

Virginia Western Community College

MEC 131

Statics for Engineering Technology

Prerequisites

MTH 111 (Not Intended for Transfer) -Provides a foundation in mathematics with emphasis in arithmetic, unit conversion, basic algebra, geometry and trigonometry. This course is intended for CTE programs.

Corequisites

None

Course Description

Teaches Newton's laws, resultants and equilibrium of force systems, trusses and frames, determination of centroids, and distributed loads and moments of inertia. Introduces dry friction and force systems in space.

Semester Credits: 3 Lecture Hours: 3 Lab Hours: 0

Required Materials

Textbook:

Applied Mechanics for Engineering Technology, 8th Edition by Keith Walker,
ISBN:9780131721517

Software:

None

Other Required Materials:

None

Course Outcomes

At the completion of this course, successful students will be able to

- Identify vector and scalar quantities.
- Convert polar and cartesian quantities.

- Demonstrate the use of trigonometric identities to solve for unknown quantities in right triangles.
- Demonstrate the law of sines and cosines for solving unknown quantities in non-right triangle systems.
- Understand basic geometrical relationships.
- Identify action and reaction forces in system members.
- Calculate force components using trigonometry.
- Construct Free Body Diagrams (FBD) of basic systems.
- Understand FBD rules.
- Apply Newton's third law to solve two-dimensional problems.
- Identify moment placement and orientation.
- Use equilibrium equations to solve for unknown forces and moments.
- Apply equilibrium equations to forces in trusses and frames.
- Reduce distributed forces to point loads and solve for supporting reactions.
- Analyze pulley systems to determine mechanical advantage.
- Identify two-force members.
- Identify and analyze three-force members.
- Understand the effects of friction on a pulley system.
- Understand the effects of friction on a multicomponent system.
- Calculate the center of gravity of an object by use of the area method.
- Calculate Area Moment of Inertia
- Understand the orientation effects of Area Moment of Inertia.

Topical Description

- Statics Applications
- Conversion of units
- Simultaneous Equations
- Trigonometry Relationships (Sine, Cosine and Tangent)
- Vectors in 2D
- Moments 2D and 3D
- Equilibrium Conditions and Equations
- Cables and Pulleys
- Coplaner Force Systems
- Truss Method of Joints
- Truss Method of Sections
- Three-dimensional Equilibrium
- Friction

- Centroids
- Area Moment of Inertia

Notes to Instructors

Beginning Fall 2020, VWCC will require students to have a computer or reliable access to a computer, capable of participation in an online format. Online courses at Virginia Western require a significant amount of interaction with Canvas, the Learning Management System, and many require real-time class sessions using the Zoom web-conferencing tool. To be successful in online classes, students must have substantial access to a computer with hi-speed internet connectivity. The expected requirements are listed on the college webpage.

[TITLE IX STATEMENT](#)

[ADA STATEMENT](#)