COURSE OUTLINE

Course Number: CIV103  
Course Title: Statics  
Credits: 3

Hours: lecture/Lab/Other 3/0/0  
Co- or Pre-requisite:  
Pre-requisite: MAT146 with a minimum C grade; one semester of high school or college physics  
Co-requisite: MAT151

Implementation:  
sem/year: Spring 2013

Catalog description:
Calculus-based introduction to the basic principles of engineering statics, including terminology and types of force systems, for engineering science 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.

Is course New, Revised, or Modified?
New

Required texts/other materials:
Text: Statics and Mechanics of Materials  
Authors: Ferdinand P. Beer, E. Russell Johnston, John T. DeWolf, David F. Mazurek  
McGraw Hill, 2011  

Latest Reviewed date: 2017  
Course coordinator: James Maccariella, 609-570-3462, maccarij@mccc.edu

Information resources:
The required textbook will be used as the primary resource for this course.

Other learning resources:
There is a sophomore engineering student tutor on the West Windsor campus. The library will have reserve copies of the textbook.
Course Competencies/Goals:

The student will be able to:
1. Demonstrate basic engineering statics terminology.
2. Identify multiple types of force systems.
3. Analyze various types of static problems.
4. Generate and interpret loading diagrams.
5. Solve statics problems in a well-organized and logical manner.
6. Demonstrate the relationship of statics to the study of advanced topics in engineering.

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.

Units of study in detail.

UNIT I: TERMINOLOGY, TYPES OF FORCE SYSTEMS, AND RESULTANTS OF COPLANAR FORCE SYSTEMS

Learning Objectives
The student will be able to:

- Compute the rectangular components of a force and give their direction. (Course Competencies 1 & 5; Gen Ed Goals 2 & 3; Core Skill B).
- Identify and list the different types of force systems. (Course Competencies 1, 2 & 5; Gen Ed Goals 2 & 3; Core Skill B).
- Define “resultant”. (Course Competency 1; Gen Ed Goal 1; Core Skill A).
- Solve for the resultant of collinear or concurrent-coplanar force systems. (Course Competencies 1, 2, 3 & 5; Gen Ed Goals 2 & 3; Core Skill B).
- Define “moment” and differentiate between clockwise and counterclockwise moment. (Course Competencies 1 & 2; Gen Ed Goal 1; Core Skill A).
- Calculate the moment about any given point for a group of coplanar forces and/or moments. (Course Competencies 1, 2, 3 & 5; Gen Ed Goals 2 & 3; Core Skill B).
- Solve for the resultant of a non-concurrent coplanar force. (Course Competencies 1, 2, 3 & 5; Gen Ed Goals 2 & 3; Core Skill B).
- Solve for the resultant of a parallel-coplanar force system. (Course Competencies 1, 2, 3 & 5; Gen Ed Goals 2 & 3; Core Skill B).
UNIT II: FREE BODY DIAGRAMS, EQUILIBRIUM, REACTIONS

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. *(Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 1, 2 & 3; Core Skill B).*
- Solve for the forces and reactions in statically determinate concurrent coplanar force systems using the equations of equilibrium. *(Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 2 & 3; Core Skill B).*
- Solve for the reactions in statically determinate non-concurrent coplanar force systems using the equations of equilibrium. *(Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 2 & 3; Core Skill B).*

UNIT III: TRUSS ANALYSIS

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. *(Course Competencies 1, 2, 3, 4, 5 & 6; Gen Ed Goals 1, 2 & 3; Core Skills B & F).*

UNIT IV: FRAMES AND MACHINES

Learning Objectives

The student will be able to:

- Compute the forces and reactions at various locations in moderately complex frames and machines. *(Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 2 & 3; Core Skill B).*

UNIT V: CENTROIDS, MOMENTS OF INERTIA

Learning Objectives

The student will be able to:

- Solve for the centroid of composite geometric and structural sections. *(Course Competencies 1, 3, & 5; Gen Ed Goals 2 & 3; Core Skill B).*
- Solve for the moment of inertia of composite geometric and structural sections about any vertical or horizontal axis using the “parallel axis theorem”. *(Course Competencies 1, 3, & 5; Gen Ed Goals 2 & 3; Core Skill B).*
UNIT VI: FRICTION

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. (Course Competencies 1 & 2; Gen Ed Goal 1; Core Skill A).

- Calculate the frictional force between two bodies for a given set of conditions. (Course Competencies 1, 2, 3, 4 & 5; Gen Ed Goals 2 & 3; Core Skill B).

Evaluation of student learning:

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes and Homework</td>
<td>10%</td>
</tr>
<tr>
<td>3 Tests</td>
<td>60%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Oral Presentations</td>
<td>5%</td>
</tr>
</tbody>
</table>

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).

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.