ME-437

# Advanced solid mechanics

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

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|---|---|
| Language of teaching | English |
| Credits | 5 |
| Withdrawal | Unauthorized |
| Session | 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