MASTER COURSE OUTLINE
Prepared By: James Sauceda Date: Sep 2017

COURSE TITLE
Statics

GENERAL COURSE INFORMATION

Dept.: ENGR&	Course Num: 214	(Formerly: EGR 211)
CIP Code: 14.1901	Intent Code: 11	Program Code:
Credits: 5		
Total Contact Hrs Per Qtr.: 55		
Lecture Hrs: 55	Lab Hrs: 0	Other Hrs: 0
Distribution Designation: Natural Science NS		

COURSE DESCRIPTION (as it will appear in the catalog)
Statics is the study of objects which are either at rest or moving with constant velocity. Students in this course will learn to apply mathematics and physical science to the analysis of the forces and moments acting on these objects, developing engineering problem-solving skills in the process. Topics studied will include the following: vector notation and operations; equilibrium of particles and rigid bodies; moments of forces; couples; trusses and frames; shear and moment diagrams; applications of friction; center of gravity, centroids, and moments of inertia.

PREREQUISITES
MATH& 151, PHYS& 221 with grades of 2.0 or higher. COREQUISITE: MATH& 152

TEXTBOOK GUIDELINES
A college-level Statics textbook such as *Engineering Mechanics: Statics*, by Hibbeler, Vector *Mechanics for Engineers: Statics*, by Beer and Johnston, or *Engineering Mechanics: Statics*, by Pytel and Kiusalaas

COURSE LEARNING OUTCOMES
Upon successful completion of the course, students should be able to demonstrate the following knowledge or skills:

1. Express forces, moments, and positions as vectors in Cartesian coordinates.
2. Calculate components of vectors in different directions by using dot products.
3. Calculate moments of forces using cross products.
4. Calculate moments of forces about specified axes.
5. Solve particle equilibrium problems using free-body diagrams and equations of equilibrium.
6. Determine resultants of nonconcurrent force systems.
7. Reduce a distributed loading to a resultant force at a specified location.
8. Solve rigid body equilibrium problems using free-body diagrams and equations of motion.
9. Determine forces in trusses using the methods of joints and sections.
10. Analyze forces acting on members of frames and machines.
11. Determine the internal loadings of a member by the method of sections.
12. Analyze internal shear and moment throughout a member.

13. Solve problems involving friction such as wedges, screws, belts, and bearings.
14. Determine the locations of center of gravity and centroid for systems of particles and objects of arbitrary shape.
15. Determine the moment of inertia of an area.

INSTITUTIONAL OUTCOMES

IO2 Quantitative Reasoning: Students will be able to reason mathematically.

COURSE CONTENT OUTLINE

I. Mathematical Preliminaries
   - A. Units of Measurement
     1. SI units and prefixes
     2. U.S. Customary units
     3. Conversion factors
   - B. Numerical Calculations
     1. Dimensional homogeneity
     2. Significant figures
     3. Rounding numbers

II. Vector Concepts
   - A. Scalars and Vectors
   - B. Vector Operations
   - C. Vector Addition of Forces
   - D. Addition of a System of Coplanar Forces
   - E. Cartesian Vectors and Addition
   - F. Position Vectors
   - G. Force Vectors Directed Along a Line and the Dot Product

III. Equilibrium of a Particle
   - A. Free-Body Diagrams
   - B. Force Systems (Coplanar and Three-Dimensional)

IV. Force System Resultants
   - A. The Cross Product
   - B. Moments of Forces
     1. Scalar formulation
     2. Vector formulation
     3. Moment about a specified axis
   - C. Forces and Couples
     1. Moment of a couple
     2. Simplification of a force and couple system
   - D. Reduction of a Distributed Loading

V. Equilibrium of a Rigid Body
   - A. Two-Dimensional Equilibrium
     1. Free-body diagrams for rigid bodies
     2. Equations of equilibrium
     3. Two- and three-force members
   - B. Three-Dimensional Equilibrium
     1. Free-body diagrams
     2. Equations of equilibrium
     3. Constraints

VI. Structural Analysis

A. Simple Trusses
    1. The method of joints
    2. Zero-force members
    3. The method of sections
B. Frames and Machines

VII. Internal Forces
A. Internal Loadings in Structural Members
B. Shear and Moment Equations and Diagrams
C. Relations between Load, Shear, and Moment

VIII. Friction
A. Dry Friction
B. Wedges

IX. Center of Gravity and Centroid
A. Calculations for Single Bodies
B. Calculations for Composite Bodies

X. Moments of Inertia
A. Calculation for Single Bodies
    1. Parallel-axis theorem
    2. Radius of gyration
B. Calculation for Composite Areas

DEPARTMENTAL GUIDELINES *(optional)*

PO5 should be assessed: Students will be able to solve problems by gathering, interpreting, combining and/or applying information from multiple sources.

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DIVISION CHAIR APPROVAL **DATE**