



BIOMATERIALS

Enrollment year	2020/2021
Academic year	2020/2021
Regulations	DM270
Academic discipline	CHIM/02 (PHYSICAL CHEMISTRY)
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	BIOENGINEERING
Curriculum	Cellule, tessuti e dispositivi
Year of study	1°
Period	2nd semester (08/03/2021 - 14/06/2021)
ECTS	6
Lesson hours	48 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	BINI MARCELLA (titolare) - 6 ECTS
Prerequisites	To better understand the program course basic inorganic chemistry notions are sufficient
Learning outcomes	At the end of course, the student must know the definition of biomaterial and biocompatibility and should be able to choose more suitable technique for the study and modification of the surface of biomaterials to modify the biocompatibility of cases submitted during the examination. In addition, he will have to know and be able to distinguish the different classes of materials and use an appropriate language to discuss the different materials properties
Course contents	Biomaterials and biocompatibility definition. Some information on the chemical bond, the definition of solid state and classification of the main classes of solids and their defects. Main techniques for the study of biomaterials surfaces (spectroscopic, thermal and microscopic

techniques and contact angle measurements). Techniques for surface modification of biomaterials (silanization, chemical reactions, plasma or laser techniques, self-assembled monolayers or Langmuir-Blodgett films, etc.).

The classes of materials. Polymeric materials (definition, characteristics, mechanical and chemical-physical properties and main classes used in medicine), Ceramic materials (definition, synthesis and chemical-physical characteristics, bio-inert, bioactive, bioresorbable ceramics), Metallic materials (definition, properties, steels and stainless steels, Co-Cr-Ni alloys, Ti and its alloys, Nitinol), Composite (nano) materials

Teaching methods

The course is based on frontal lessons without tutoring. A minimum of frequency is not required.

Reccomended or required readings

- 1 - Lesson notes and material provided by the teachers
- 2 - Carlo di Bello, Biomateriali (Introduzione allo studio dei materiali per uso biomedico), Patron Editore

Assessment methods

The assessment of skills is represented by the oral exam. For the part devoted to techniques for the study of the surfaces is given the opportunity to the students to choose one of them to discuss during the examination.

Further information

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Sustainable development goals - Agenda 2030

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