ME-331

Solid mechanics

Curtin William

Cursus	Sem.	Type
Mechanical engineering	BA6	Obl.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Written
Workload	120h
Weeks	14
Hours	**4 weekly**
Lecture	3 weekly
Exercises	1 weekly
Number of positions	

Summary

Model the behavior of elastic, viscoelastic, and inelastic solids both in the infinitesimal and finite-deformation regimes.

Content

This course will articulate the behavior of elastic, viscoelastic, and inelastic solids both in the infinitesimal and finite-deformation regimes. Exact and approximate solutions to initial and boundary-value problems will be employed to analyze the stress and strain state of a finite body under different assumptions. The time/frequency dependence of viscoelastic materials will be presented. Certain constitutive models for strain and stress fields associated with permanent deformations are also analyzed.

Keywords

Large deformations, Elasticity, Viscoelasticity, Plasticity.

Learning Prerequisites

Required courses

- Mechanics of Structures II (ME-232)
- Mechanics of continuous media (ME-201)

Recommended courses

Important concepts to start the course

Theory of ordinary differential equations
Theory of partial differential equations
Vector/Tensor operations and properties

Learning Outcomes

By the end of the course, the student must be able to:

- Model and analytically solve simple problems of statics and stress analysis, S1
- Identify the constitutive behaviour of a material from the results of a mechanical test and choose a suitable test standard, S5

- Model with analytical or numerical tools the nonlinear response of structures and materias, S12

Transversal skills

- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Take feedback (critique) and respond in an appropriate manner.

Teaching methods

Ex-cathedra

Expected student activities

Homework

Assessment methods

There will be a midterm exam worth 40% and a written final exam worth 60% of the grade.

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes

Resources

Ressources en bibliothèque

- Applied Mechanics of Solids / Bower

Notes/Handbook

A. Bower, *Applied Mechanics of Solids*, CRC Press, 2009

Websites

- http://moodle.epfl.ch

Prerequisite for

Computational Solid and Structural Dynamics (ME-473)
Fracture mechanics (ME-432)
Mechanics of composites (ME 430)