Fall 2015

ENCE 2350

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University of New Orleans

Civil Engineering 2350

STATICS

CATALOG DESCRIPTION

ENCE 2350 Statics (3 credits)

Vectors; two-dimensional and three-dimensional force systems; equilibrium; friction; centroids; mass moments of inertia; second moments of areas.

PREREQUISITES

Calculus and Analytical Geometry MATH 2108, General Physics PHYS 1061, Civil Engineering Computing and Graphics ENCE 2301.

TEXTBOOKS AND OTHER MATERIAL

1. Beer and Johnston, "Vector Mechanics for Engineers: Statics", McGraw-Hill, Latest Edition
2. Online Course site: http://instruction.uno.edu and www.mhhe.com/beerjohnston?/
3. Handouts (class notes).

STUDENT LEARNING OBJECTIVES

After successfully completing this course each student will be able to:

1. Solve for the resultant of forces acting on a particle in 2 and 3 dimensional space.
2. Replace a given system of forces exerted on a rigid body by simpler equivalent system.
3. Draw a free body diagram, determine whether a structure is properly supported, and if it is, use the equilibrium equations to solve for unknown forces and reactions.
4. Solve for the internal forces that hold the two-force members of a statically determinate structure together using the method of joints and method of sections and the internal and unknown forces of frames and machines with multi-force members.
5. Determine and graphically represent shear and bending in beams.
6. Determine the centroid of an area or line and compute the area and volume of a surface of revolution.
7. Apply the parallel axis theorem to solve for the moment of inertia of an area.
8. Solve for the dry friction forces acting upon rigid bodies, structures, and belts passing over a cylindrical drum.

COURSE TOPICS AND SCHEDULE	No. Class Hours
1. Fundamental Concepts & Principles, Method of Problem Solution, Numerical Accuracy	1.25
2. Resultant Forces, Vectors, Concurrent Forces	1.25
3. Resolution of a Force into Components, Rectangular Components, Addition of	1.25

	Forces	
4.	Equilibrium of a Particle, Free Body Diagram (FBD), Forces in Space	1.25
5.	External and Internal Forces, Transmissibility, Vector Products, Moments of a Force	1.25
6.	Scalar Product, Moment about a given Axis, Couples	1.25
7.	Reduction to Force and One Couple	1:25
8.	Equivalent Systems, Reduction of a System of Forces	1.25
9.	FBD, Reactions at Supports and Connections, Equilibrium	1.25
10.	Statically Indeterminate Reactions, Equil. Of a 2-Force Body, Equil. Of a 3-Force Body	1.25
11.	Equilibrium in 3 Dimensions, Reactions at Supports and Connections for a 3D Structure Trusses, Method of Joints, Method of Sections	1.25
12.	Frames, Machines	1.25
13.	Beams, Shear and Bending Moment in Beams	1.25
14.	Load, Shear, and Bending Moment	1.25
15.	Shear and Bending Moment Diagrams	1.25
16.	Center of Gravity of a 2D Body, Centroids of Areas and Lines	1.25
17.	First Moments of Areas and Lines, Composite Plates and Wires	1.25
18.	Centroids by Integration, Theorems of Pappus-Guldinus	1.25
19.	Center of Gravity of 3D Body, Composite Bodies	1.25
20.	Moments of Inertia of Areas, Parallel Axis Theorem	1.25
21.	Moments of Inertia of Composite Areas, Moments of Inertia of Masses	1.25
22.	Coefficients of Friction, Angles of Friction, Dry Friction, Belt Friction	1.25

CONTRIBUTION OF THE COURSE TO MEETING PROFESSIONAL COMPONENT

1. Contribution to one and one-half years of engineering topics, consisting of engineering sciences and engineering design. This course introduces the students to basic and applied topics in sub-fields of stationary engineering systems, e.g. equilibrium of rigid bodies, analysis of structures, friction, centroid and moment of inertia. It represents an applied side of the subject matter acquired under the previous requirements in the areas of mathematics and science.
2. Contribution to proficiency in one of the four recognized major civil engineering areas: this course contributes to proficiency in the area of structural engineering.