I. Course Number and Name

MECH 1321: Statics

II. Credits and Contact Hours

3 Credit Hours

III. Instructor's or Course Coordinator's Name

Barry Benedict

IV. Text Book, Title, Author, and Year

Hibbeler, R. C.(2009). *Engineering Mechanics: Statics*. 12th Edition

V. Specific Course Information

a. Description: Principles of mechanics, vectors, force systems, equilibrium of particles and rigid bodies, force analysis of truss structures, distributed forces, centroids, and friction.
b. Prerequisites: MATH 1411: Calculus
c. Required

VI. Specific Goals for the Course

At the end of the course, students will learn the principles that govern the behavior of rigid-body mechanical engineering systems in static equilibrium. Specifically, students will be able to do the following:

a. Identify an engineering problem appropriate for engineering mechanics analysis;
b. Draw a free-body diagram and identify all forces an moments acting on an object at rest;
c. Represent force and moment systems with equivalent systems;
d. Perform an analysis to identify all forces an moments acting internally or externally on an object;
e. Determine geometric properties of one, two and three dimensional objects

This class significantly addresses the following ABET Objectives:

Program Outcomes
A[1, 2]

VII. Brief List of Topics to be Covered

a. General Principles
    i. Classification of mechanics
    ii. International and English units
    iii. General procedure for analysis
b. Force Vectors
    i. Scalars and vectors
    ii. Vector operations
    iii. Cartesian vectors
    iv. Dot product
    v. Addition of vectors
c. Equilibrium of a Particle
    i. Condition for the equilibrium of a particle
    ii. Free-body diagram
    iii. Three dimensional force systems
d. Force Systems Resultant
    i. Cross product
    ii. Principle of moments
    iii. Moment of a force in scalar and vector formulation
    iv. Simplification of a force and couple system
    v. Reduction of a simple distributed loading
e. Equilibrium of a Rigid Body
    i. Conditions for rigid body equilibrium
    ii. Equations for equilibrium
    iii. Two and three force member
f. Structural Analysis
    i. Simple trusses
    ii. The method of joints
    iii. The method of sections
    iv. Space trusses
    v. Flames and machines
g. Internal Forces
    i. Internal forces developed in structural members
    ii. Shear and moment equations and diagrams
    iii. Relations between distributed load, shear and moment
h. Friction
    i. Dry friction
    ii. Frictional forces and flat belts
    iii. Frictional forces on journal bearings

i. Center of Gravity and Centroid
    i. Center of gravity, center of mass, and the centroid of a body
    ii. Composite bodies
    iii. Resultant of a general distributed loading
j. Moment of Inertia
    i. Definition of moments of inertia for areas
    ii. Parallel-Axis theorem for an Area
    iii. Radius of gyration of an area