كلية الهندسة

GE201 Statics (Required Course)

Code and Name: GE201 Statics
Credit Hours: 3 (Lecture: 3, Tutorial: 1)

Textbook:
- Engineering Mechanics – Statics, R.C. Hibbler, 12th Edition, Pearson, 2010.

Other References:
- Vector Mechanics for Engineers – Statics, Beer, Johnston, Mazurek, and Elsenberg, 11th Edition, McGraw Hill, 2015.
- Engineering Mechanics - Statics, A. Pytel and J. Kiusalaas, 3rd Edition, Cengage Learning, 2010.
- Engineering Mechanics - Statics, J. L. Meriam, and L. G. Kraige, 5th Edition, John Wiley and Sons, 2002.

Course Description:
Forces, Moments, and Couples, Resultants of Force Systems, Equilibrium Analysis and Free-Body Diagrams, Analysis of Trusses and Frames, Shear-Force and Bending-Moment Distributions. Centroid, Center of Gravity, Moment of Inertia, Polar Moment of Inertia and Product of Inertia.

Pre-requisites: MATH106 Calculus II, PHYS118 Physics II, PHYS120 Physics II Lab.
Co-requisites: None

Course Learning Outcomes:
With relation to ABET Student Outcomes (SOs: 1-7)

1. Recognize the importance of knowledge of math and physical sciences to solve engineering problems
2. Understand the principles of engineering mechanics and statics (1)
3. Explain position, forces, and moments in terms of scalar and vector forms in two and three dimensions. (1)
4. Determine components and resultant of a force system as well as simplify systems of forces and moments to equivalent systems. (1)
5. Apply the concepts of equilibrium to evaluate support reactions and internal forces. (1)
6. Draw free-body, shear-force and bending-moment diagrams. (1)
7. Evaluate geometrical properties of plane area needed for engineering analysis and design (1)
8. Appraise the importance of computational tools in engineering analysis (1)

Topics to be covered:

- General Principles: Basic quantities, idealizations of mechanics, Newton's laws of motion and gravitation, SI system of units, Standard procedures for performing numerical calculations.
- Force Vectors: Vector Operations, Cartesian Vectors, Position Vectors, Dot Product.
- Equilibrium of a Particle: Condition for the Equilibrium of a Particle, Free-Body Diagram, Coplanar Force Systems, 3D Force Systems.
- Force System Resultants: Moment of a Force, Cross Product, Principle of Moments, Moment of a Couple, Simplification of a Force and Couple System, Reduction of a Simple Distributed Loading.
- Equilibrium of a Rigid Body: Conditions for Rigid-Body Equilibrium, FBD, Equations of Equilibrium, Two and Three-Force Members, Constraints and Statically Determinacy.
- Structural Analysis: Simple Trusses, the Method of Joints, Zero-Force Member, the Method of Sections.
- Internal Forces: Internal Loadings Developed in Structural Members, Shear and Moment Equations and Diagrams, Relations between Distributed Load, Shear and Moment.
- Center of Gravity and Centroid: Center of Gravity, Center of Mass and the Centroid of a Body.

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Grading Policy:

The grading for the course are 60% coursework and 40% Final Exam. The course work consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes, homework, and projects for the remaining 20% that is modified by the course instructor.