The University of Jordan

School of Engineering

Civil Engineering department

Spring 2017

Statics 0901241 (3 Credit hours)

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Office hours 11-12 Sunday, Tuesday and Thursday.

Recommended books Engineering Mechanics: Statics (14th edition) by Russell C. Hibbeler.

Engineering Mechanics: Statics (7th edition) by J.L. Meriam and L. Kraige.

Course outline

- General principles.
- Force Vectors.
- Force systems (2D and 3D)
- Equilibrium of particles and rigid bodies (2D and 3D)
- Structures (trusses, frames and machines)
- Distributed forces (centroids and centers of mass)
- Beams (shearing force and bending moment diagrams)
- Moment of inertia

Prerequisite: General Physics-1 (0301101)

Required for Civil Engineering

Grading

The marks will be distributed as follows

- Midterm Exam 30%
- Participation, Homework, Attendance and Quizzes 10%
- Final Exam 50%
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Course goals

- The student will be able to solve vector operations
- Student will be able to analyse force systems (2D and 3D)
- Student will be able to analyse equilibrium problems of particles and rigid bodies (2D and 3D).
- Student will be able to analyse structures (trusses, frames and machines)
- The student will be able to solve and analyse problems incorporating distributed forces.
- Student will be able to analyse beams and draw shearing force and bending moment diagrams
- Student will be able to calculate moment of inertia, centroids and centre of mass of rigid bodies.

ABET Outcomes

Course addresses ABET Student Outcome(s): a, and e

- An ability to apply knowledge of mathematics, science, and engineering [ABET: 3a]
- An ability to identify, formulate and solve engineering problems [ABET: 3e].

Brief list of topics to be covered

- General Principles
  - Mechanics
  - Fundamental Concepts
  - Units of Measurement
  - The International System of Units
- Force Vectors
  - Scalars and Vectors
  - Vector Operations
  - Vector Addition of Forces
  - Addition of a System of Coplanar Forces
  - Cartesian Vectors
  - Addition of Cartesian Vectors
  - Position Vectors
  - Force Vector Directed Along a Line
  - Dot Product
- Equilibrium of a Particle
  - Condition for the Equilibrium of a Particle
  - The Free-Body Diagram
  - Coplanar Force Systems
  - Three-Dimensional Force Systems
- Force System Resultants
  - Moment of a Force—Scalar Formulation
  - Cross Product
  - Moment of a Force—Vector Formulation
  - Principle of Moments
  - Moment of a Force about a Specified Axis
  - Moment of a Couple

    - Simplification of a Force and Couple System
    - Further Simplification of a Force and Couple System
    - Reduction of a Simple Distributed Loading
- Equilibrium of a Rigid Body
    - Conditions for Rigid-Body Equilibrium
    - Free-Body Diagrams
    - Equations of Equilibrium
    - Two- and Three-Force Members
    - Free-Body Diagrams
    - Equations of Equilibrium
    - Constraints and Statically Determinacy
- Structural Analysis
    - Simple Trusses
    - The Method of Joints
    - Zero-Force Members
    - The Method of Sections
    - Frames and Machines
- Internal Forces
    - Internal Loadings Developed in Structural Members
    - Shear and Moment Equations and Diagrams
    - Relations between Distributed Load, Shear, and Moment
- Centre of Gravity and Centroid
    - Centre of Gravity, Centre of Mass, and centroids.
    - Composite Bodies
- Moments of Inertia
    - Definition of Moments of Inertia for Areas
    - Parallel-Axis Theorem for an Area
    - Radius of Gyration of an Area
    - Moments of Inertia for Composite Areas

Policies

- **CHEATING WILL RESULT IN AN F GRADE.**
- Students are expected to attend every class session. The university policy regarding the **ATTENDENCE** will be **STRICTLY** enforced.
- You are **NOT ALLOWED** to use **CELL PHONE** in class.
- If you have a course-related question, please see the instructor during office hours or set an appointment by **email**.
- You are expected to arrive in class and be seated **on time** and not leave the classroom before the instructor dismisses class.