**Birzeit University**

**Faculty of Engineering**

**Department of Civil Engineering**

**ENCE 232, Statics, Summer Semester, 2016**

**3 Credit Hours**

**Prerequisites:** Physics PHYSI 141.

**Instructors:** Dr. Omar Zimmo, Dr. Jamal Zalatimo, Eng. Farhat Majadbeh, Eng. Abdulrahman Hamdan.

**Textbooks:** Vector Mechanics for Engineers, Statics, Tenth Edition, Beer, F., B., Johnston, E., R., and Eisenberg, E., R., McGraw Hill, Inc., 2013, New York.

**References and Supplementary Materials:**

Engineering Mechanics, Statics, Eleventh Edition, (R. C. Hibbeler), Pearson Prentice Hall, Ltd., 2007.

Statics Study Pack, Engineering Mechanics, Statics, Eleventh Edition, (Peter Schiavone), Pearson Prentice Hall, Ltd., 2007.Civil Engineering and Structural Engineering Handbooks, Class Notes, Handouts, Library and Online Resources.

**Course Description:** This course introduces the basic concepts of Statics including vectors, equilibrium of static particles, resolution and resultants of forces, center of gravity and moment of inertia, equilibrium of structural systems, forces in beams and frames, force and moment diagrams, and friction.

**Intended Learning Outcomes:**

1. To understand the concepts related to vectors and the action of forces and moments.
2. To be able to determine the components and the resultants of forces.
3. To understand and utilize the concept of equilibrium.
4. To posses the basic knowledge and expertise necessary for analyzing beams, trusses, and simple structures, and determine the internal forces.
5. To understand the concepts related to centroids of areas and masses.

**Course Outline**

1. **Introduction**

Units

Scalars and Vectors

Addition and Subtraction of Vectors

Multiplication and Division of a Vector by a Scalar

Force as a Vector Quantity

Cartesian Vectors

Addition and Subtraction of Cartesian Vectors

1. **Equilibrium**

Conditions for the Equilibrium of a Particle

Free-Body Diagrams

Coplanar Force Systems Acting on a Particle

Cross Product

Moment of a Force

Varignon's Theorem

Moment of a Couple

Principle of Transmissibility

Resolution of a Force into a Force and a Couple

Simplification of a Force and Couple System

Dot Product

Coplanar Force Systems Acting on a Rigid Body

Equilibrium in Three Dimensions

1. **Structures**

Plane Trusses

Method of Joints

Method of Sections

Frames and Machines

1. **Centroids**

Center of Mass

Centroids

1. **Internal Forces**

Internal Forces Developed in Structural Members

Shear and Bending-Moment Diagrams

Relations among Distributed Load, Shear, and Moment

Cables

**Assignments will be given in class and due one week later.**

**Exam dates will be set and agreed on in class.**

**Course Policies:** Students are required to attend all classes. All unexcused absences will be penalized. Late homeworks will be accepted under special circumstances with the consent of the instructor only. Missing an exam with an acceptable excuse will result in a 30% penalty inflicted on the makeup exam.

**Teaching Methods:**

Lectures

Quizzes and Discussions

Assignments and Homeworks

**Grading System:**

The overall grade of this course will be determined as follows:

Mid-Term 40 %

Final Exam 50 %

Assignments and Quizzes

Participation and Attendance 10 %