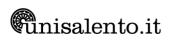
MATERIALS ENGINEERING AND NANOTECHNOLOGY (LM56)

(Lecce - Università degli Studi)

Teaching BIOMATERIAL	S	Teaching in italian BIOMATERIALS	Course year 2
		Teaching BIOMATERIALS	Language INGLESE
GenCod A003986		SSD code ING-IND/22	Curriculum MATERIALS FOR BIOMEDICAL APPLICATIONS
Owner professor Marta MADAGHIELE		Reference course MATERIALS ENGINEERING AND	
		Course type Laurea Magistrale	Location Lecce
		Credits 9.0	Semester Secondo-Semestre
		Teaching hours Ore-Attivita-frontale:	Exam type Orale
		81.0	Assessment Voto-Finale
		For enrolled in 2017/2018	Course timetable
		Taught in 2018/2019	https://easyroom.unisalento.it/Orario
DESCRIPTION	for given applications, from biomaterial choice to manufacturing technologies. Particular attention is given to the development of the following devices: a) artificial prostheses; b) scaffolds for regenerative medicine and tissue engineering; c) devices for controlled drug release. Basic knowledge on polymer science and technology is suggested.		
COURSE AIMS	 This course aims to highlight the properties of biomaterials affecting their performance as medical implants, scaffolds for tissue engineering and drug delivery devices. At the end of the course, students are expected to: understand the physiological response to medical implants; know the principles of scaffold design and related manufacturing technologies; know the principles of drug delivery design; identify the most suitable biomaterial(s) for given applications; know the methods for bulk and surface characterization of biomaterials. 		
TEACHING METHODOLOGY			
	The course includes lectures, lab experiences and seminars on selected topics.		
ASSESSMENT TYPE Final exam will consists of an oral interview, during which the student is expected t complete knowledge and comprehension of the topics of the course.			



FULL SYLLABUS

• Introduction on biomaterials and medical devices. Metals, bioceramics, natural and synthetic polymers (6 ore).

• Viscoelasticity of polymers and biological tissues. Hydrogels: definition and applications; thermodynamics and kinetics of swelling; crosslink density (rubber elasticity theory) (16 hours). Laboratory activities (4 hours).

• Diffusion in polymers and principles of drug delivery devices. Diffusion and erosion-based mechanisms. Examples: hydrogels, micro- and nano-particles. Transdermal drug release devices. Drug targeting for cancer therapy (14 hours).

• Physiological response to permanent implants. Definitions and examples of favourable or adverse responses. Wound healing: acute and chronic response. Examples of permanent implants: orthopedic prostheses; contact lenses; stents (8 hours).

• Principles of tissue engineering. Scaffold design: structure and properties; porosity, degradation, mechanical properties, manufacturing technologies. Bioreactors; cells for tissue engineering (16 hours). Laboratory activities (5 hours).

• Case studies: biomaterials and scaffolds for regeneration of nerves, bone, cartilage, tendons and ligaments. Biomaterials for cell encapsulation (9 hours).

• Classification and regulatory issues for medical devices (3 hours).

REFERENCE TEXT BOOKS

[1] Pietrabissa, R. *Biomateriali per protesi e organi artificiali*. Patron Editore.
[2] Yannas I.V. *Tissue and Organ Regeneration in Adults*. Springer
[3] Class notes and slides

