Course Information

Division: ASET
Contact Hours: 60
Total Credits: 3

Prerequisites: MECH 201

Course Description

This course is second in sequence to the introduction to CAD/CAM, using Mastercam software. Emphasis will be on two- and three-dimensional objects and solids. Editing objects, extruding, sweeping, loft, rotation features of the software in manipulating the object will be demonstrated. Students will learn to manage views, levels of entities within the object as specified in the part drawing and generate surfaces to machine. Other aspects of the course will include importing and exporting graphical data from CAD design software with the purpose of generating code to machine complex surfaces and retrieving CAD type drawings for rework. 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. Identify the complete design and the process, from concept to completion.
D. Identify the major functions of a manufacturing system, their characteristics, relationship to design, process routing and lean manufacturing.
E. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
F. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
G. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
H. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.
Course Outcome Summary
Required Program Core Course

MECH 221 (CAD/CAM II Solids)

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

1. Design two- and three-dimensional wire frames.
   Program outcomes linked:
   A. Demonstrate safe operation and practices of equipment.
   B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
   C. Identify the complete design and the process, from concept to completion.
   D. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
   E. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
   F. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
   G. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
   H. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

2. Feature based solid modeling.
   Program outcomes linked:
   A. Demonstrate safe operation and practices of equipment.
   B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
   C. Identify the complete design and the process, from concept to completion.
   D. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
   E. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
   F. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
   G. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
   H. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

3. Modeling modes and level management.
   Program outcomes linked:
   A. Demonstrate safe operation and practices of equipment.
   B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
   C. Identify the complete design and the process, from concept to completion.
   D. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
   E. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
   F. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
   G. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
   H. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.
4. Solid modeling functions.
   A. Demonstrate safe operation and practices of equipment.
   B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
   C. Identify the complete design and the process, from concept to completion.
   D. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
   E. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
   F. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
   G. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
   H. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

5. Extrude, revolve, sweep, draft and loft toolpaths.
   Program outcomes linked:
   A. Demonstrate safe operation and practices of equipment.
   B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
   C. Identify the complete design and the process, from concept to completion.
   D. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
   E. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
   F. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
   G. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
   H. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

6. Edit solids and Boolean functions.
   Program outcomes linked:
   A. Demonstrate safe operation and practices of equipment.
   B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
   C. Identify the complete design and the process, from concept to completion.
   D. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
   E. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
   F. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
   G. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
   H. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.
7. Loft, shell, chamfer and fillet features.
   Program outcomes linked:
   A. Demonstrate safe operation and practices of equipment.
   B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
   C. Identify the complete design and the process, from concept to completion.
   D. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
   E. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
   F. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
   G. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
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   Program outcomes linked:
   A. Demonstrate safe operation and practices of equipment.
   B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
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   H. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

9. Create solids by cut, create, and add from wireframe.
   Program outcomes linked:
   A. Demonstrate safe operation and practices of equipment.
   B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
   C. Identify the complete design and the process, from concept to completion.
   D. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
   E. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
   F. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
   G. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
   H. Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.
Course Outcome Summary
Required Program Core Course

MECH 221 (CAD/CAM II Solids)

10. Create libraries.
Program outcomes linked:
   A. Demonstrate safe operation and practices of equipment.
   B. Specify proper Personal Protective Equipment (PPE) required for applicable work environments.
   C. Identify the complete design and the process, from concept to completion.
   D. Identify the major functions of a manufacturing system, their characteristics, and relationship to design, process routing and lean manufacturing.
   E. Demonstrate computer competency required for CAM applications including CNC programming, set up, data transmission and the use of CAD/CAM editing software.
   F. Analyze, apply and qualify engineering specifications for parts machined, prototyped or fabricated.
   G. Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.
   H. 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