



MONROE COUNTY
COMMUNITY COLLEGE

Course Outcome Summary

METC 210
Computers in Machine Design

Course Information

Division	Applied Science and Engineering Technology
Contact Hours	90.0
Total Credits	4.0

Prerequisites METC 220, METC 170 (or equivalent), and MATH 160

Course Description

This course covers the application of the principles of engineering mechanics (stress/strain, impact, dynamic loading and fatigue) through computer analysis to the design and/or selection of machining elements. Components discussed include fasteners, springs, bearings, belt and chain drives, brakes and clutches, power screws and gears. Students are exposed to use of CAD to model designs, FEA stress verification and a variety of math tools to reproduce equations from industry handbooks and component supplier guides.

This course is a restricted tech elective 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 mathematic 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. **Represent velocity and acceleration as vectors.**

Applies To Program Outcomes

- A. Identify and define problems in mathematic and scientific terms.
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- G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
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2. **Assign reference frames and determine relative and absolute motion components**

Applies To Program Outcomes

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- B. Produce graphic representations of designs using CAD software, Solid Modeling software, and pencil and paper methods.
- 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.

3. **Apply computer software tools to determine motion profiles and simulated motion trajectories**

Applies To Program Outcomes

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- D. Apply instruments to make measurements and analyze data from such measurements.
- E. Identify typical mechanical components and explain their function.
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- I. Recognize the need to engage in lifelong learning, and to perform research or conduct investigations to continuously upgrade knowledge and skills.



4. Determine dynamic loading of components using software tools

Applies To Program Outcomes

- A. Identify and define problems in mathematic and scientific terms.
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- 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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- J. Communicate effectively, and work as part of a team.

5. Develop a plan to design, review, test, and evaluate new designs of mechanical parts

Applies To Program Outcomes

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- 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.
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6. **Design a drive train using gears, shafts, belts and clutches to transmit power**

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- 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.

7. **Select fasteners, springs, and other mechanical fasteners to meet design criteria**

Applies To Program Outcomes

- A. Identify and define problems in mathematic 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.
- E. Identify typical mechanical components and explain their function.
- 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.
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8. **Analyze statics stress in mechanical components using Finite Element Analysis Software.**

Applies To Program Outcomes

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- 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.



9. Develop a solution to a problem based on a written problem statement

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- G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications.
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10. Prepare reports explaining results of technical analysis, design, and testing

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Date Updated: April 7, 2019
By: MJ Dubois