



# Course Outcome Summary

Required Program Core Course

**MECH 105 (CNC III)**

## Course Information

Division	ASET
Contact Hours	60
Total Credits	3

**Prerequisites**                      **MECH 104**

## Course Description

This course is the third in sequence of CNC programming, and the second in related courses that emphasize more advanced G & M code programming concepts. Students will use the same online professional certification software to complete their FANUC CNC Professional Certification at the end of the semester. Students will also be editing programs using laboratory computers, send data to machines, troubleshoot code and work with machine specific post processors to modify and write code to run on different types of machines. Other activities will include using different media to transfer data to machine tools, use desktop simulators, determine proper machining sequence, plan tool selection, operate machine controls to set up machines and document the setup using process sheets. Projects will comprise use of the CNC milling centers and lathes. Appropriate theory and practice of safe work methods will be emphasized.

**This course is a required core course for students pursuing an AAS in Product and Process 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. Demonstrate safe operation and practices of equipment.
- B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
- C. Interpret and explore the impact of new global and social applications in the manufacturing forum.
- D. Identify the complete design and the process, from concept to completion.
- E. Identify the major functions of a manufacturing system, their characteristics, relationship to design, process routing and lean manufacturing.
- F. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
- G. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
- H. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
- I. Demonstrate competency in technical math, including trigonometry, required for process solutions.
- J. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.
- K. Communicate and problem solve in multi-disciplinary groups and teams to increase knowledge through lifelong learning disciplines.



MECH 104 and 105 is a two-part series. The following program outcomes were satisfied during MECH 104.

- A. Demonstrate safe operation and practices of equipment.
- B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
- C. Interpret and explore the impact of new global and social applications in the manufacturing forum.
- I. Demonstrate competency in technical math, including trigonometry, required for process solutions.
- K. Communicate and problem solve in multi-disciplinary groups and teams to increase knowledge through lifelong learning disciplines.

## Course Outcomes

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

1. Provide Structure to a CNC Program.

Program outcomes linked:

- D. Identify the complete design and the process, from concept to completion.
- E. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
- F. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
- G. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
- H. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
- J. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

2. Using Canned Cycles for Drilling.

Program outcomes linked:

- D. Identify the complete design and the process, from concept to completion.
- E. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
- F. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
- G. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
- H. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
- J. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

3. Sub-Programming Techniques.

Program outcomes linked:

- D. Identify the complete design and the process, from concept to completion.
- E. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
- F. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
- G. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
- H. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
- J. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.



4. Special Programming Features.

Program outcomes linked:

- D. Identify the complete design and the process, from concept to completion.
- E. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
- F. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
- G. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
- H. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
- J. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

5. Rotary Device Programming.

Program outcomes linked:

- D. Identify the complete design and the process, from concept to completion.
- E. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
- F. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
- G. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
- H. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
- J. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

6. Setup and Production-Running Tasks.

Program outcomes linked:

- D. Identify the complete design and the process, from concept to completion.
- E. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
- F. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
- G. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
- H. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
- J. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

7. Operation Panels.

Program outcomes linked:

- D. Identify the complete design and the process, from concept to completion.
- E. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
- F. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
- G. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
- H. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.



J. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

8. Operation Modes.

Program outcomes linked:

D. Identify the complete design and the process, from concept to completion.

E. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.

F. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.

G. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.

H. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.

J. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

9. Operation Procedures.

Program outcomes linked:

D. Identify the complete design and the process, from concept to completion.

E. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.

F. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.

G. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.

H. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.

J. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

10. Running and Verifying Programs.

Program outcomes linked:

D. Identify the complete design and the process, from concept to completion.

E. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.

F. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.

G. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.

H. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.

J. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

Date Updated: 3/13/2019

By: Troy Elliott