MSE-464

Assembly techniques

Cursus	Sem.	Type
Materials Science and Engineering	MA2, MA4	Opt.
Mechanical engineering	MA2, MA4	Opt.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	During the semester
Workload	60h
Weeks	14
Hours	**2 weekly**
Courses	2 weekly
Number of positions	

Remark

Pas donné en 2026-27

Summary

Introduction to the assembly of materials by homogeneous or heterogeneous joints (welding, bonding, mechanical assembly). Mechanical and environmental resistance of joints.

Content

Metallic assemblies

- Assembly systems
- Brazing and welding
- Welding techniques
- Surface and interfacial phenomena

Polymer assemblies

- Theoretical aspects of adhesion
- Principal classes of adhesives and their applications
- Properties of polymeric joints
- Polymer interdiffusion in plastic welding
- Mechanical methods of plastic joining

Ceramic assemblies

- Techniques for ceramic/metal/glass joints
- Physical and chemical basis for determining the properties of heterogeneous joints
- Typical applications

Keywords

Welding, brazing, adhesives, mechanical joining, polymers, ceramics, metals

Learning Prerequisites

Recommended courses

Polymères, structures, propriétés, MSE-230, MX, Plummer
Materials mechanics, MSE-205, MX, Bourban

Deformation of materials, MSE-310, MX, Logé
Surfaces and interfaces, MSE-304, MX, Ceriotti

Important concepts to start the course

Basic physics and chemistry, simple mechanics

Learning Outcomes

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

- Describe the basic pricinples of the different joining methods
- Recognize specific characteristics of joints in the different classes of materials (metals, ceramics and plastics)
- Explain the advantages and disadvantages of different joining techniques
- Perform simple structural analysis of mechanical joints
- Discriminate between different classes of adhesives and their applications
- Choose the best joining method for a given application
- Choose the best joining method for different materials
- Analyze the failure of a joint

Transversal skills

- Collect data.
- Make an oral presentation.
- Access and evaluate appropriate sources of information.

Teaching methods

Ex cathedra, seminars, workshop demonstration, exercises

Expected student activities

Attendance at lectures and workshop demonstration, participation in exercises

Assessment methods

Intermediate tests on metals and ceramics and polymers + presentation of a case study. The final mark is the average of the average mark for the tests and the mark for the case study (which hence counts for 50 % of the overall mark)

Supervision

Office hours Yes

Resources

Websites

- http://my.epfl.ch

Moodle Link

- https://go.epfl.ch/MSE-464

Prerequisite for

Master thesis