EPFL

ME-201   **Continuum mechanics**

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Cursus	Sem.	Type
Mechanical engineering	BA4	Obl.

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

Summary

The student acquires the basic operations of indicial notation, orthogonal transformation, Cartesian tensors; various deformation and stress tensors; conservation laws; constitutive equations for simple fluids and solids with examples on Newtonian fluids and linear elastic solids.

Content

The course elaborates on the generalization of rational mechanics to the continuum mechanics and deduces the conservation laws as well as the materials constitutive behaviour. The main chapters of the course cover the following points: cartesian tensors, kinematics and dynamics of continuous media, energy, constitutive laws, applications to solids and fluids.

Keywords

Kinematics, Dynamics, Solid, Fluid

Learning Prerequisites

Required courses

- Linear algebra
- Mechanics of structures I
- Mechanics of structures II
- Analysis III
- Analysis IV

Recommended courses

Important concepts to start the course

- Apply the concepts of rigid and deformable body mechanics and of continuum mechanics to model and analytically solve problems of statics, structural stress analysis or simple mechanisms
- Apply the principle of statics and structural mechanics to analyse and design assemblies of simple mechanical elements in the framework of statics, buckling; compute thermal stresses for simple cases

Learning Outcomes

By the end of the course, the student must be able to:
- Model and analytically solve problems of statics, structural stress analysis or simple mechanisms, S1

Transversal skills

- Assess one's own level of skill acquisition, and plan their on-going learning goals.

Teaching methods

Ex cathedra lectures and exercise sessions

Assessment methods

Examen écrit (100%)

Supervision

Office hours	Yes
Assistants	Yes
Forum	No

Resources

Bibliography

John Botsis & Michel Deville, *Mécanique des milieux continus: une introduction*, Presses Polytechniques et Universitaires Romandes, Lausanne, Switzerland, 2006.

Ressources en bibliothèque

- Mécanique des milieux continus / Botsis

Prerequisite for

- incompressible fluid mechanics
- solid mechanics