MERCER
COUNTY COMMUNITY COLLEGE

COURSE OUTLINE

Course Number	Course Title	Credits
CIV106	**Mechanics**	**3**

Hours: Lecture/Lab/Other	Co- or Pre-requisite	Implementation Semester & Year
3/0/0	**MAT115 or divisional permission**	**Spring 2022**

Catalog description:

Introduction to the basic principles of engineering mechanics, including terminology and types of force systems, for engineering technology students. Topics include the resultant force of a force system, distributed and concentrated forces, force systems in equilibrium, trusses, frames and machines, friction, centroids, and moments of inertia.

General Education Category:
Not GenEd

Course coordinator:
James Maccariella, 609-570-3462, maccarij@mccc.edu

Required texts & Other materials:

Statics and Strength of Materials, latest edition
Cheng
McGraw Hill
ISBN-13: 978-0028030678

Course Student Learning Outcomes (SLO):
Upon successful completion of this course the student will be able to:

1. Demonstrate basic engineering mechanics terminology. [Supports ILG 1; PLO 1]
2. Identify multiple types of force systems. [Supports ILG 11; PLO 1]
3. Analyze various types of static problems. [Supports ILG 4; PLO 1]
4. Generate and interpret loading diagrams. [Supports ILG 11; PLO 1]
5. Solve statics problems in a well-organized and logical manner. [Supports ILG 2; PLO 1]
6. Demonstrate the relationship of statics to the study of advanced topics in engineering. [Supports ILG 1; PLO 1]

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 1. Written and Oral Communication in English. Students will communicate effectively in both speech and writing.

Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Program Learning Outcomes for Civil Engineering Technology (PLO)

1. Prepare designs for highways, buildings, and bridges.
2. Perform route/construction surveys using survey equipment and methods.
3. Test and analyze various construction materials.
4. Prepare design drawings.

Units of study in detail – Unit Student Learning Outcomes:

Unit I   Terminology, Types of Force Systems, and Resultants of Coplanar Force Systems [Supports Course SLO #1, 2, 3, 4, 5, 6]

Learning Objectives
The student will be able to:
- Compute the rectangular components of a force and give their direction.
- Identify and list the different types of force systems
- Define "resultant".
- Solve for the resultant of collinear or concurrent-coplanar force systems.
- Define "moment" and differentiate between clockwise and counterclockwise moment.
- Calculate the moment about any given point for a group of coplanar forces and/or moments
- Solve for the resultant of a non-concurrent coplanar force.
- Solve for the resultant of a parallel-coplanar force system

Unit II   Free Body Diagrams, Equilibrium, Reactions [Supports Course SLO #1, 2, 3, 4, 5, 6]

Learning Objectives
The student will be able to:
- Draw free body diagrams of coplanar force systems considering gravity, pins, rollers, smooth surface, fixed ends, bearings, flexible cable and ball and sockets.
- Solve for the forces and reactions in statically determinate concurrent coplanar force systems using the equations of equilibrium
- Solve for the reactions in statically determinate non-concurrent coplanar force systems using the equations of equilibrium

Unit III   Truss Analysis [Supports Course SLO #1, 2, 3, 4, 5, 6]

Learning Objectives
The student will be able to:
- Compute the unknown tensile and compressive loads in truss members using the "Method of Joints" or the "Method of Sections" both individually and in teams.

Unit IV   Frames and Machines [Supports Course SLO #1, 2, 3, 4, 5, 6]

Learning Objectives
The student will be able to:
- Compute the forces and reactions at various locations in moderately complex frames and machines.

Unit V   Centroids, Moments of Inertia [Supports Course SLO #1, 2, 3, 4, 5, 6]

Learning Objectives
The student will be able to:
- Solve for the centroid of composite geometric and structural sections.
- Solve for the moment of inertia of composite geometric and structural sections about any vertical or horizontal axis using the "parallel axis theorem".

Unit VI   Friction [Supports Course SLO #1, 2, 3, 4, 5, 6]

Learning Objectives
The student will be able to:
- Define: friction, friction force, static friction, kinetic friction, normal force, coefficient of static friction, angle of friction, and angle of repose.
- Calculate the frictional force between two bodies for a given set of conditions.
- Solve for the moment of inertia of composite geometric and structural sections about any vertical or horizontal axis using the "parallel axis theorem".

Evaluation of student learning:

Course student learning outcomes will be assessed by the following activities:

Tests (3)	60%
Quizzes and Homework	10%
Final Exam	30%