

MSE-403

**Materials science**

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<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Bioengineering	MA1, MA3	Opt.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Written
Workload	90h
Weeks	14
<b>Hours</b>	<b>3 weekly</b>
Courses	2 weekly
Exercises	1 weekly
<b>Number of positions</b>	

**Summary**

The student will acquire an understanding of the basic concepts of materials in general and a deeper knowledge in metallic and nonmetallic inorganic materials and in polymers

**Content**

1. Atomic structure and bonding in solids 2. Metals and their alloys and ceramics - Structures and derived properties- Characterization- Phase diagrams- Defects in solids and resulting properties 3. Polymers- Macromolecular dispersity and characteristics- Basic polymerization mechanisms- Structures in dilute solution and solid state - Characterization 4. Mechanical properties of polymers, metals and alloys, ceramics

**Keywords**

Atomic structure and bonding  
Phase diagrams  
Polymers  
Metals

**Learning Prerequisites****Recommended courses**

Organic Chemistry, bio-oriented Chemistry

**Learning Outcomes**

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

- Discuss the basic concepts of the structure and organization of materials
- Compare the differences in structure and properties of different classes of materials
- Sketch the preparation and processing, structure and properties of polymers, metals and ceramics

**Transversal skills**

- Use a work methodology appropriate to the task.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Assess one's own level of skill acquisition, and plan their on-going learning goals.

**Teaching methods**

Lectures with exercises

### Assessment methods

written exam

### Resources

#### Bibliography

polycopies

- W.D. Callister Jr., D.G. Rethwisch, Fundamentals of Materials Science and Engineering, third edition, John Wiley & Sons.- G. Odian, Principles of Polymerization, 4th edition, Wiley-Interscience 2004.

- P.C. Hiemenz, T.P. Lodge, Polymer Chemistry, 2nd edition, CRC Press 2007.

#### Ressources en bibliothèque

- [Principles of Polymerization / Odian](#)
- [Polymer Chemistry / Hiemenz](#)
- [Fundamentals of Materials Science and Engineering](#)