



Ewha International Summer College

Course Syllabus

Solid Mechanics

Professor: TBA

E-mail: TBA

Home Univ.: TBA

Dept.: TBA

Description:

In design and development of advanced products and process, it is important to assure the functionality. All products and processes are required to have the correct stiffness and not to break under service. In this course, you will learn about the mechanical properties of materials and components and how this knowledge is used to design products and processes with respect to stiffness and strength. Knowledge in strength of materials and solid mechanics design will make product development much more efficient since you will be able to answer question such as "Does it break?" or "Will there be too much deformations?" even before the prototypes has been built. The course contains basic knowledge and theory for continued work in mechanical engineering and the mechanical modelling of materials.

Objective:

[Course objective] The course is a sophomore-level engineering mechanics course, commonly labelled "Statics and Strength of Materials" or "Solid Mechanics". It introduces students to the fundamental principles and methods of structural mechanics. Topics covered include: static equilibrium, force resultants, support conditions, analysis of determinate planar structures (beams, trusses, frames), stresses and strains in structural elements, states of stress (shear, bending, torsion), displacements and deformations, introduction to matrix methods, elastic stability, and approximate methods. Laboratory exercises are used to encourage student creative and logical thinking.

After the course, the participant should be able to

- Identify the purpose and function of various structures
- Determine stresses and deformations in truss structures, frames and composites using models for rods and beams
- Determine stresses and deformations in axisymmetric structures
- Analyse rods, shafts, beams, simple trusses and thin-walled pressure vessels with respect to internal forces, stresses and deformations
- Be able to determine the applicability of the models above and also understand the order of the approximations included in the models

- Analyse one dimensional dynamic problems

[Pre-knowledge needed?] [Materials needed?]

Required to take Introduction to **Mechanical and Biomedical Engineering** course

Basic knowledge of Engineering Mathematics required

Prerequisite:: [Textbook]

(Required) Mechanics of Materials (9th Ed.) by R.C. Hibbeler, Pearson (ISBN: 9780133254426)

(Supplementary) Engineering Mechanics: Statics by R.C. Hibbeler, Pearson (ISBN: 9780134160689)

Credits	3		Contact Hours	45		
Week 1	6/29(Tue)	Introduction to Solid Mechanics & Equilibrium of a Deformable Body				
	6/30(Wed)	Stress & Average Normal Stress in an Axially Loaded Bar				
	7/1(Thu)	Average Shear Stress & Allowable Stress Design / Limit State Design				
Week 2	7/5(Mon)	Strain / Deformation & The Tension and Compression Test / The Stress-Strain Diagram				
	7/6(Tue)	Stress-Strain Behavior of Ductile and Brittle Materials / Hooke's Law & Strain Energy / Poisson's Ratio				
	7/7(Wed)	The Shear Stress-Strain Diagram & Failure of Materials Due to Creep and Fatigue				
	7/8(Thu)	Midterm				
Week 3	7/12(Mon)	Saint-Venant's Principle & Elastic deformation of an axially loaded member				
	7/13(Tue)	Principles of Superposition & Statistically Indeterminate Axially Loaded Member				
	7/14(Wed)	Force Method of Analysis (Flexibility Method) & Thermal Stress / Stress Concentration				
	7/15(Thu)	Inelastic Axial Deformation / Residual Stress & Torsional Deformation of a Circular Shaft				
Week 4	7/19(Mon)	Torsion Formula & Power Transmission / Angle of Twist				
	7/20(Tue)	Statistically Indeterminate Torque & Solid Non-Circular Shafts / Thin-Walled Tubes Having Closed Cross-Sections				
	7/21(Wed)	Stress Concentration / Inelastic Torsion & Residual Stress				
	7/22(Thu)	Final Exam				

Evaluation(%)	Midterm	Final	Attendance	Assignments	Participation	Etc.
	30%	40%		15%	5%	

※ Applicants with intent for more than one course are asked to make up a syllabus for each, repeatedly

using the above template.