COURSE OUTLINE

CIV106
Course Number

Mechanics
Course Title

3
Credits

3/0
Lecture/Laboratory Hours

COURSE 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.

Text (s): Reference Division Booklist

Prerequisites: MAT115 or MAT110 or divisional permission

Course Coordinator: James Maccariella
Latest Review: Spring 2019
I. GENERAL OBJECTIVES:

Course Competencies/Goals:

The student will be able to:

1. Demonstrate the principles of engineering mechanics.
2. Demonstrate basic engineering mechanics terminology.
3. Recognize various types of static problems.
4. Solve problems in a well organized and logical manner.
5. Demonstrate the relationship of statics to the study of advanced topics in civil and mechanical engineering technology.

Course-specific General Education Knowledge Goals and Core Skills.

General Education Knowledge Goals
Goal 1. Communication. Students will communicate effectively in both speech and writing.
Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

MCCC Core Skills
Goal A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.
Goal B. Critical Thinking and Problem-solving. Students will use critical thinking and problem solving skills in analyzing information.
Goal F. Collaboration and Cooperation. Students will develop the interpersonal skills required for effective performance in group situations.

UNIT I (3 Weeks): TERMINOLOGY, TYPES OF FORCE SYSTEMS, AND RESULTANTS OF COPLANAR FORCE SYSTEMS

(Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 1, 2 & 3; Core Skills A, B & F).

The student must be able to:

1. Compute the rectangular components of a force and give their direction.
2. Identify and/or list the different types of force systems.
3. Define “resultant”.
4. Solve algebraically for the resultant of collinear or concurrent-coplanar force systems.
5. Define “moment” and differentiate between clockwise and counterclockwise moment.
6. Calculate the moment about any given point for a group of coplanar forces and/or moments.
7. Solve algebraically for the resultant of a non-concurrent coplanar force.
8. Solve algebraically for the resultant of a parallel-coplanar force system.

UNIT II (2 1/2 Weeks): FREE BODY DIAGRAMS, EQUILIBRIUM, REACTIONS  
(Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 1, 2 & 3; Core Skills A, B & F).

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

UNIT III (2 ½ Weeks): TRUSS ANALYSIS  
(Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 1, 2 & 3; Core Skills A, B & F).

The student must be able to compute the unknown tensile and compressive values of loads in truss members using the “Method of Joints” or the “Method of Sections”.

UNIT IV (2 Weeks): FRAMES AND MACHINES  
(Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 1, 2 & 3; Core Skills A, B & F).

The student must be able to compute the forces and reactions at various locations in moderately complex frames and machines.

UNIT V (2 ½ Weeks): CENTROIDS, MOMENTS OF INERTIA  
(Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 1, 2 & 3; Core Skills A, B & F).

1. Solve for the centroid of composite geometric and structural sections.
2. 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 (1 ½ Weeks): FRICTION  
(Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 1, 2 & 3; Core Skills A, B & F).

The student must be able to:
1. Define: friction, friction force, static friction, kinetic friction, normal force, coefficient of static friction, angle of friction, and angle of repose.
2. Calculate the frictional force between two bodies for a given set of conditions.

UNIT VII (1 ½ Weeks): PRINCIPLES OF KINEMATICS (OPTIONAL TOPIC)  
(Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 1, 2 & 3; Core Skills A, B & F).
The student must be able to:
1. Define: kinematics, kinetics, rectilinear motion, curvilinear motion, rotation, plane motion, displacement, linear velocity, angular velocity, speed centripetal force.
2. Solve basic problems using the equations of rectilinear motion and curvilinear motion.

This final unit on the “Principles of Kinematics” is optional, and will be included only if time permits.

II. REVIEW OF SEMESTER OBJECTIVES

Time: 1/2 Week

III. EVALUATION

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<tr>
<th>Assessment</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Quizzes and Homework</td>
<td>10 - 15%</td>
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<tr>
<td>3 Tests</td>
<td>55 - 60%</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
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<tr>
<td>Attendance, Interest, and Oral Presentations</td>
<td>5 - 10%</td>
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**Academic Integrity Statement:**
Students are expected to comply with the college-wide requirements for academic integrity. Mercer County Community College is committed to Academic Integrity—the honest, fair, and continuing pursuit of knowledge, free from fraud or deception. This implies that students are expected to be responsible for their own work. Presenting another individual’s work as one’s own and receiving excessive help from another individual will qualify as a violation of Academic Integrity. The entire policy on Academic Integrity is located in the Student handbook and is found on the college website [http://www.mccc.edu/admissions_policies_integrity.shtml](http://www.mccc.edu/admissions_policies_integrity.shtml).

**ORAL PRESENTATIONS**

Students will be expected to give short presentations before the class involving problem solutions. A neat blackboard sketch with an organized solution and full explanation is required.

IV. ATTENDANCE

Students are expected to attend all classes unless excused by the instructor. Unexcused absences in excess of two (2) classes during the day session or one (1) class during the evening session, without a valid excuse, will result in a reduction of the average in calculating the final grade. Perfect attendance will result in an increase in the final average.

Students are expected to earn a minimum grade of “C” in order to enroll in the succeeding course CIV229 - Mechanics of Materials.
**Special Needs**

Any student in this class who has special needs because of a disability is entitled to receive accommodations. Eligible students at Mercer County Community College are assured services under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973. If you believe you are eligible for services, please contact Arlene Stinson, the Director of Academic Support Services. Ms. Stinson’s office is LB216, and she can be reached at (609) 570-3525.

Mercer County Community College is committed to ensuring the full participation of all students in all activities, programs, and services. Please refer to the Student Handbook to review accommodations available for Students with Special Needs.