MSE-214

# Materials engineering I

Yee Daryl

| Cursus | Sem. | Type |
|---|---|---|
| Microtechnics | BA3 | Obl. |

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

## Summary

An introduction to the processing-microstructure-property relationships of polymers and metals. The objectives of the course are to understand a) basic behaviors of polymers and metals and b) how to select materials for 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 scheduled for the following semester.

## Expected student activities

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

## Assessment methods

A written exam during the exam session (100% of the grade)

## Supervision

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|---|---|
| Office hours | No |
| Assistant.e.s | 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

- Retrouver les références à la Bibliothèque

### Notes/Handbook

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