

MSE-471

**Biomaterials (pour MX)**

Van Landuyt Pascale

<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Materials Science and Engineering	MA1, MA3	Opt.

Language of teaching	English
Credits	2
Session	Winter
Semester	Fall
Exam	Written
Workload	60h
Weeks	14
<b>Hours</b>	<b>2 weekly</b>
Courses	2 weekly
<b>Number of positions</b>	

**Summary**

The course introduces the main classes of biomaterials used in the medical field. The interactions with biological environment and the properties of implants are presented with examples in orthopaedics, dentistry and ocular fields. Introduction to regulatory aspects.

**Content**

Introduction : definition of biomaterials and biological environment.  
 Interactions with biological environment : biocompatibility, cytotoxicity, degradation, wear and corrosion.  
 Main classes of biomaterials and their properties (metals, polymers and ceramics/cements).  
 Orthopaedic implants : bone physiology and implants.  
 Dental implants : tooth physiology and implants.  
 Ocular implants : physiology and implants.  
 Stage of development of biomaterials.  
 Sterilization techniques.  
 Introduction to regulatory aspects.

**Keywords**

Biomaterials, biocompatibility, biofonctionality, implants.

**Learning Prerequisites****Required courses**

Introduction to materials science

**Recommended courses**

Materials, metallurgy, polymer, ceramics.

**Learning Outcomes**

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

- Estimate a biomaterial in function of the application
- Compare developments of new biomaterials
- Describe the interactions with biological environment
- Describe the developement process and regulatory aspects

**Transversal skills**

- Use a work methodology appropriate to the task.
- Communicate effectively with professionals from other disciplines.
- Respect relevant legal guidelines and ethical codes for the profession.
- Collect data.
- Access and evaluate appropriate sources of information.

### Teaching methods

Ex cathedra and invited speakers

### Expected student activities

Attendance at lectures.

Search for information to prepare course.

### Assessment methods

Written exam

### Supervision

Office hours	Yes
Assistants	No
Forum	No

### Resources

#### Ressources en bibliothèque

- [Biomaterials science : an introduction to materials in medicine / Ratner](#)
- [Human Anatomy & Physiology: Pearson New International Edition / Marieb](#)
- [Biological performance of materials : fundamentals of biocompatibility / Black](#)
- [Traité des matériaux 7 - Comportement des matériaux dans les milieux biologiques / Schmidt](#)
- [Bone Repair Biomaterials / Planell](#)