MONROE COUNTY COMMUNITY COLLEGE

# Course Outcome Summary

## METC 234
## Thermodynamics and Fluid Sciences

### Course Information

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

**Prerequisites** MATH 124 or MATH 160 or MATH 164 or MATH 157 and MATH 159

### Course Description

This course presents the fundamental concepts of thermodynamics, heat transfer, and fluid science. The focus is on industrial applications and their basis in thermodynamic theory and fluid mechanics. Included are heat capacity, heat transfer, phase changes, thermal cycles, efficiency, power generation, refrigeration, fluid flow, and pumping. Lab exercises will demonstrate some of these concepts, with computer simulations used to demonstrate where physical equipment is impractical for the classroom. In addition, fluid flow characteristics are presented where related to heat exchanger performance.

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

**Mechanical Engineering Technology**

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.
D. Apply instruments to make measurements and analyze data from such measurements.
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.

**Nuclear Engineering Technology**

C. Describe the main systems in a nuclear power plant, and how they are used in power generation
D. Identify typical power plant components and explain their function
F. Identify and define problems in mathematics and scientific terms
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## Outcomes

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

1. Convert thermodynamic quantities to different scales and units

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2. Calculate the temperature changes of materials due to the gain or loss of thermal energy

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**Nuclear Engineering Technology**

F. Identify and define problems in mathematics and scientific terms

G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications
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3. Calculate the expected heat transfer and temperature rise of fluids in a heat exchanger

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**Nuclear Engineering Technology**

D. Identify typical power plant components and explain their function
F. Identify and define problems in mathematics and scientific terms
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4. Draw diagrams of Pressure-Volume for various industrial thermal cycles and calculate efficiency

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5. Calculate pressure drop of fluid flow along a path, and determine whether the flow is laminar or turbulent

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D. Identify typical power plant components and explain their function
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6. Descibe the different forms of heat transfer (radiation, conduction and convection)

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7. Calculate the expected heat transfer and temperature rise of fluids in a heat exchanger

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D. Identify typical power plant components and explain their function
F. Identify and define problems in mathematics and scientific terms
G. Recognize assumptions and limits of analysis to the application of technology, including social and ethical implications
H. Recognize the need to engage in lifelong learning, and to perform research or conduct investigations to continuously upgrade knowledge and skills
I. Communicate effectively, and work as part of a team

8. Identify Components in a typical power plant and explain their function

**Mechanical Engineering Technology**

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.

**Nuclear Engineering Technology**

C. Describe the main systems in a nuclear power plant, and how they are used in power generation
D. Identify typical power plant components and explain their function
H. Recognize the need to engage in lifelong learning, and to perform research or conduct investigations to continuously upgrade knowledge and skills

Date Updated: Mar 29, 2019
By: MJ Dubois