

**BIOMÉCANIQUE DES TISSUS VIVANTS ET BIOMATÉRIAUX PROTHÉTIQUES****BIOMECHANICS OF LIVING TISSUE AND PROSTHETIC BIOMATERIALS****Lecturers:** Clotilde MINFRAY, Thierry HOC, Vincent FRIDRICI

| Lecturers : 20.0 | TC : 4.0 | PW : 4.0 | Autonomy : 18.0 | Study : 0.0 | Project : 0.0 | Language : FR

Objectives

For developing artificial joint, it is necessary to know the properties of living materials to choose substitutes. This module proposes a detailed study of the mechanical properties of various living tissues (bone, skin, cell, organ, etc.). The choice of biocompatible materials for artificial joint will then be discussed in particular the problems generated by the mechanical stresses and the surrounding environment (damage, biocompatibility ...). The aim of the course is to use notions of mechanics and materials science to justify the choices made today in terms of prostheses and bone reconstruction.

Keywords : Biomechanics, Biomaterials, Living tissues (bone), artificial joint**Programme**

- Biomechanics.
- The bone : living and anisotropic materials.
- Soft tissues.
- From cell to organ.
- Biomaterials.
- Family of substitutes materials (Ceramics, metals and polymers).
- Properties of biomaterials : biocompatibility, friction and wear, fatigue.
- BE: Synthesis of a scientific article on biomaterials .

Learning outcomes

- Identify mechanical law for living tissues.
- Know how to explain the process of bone regrowth.
- Know biocompatibility issues with materials.
- Know family of materials used in artificial joint.

Independent study**Objectifs :** Case study to increase knowledge on a subject of your choice related to the course.**Méthodes :** To be done in autonomy by group of two. A written report and an oral presentation are requested.**Core texts**B.D. Ratner , *BIOMATERIALS SCIENCE - THIRD EDITION. ACADEMIC PRESS, 2013***Assessment**

Mark = 50% knowledge + 50% know-how.
Mark knowledge = 100% final exam.
Mark know-how = 80% final exam + 20% continuous assessment.