

Course number: BME/DEN 399-504

Term: Winter

Title: Biomaterials and issue related to their bioperformance

Course coordinator: Maryam Tabrizian

Right to submit in English or French written work that is to be graded.

Title	Content
- Introduction to biomaterials - Polymeric biomaterials:	- Aim and learning objective, introducing different biomaterials, their various applications and market size - Various polymeric materials and their characteristics for being used as biomaterials
- Metallic biomaterials - Bioceramics	- Crystallin structure, mechanical and physiochemical properties of metal and ceramics as well as their biological properties
- Composite - Bioperformance criteria	- Modulation the mechanical and physiochemical properties for the main biomaterials towards a better biological response through making composite - What does define the 'bioperformance' and what are the characteristics of materials taking into account making them bioperforming
Term project assignment	Finalizing the term project assignment / A quiz might be set
Bulk characterization of biomaterials	Learning about main techniques for determining the biofunctionality of biomaterials
Surface of biomaterials - Microscopic techniques - Spectroscopic techniques	Learning about main techniques for the surface characterization as one of the main criteria for determining the biocompatibility of biomaterials
Biological characterization of biomaterials: Part 1 (hard tissues)	Learning about main techniques for the characterization of cell response to biomaterials in the context of biocompatibility of materials in contact with hard tissue, mainly bone
Biological characterization of biomaterials: Part 1 (blood and soft tissues)	Learning about main techniques for the characterization of cell response to biomaterials in the context of biocompatibility of materials in contact with soft tissue
Study Break	
Biomaterials in use 1: 1-Implants	Example one: going deeper to characteristics of biomaterials being used as cardiovascular, orthopedic, dental and ocular implants
Biomaterials in use 2 and 3: - Controlled release systems - Tissue Engineering	Example two: going deeper to characteristics of biomaterials being used as for regenerative and nanomedicine: drug delivery systems, tissue engineering
Sterilization and regulatory issues of medical devices	- Materials tolerance to the sterilization technologies as one important criterion for evaluation the bioperformance of biomaterials - Steps for a biomaterial/medical device reaching the market
Students' presentations	Term project report Term project presentation