



MERCER
COUNTY COMMUNITY COLLEGE

COURSE OUTLINE

Course Number	Course Title	Credits
CIV103	Statics	3
Hours: Lecture/Lab/Other	Co- or Pre-requisite	Implementation Semester & Year
3/0/0	MAT146 with a minimum C grade; one semester of high school or college physics; co-requisite MAT151	Spring 2022

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.

General Education Category:

Not GenEd

Course coordinator:

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

Required texts & Other materials:

Statics and Mechanics of Materials, latest edition
Ferdinand P. Beer, E. Russell Johnston, John T. DeWolf, David F. Mazurek
McGraw Hill
ISBN13: 9781260226751

Course Student Learning Outcomes (SLO):

Upon successful completion of this course the student will be able to:

1. Demonstrate basic engineering statics terminology. [Supports ILG 1; PLO 5]
2. Identify multiple types of force systems. [Supports ILG 11; PLO 5]
3. Analyze various types of static problems. [Supports ILG 4; PLO 5, 6, 7]
4. Generate and interpret loading diagrams. [Supports ILG 11; PLO 5, 6, 7]
5. Solve statics problems in a well-organized and logical manner. [Supports ILG 2; PLO 5, 6, 7]
6. Demonstrate the relationship of statics to the study of advanced topics in engineering. [Supports ILG 1; PLO 5]

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 Engineering Science (PLO)

1. Analyze engineering drawings, demonstrating an understanding of the concept of scale and orthographic projection;
2. Complete written engineering reports;
3. Write computer programs to solve engineering-based problems;
4. Complete computer-aided design (CAD) drawings;
5. Communicate effectively both verbally and in writing;
6. Demonstrate effective mathematical skills and application of scientific principles in solving engineering problems;
7. Apply critical thinking and problem-solving skills in the analysis of data, design of experimental procedures, and evaluation of outcomes;

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, 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%