

ME-437

Advanced solid mechanics

Cursus	Sem.	Type
Mechanical engineering minor	H	Opt.
Mechanical engineering	MA1, MA3	Opt.
Mechanics		Opt.

Language of teaching	English
Credits	5
Withdrawal Session	Unauthorized Winter
Semester	Fall
Exam	During the semester
Workload	150h
Weeks	14
Hours	5 weekly
Lecture	3 weekly
Exercises	2 weekly

Number of positions

It is not allowed to withdraw from this subject after the registration deadline.

Remark

pas donné en 2023-24

Content

The course will be topical but evolving in a natural flow. Topics will include:

Anisotropic Elasticity: beyond isotropic elasticity

Homogenization methods: the connection between microstructure of a material and the macroscopic effective properties that can be used in continuum analyses

Laminate theory: the special case of fiber composites as layered anisotropic materials, connecting fiber/matrix properties to macroscopic structural response.

Inclusions and Eshelby analysis: stresses and strains around particles embedded in a matrix and undergoing transformations that affect functional performance and failure, with connections to homogenization theory.

Fracture mechanics: basic understanding of the driving forces for crack growth, from both energy and stress perspectives, with advanced concepts for implementation in numerical methods.

Teaching methods

Lectures on mechanics theory

Examples to illustrate theory and application

Exercises for cementing and applying new knowledge

Course will include project in each of the main course topics

Expected student activities

In-class participation

Collaborative problem solving

Execution of projects

Assessment methods

Graded projects during the semester

NO final examination

Resources

Moodle Link

- <https://go.epfl.ch/ME-437>