

**Departmental Syllabus**

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**Prepared by the Department of Natural Sciences and Applied Technology**

**Date of Departmental Approval:** August 28, 2017

**Date approved by Curriculum and Programs:** October 11, 2017

**Effective: Fall 2018**

1. **Course Number:** ENR201  
**Course Title:** Statics

**Description:** Students analyze the structural integrity of mechanical devices such as frames, trusses, beams and cable. Using vector algebra and calculus, understand how Newton's Laws can address engineering static equilibrium problems and master free body diagram construction. Vectors, dot and cross product, moment of a force, reduction of loadings to an equivalent force, construction of free body diagrams, calculation of reaction forces and moments for structures, static equilibrium loadings are among the topics covered.

2. **Student Learning Outcomes** (instructional objectives, intellectual skills):

Upon successful completion of this course, students are able to do the following.

- Manipulate vectors; calculate dot, cross product and moment of force about a point.
- Reduce simple distributed loadings to an equivalent resultant force, position of application of equivalent force, and equivalent moment.
- Recognize two-force members and use this concept to analyze trusses, frames, and machines.
- Select and isolate free bodies, and construct free body diagrams.
- Use equations of equilibrium to calculate reaction forces and moments for statically determinate structures.
- Isolate a frame or a machine to construct Free Body Diagrams and to calculate the static equilibrium loading on each member.
- Apply the Method of Joints and the Method of Sections to analyze forces in rigid truss networks.
- Identify statically determinate and statically indeterminate structures.
- Use the Method of Sections to determine the internal shear and moment at a point in a loaded member.
- Analyze the equilibrium of rigid bodies subjected to frictional forces.
- Determine the centroid and area moment of inertia of combinations of simple shapes.

3. **Credit(s):** 3 credits (3 class hours)

4. **Satisfies General Education Requirement:** No

5. **Prerequisite(s):** ENR101 (Intro to Engineering & Advanced Manufacturing) and MAT240 (Calculus I); co-requisite: MAT250 (Calculus II)

6. **Semester(s) Offered:** Varies

7. **Suggested General Guidelines for Evaluation:** The course grade is based on homework assignments; class work and participation; one-hour exam(s); and a final examination.

8. **General Topical Outline** (Optional):

1. Vectors, Dot and Cross Product, Moment of Force about a Point.
2. Equivalent Resultant Force, Positions of Application of Equivalent Resultant Force, and Equivalent Moment.
3. Two-Force Members; Analysis of Trusses, Frames, and Machines.
4. Free Body Diagrams.
5. Equations of Equilibrium.
6. The Method of Joints and the Method of Sections.
7. Statically Determinate and Statically Indeterminate Structures.
8. Internal Shear and Moment at a Point in a Loaded member.
9. Equilibrium of Rigid Bodies Subjected to Frictional Forces.
10. Centroid and Area Moment of Inertia.