm tooling, power sources, future trends and societal impact. Laboratory experiences will include hard wired controls, PLC controls, robot programming and operation through both teach pendants and microcomputers. Basic troubleshooting of automatic controls will be included, with an introduction to fluid power and ladder logic.

**This course is a required core course for students pursuing a degree in Mechanical Engineering Technology**

#### Program Outcomes Addressed by this Course:

Upon successful completion of this course, students should be able to meet the program outcomes listed below:

- A. Identify and define problems in mathematical and scientific terms.
- B. Produce graphic representations of designs using CAD software, Solid Modeling software, and pencil and paper methods.
- C. Select materials and determine component sizes and shapes to meet design criteria.
- D. Apply instruments to make measurements and analyze data from such measurements.
- E. Identify typical mechanical components and explain their function.
- F. Apply fundamental manufacturing processes using manual and automated machine tools.
- G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
- H. Select and apply power generation and power transmission components including mechanical, pneumatic, hydraulic, thermal, and electrical types.
- I. Recognize the need to engage in lifelong learning, and to perform research or conduct investigations to continuously upgrade knowledge and skills.
- J. Communicate effectively, and work as part of a team.



## Course Outcomes

In order to evidence success in this course, the students will be able to:

**1. Identify Benefits of Automation, including "Hard" and "Flexible" automation.**

*Applies To Program Outcomes*

- E. Identify typical mechanical components and explain their function.
- F. Apply fundamental manufacturing processes using manual and automated machine tools.
- G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
- I. Recognize the need to engage in lifelong learning, and to perform research or conduct investigations to continuously upgrade knowledge and skills.

**2. Classify a robot by number of axes, control system and/or power sources.**

*Applies To Program Outcomes*

- A. Identify and define problems in mathematical and scientific terms.
- C. Select materials and determine component sizes and shapes to meet design criteria.
- D. Apply instruments to make measurements and analyze data from such measurements.
- E. Identify typical mechanical components and explain their function.
- F. Apply fundamental manufacturing processes using manual and automated machine tools.
- G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.

**3. Define Accuracy, Repeatability, Degrees of Freedom, Payload and Cycle Time.**

*Applies To Program Outcomes*

- A. Identify and define problems in mathematical and scientific terms.
- E. Identify typical mechanical components and explain their function.
- F. Apply fundamental manufacturing processes using manual and automated machine tools.
- G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
- I. Recognize the need to engage in lifelong learning, and to perform research or conduct investigations to continuously upgrade knowledge and skills.



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#### 4. **Apply Electrical, Pneumatic and Hydraulic power systems.**

*Applies To Program Outcomes*

- A. Identify and define problems in mathematical and scientific terms.
- C. Select materials and determine component sizes and shapes to meet design criteria.
- D. Apply instruments to make measurements and analyze data from such measurements.
- E. Identify typical mechanical components and explain their function.
- F. Apply fundamental manufacturing processes using manual and automated machine tools.
- G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
- H. Select and apply power generation and power transmission components including mechanical, pneumatic, hydraulic, thermal, and electrical types.
- I. Recognize the need to engage in lifelong learning, and to perform research or conduct investigations to continuously upgrade knowledge and skills.
- J. Communicate effectively, and work as part of a team.

#### 5. **Design machine controls using Relays and Ladder Logic.**

*Applies To Program Outcomes*

- A. Identify and define problems in mathematical and scientific terms.
- B. Produce graphic representations of designs using CAD software, Solid Modeling software, and pencil and paper methods.
- C. Select materials and determine component sizes and shapes to meet design criteria.
- D. Apply instruments to make measurements and analyze data from such measurements.
- E. Identify typical mechanical components and explain their function.
- F. Apply fundamental manufacturing processes using manual and automated machine tools.
- G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
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**6. Apply timer and counter instructions of Programmable Logic Controllers (PLC)**

*Applies To Program Outcomes*

- A. Identify and define problems in mathematical and scientific terms.
- B. Produce graphic representations of designs using CAD software, Solid Modeling software, and pencil and paper methods.
- D. Apply instruments to make measurements and analyze data from such measurements.
- E. Identify typical mechanical components and explain their function.
- F. Apply fundamental manufacturing processes using manual and automated machine tools.
- G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
- I. Recognize the need to engage in lifelong learning, and to perform research or conduct investigations to continuously upgrade knowledge and skills.
- J. Communicate effectively, and work as part of a team.

**7. Program Robots using Teach Pendants**

*Applies To Program Outcomes*

- B. Produce graphic representations of designs using CAD software, Solid Modeling software, and pencil and paper methods.
- E. Identify typical mechanical components and explain their function.
- F. Apply fundamental manufacturing processes using manual and automated machine tools.
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- 8. Define and modify Robot Tool Center points and coordinate systems.**  
*Applies To Program Outcomes*
- B. Produce graphic representations of designs using CAD software, Solid Modeling software, and pencil and paper methods.
  - E. Identify typical mechanical components and explain their function.
  - F. Apply fundamental manufacturing processes using manual and automated machine tools.
  - G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
  - J. Communicate effectively, and work as part of a team.
- 9. Write Robot control routines using logical statements and branches**  
*Applies To Program Outcomes*
- B. Produce graphic representations of designs using CAD software, Solid Modeling software, and pencil and paper methods.
  - E. Identify typical mechanical components and explain their function.
  - F. Apply fundamental manufacturing processes using manual and automated machine tools.
  - G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
  - J. Communicate effectively, and work as part of a team.
- 10. Describe and apply safety equipment used in automation**  
*Applies To Program Outcomes*
- F. Apply fundamental manufacturing processes using manual and automated machine tools.
  - G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
  - I. Recognize the need to engage in lifelong learning, and to perform research or conduct investigations to continuously upgrade knowledge and skills.