MSE-214

Materials engineering I

Yee Daryl

Cursus	Sem.	Type
Microtechnics	BA3	Obl.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Written
Workload	90h
Weeks	14
Hours	**3 weekly**
Lecture	2 weekly
Exercises	1 weekly
Number of positions	

Summary

An introduction to the processing-microstructure-property relationships of polymers and metals. The objective of the course is to provide the materials science foundation needed to understand how to select materials and processes for the manufacturing of components relevant in microtechnology.

Content

Understanding how the synthesis and processing of materials (polymers and metals) impact their properties.
Description of different types of materials processes and the materials science concepts associated with them.

Keywords

Polymers
Metals and alloys
Synthesis
Processing
Material selection
Microstructure
Mechanical and thermal properties
Stresses and strains
Fatigue and creep
Phase transformations

Learning Prerequisites

Required courses

Materials: from Chemistry to Properties (MSE-101(b))

Recommended courses

Materials: from Chemistry to Properties (MSE-101(b))

Learning Outcomes

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

- Describe the main characteristics of polymers and metals
- Explain the structure and basic properties of polymers and metals

- Choose or select a polymer or metal according to its properties
- Analyze the properties of polymers and metals according to their structure and composition
- Describe how materials science informs the processing of a material
- Recognize the environmental impact of different materials and processes

Transversal skills

- Give feedback (critique) in an appropriate fashion.
- Take account of the social and human dimensions of the engineering profession.
- Collect data.
- Access and evaluate appropriate sources of information.
- Assess one's own level of skill acquisition, and plan their on-going learning goals.

Teaching methods

Lectures and exercise sessions.
Practical work is schedules for the following semester.

Expected student activities

Participation in class and exercises. The exercises should also be worked on outside of class.

Assessment methods

Written exam during exam session

Supervision

Office hours	No
Assistants	Yes
Forum	Yes
Others	Prof. Yee will be present during the exercise sessions to answer questions.

Resources

Virtual desktop infrastructure (VDI)

No

Bibliography

Z. Tadmor, Principles of Polymer Processing, John Wiley & Sons, Inc., 2nd Edition, 2006.
G. Odian, Principles of polymerization, John Wiley & Sons, Inc., 2004
W. D. Callister, Materials Sciene and Engineering: An Introduction, John Wiley & Sons, 2007

Ressources en bibliothèque

- Principles of polymer processing / Tadmor
- Principles of polymerization / Odian
- Materials Sciene and Engineering: An Introduction / Callister

Notes/Handbook

Slides and notes of the course will be available on Moodle: https://go.epfl.ch/MSE-214

Moodle Link

- https://go.epfl.ch/MSE-214