

(Textile Engineering Department)

Undergraduate

Course Title: **Static**

Prerequisite: Physics (I)

Number of Credits ३

Lecturer: Dr. Azita Asayesh

Course Topics:

- Basic concepts-rigid and deformable body-Newton's laws-quantities and units-scalars and vectors-components of a vector-dot product and cross product of vectors.
 - Force- external and internal force- concentrated and distributed force- two dimensional force system- collinear forces- concurrent at a point forces- parallel forces- general forces- three dimensional force system
 - Moment- varignons theorem- couple- force couple system- resultants.
 - Equilibrium- equilibrium conditions- equilibrium of collinear forces, concurrent at a point forces, parallel forces, and general forces- two_ force member equilibrium - three_ force member equilibrium.
 - Mechanical system isolation- free body diagram- types of supports- statically determinate and statically indeterminate systems.
 - Plane trusses-truss analysis- method of joints
 - Truss analysis using method of sections.
 - Center of mass- centroids of lines, area and volumes-composite bodies and figures- theorems of pappus.
 - First moment of area- second moment of area (moment of inertia) - definitions- product of inertia-radius of gyration.
 - Transfer of axes- rotation of axes- Midterm test.
 - Beams- types of beams- concentrated and distributed forces.
 - Shear and moment relationships- shear force and bending moment diagrams for a beam.
 - Flexible cables- parabolic cables.
 - Friction- frictional phenomena- types of friction- dry friction- friction in flexible belts.
 - Principle of virtual work.
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Reading Resources:

- Engineering Mechanics Statics, Meriam
- Vector Mechanics for Engineers-Statics, Beer & Johnson
- Engineering mechanics Statics, Shames