



# UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2020/2021
BACHELOR'S DEGREE (BSC)	BIOMEDICAL ENGINEERING
SUBJECT	BIOMEDICAL DEVICES
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50296-Ingegneria biomedica
CODE	21192
SCIENTIFIC SECTOR(S)	ING-IND/34
HEAD PROFESSOR(S)	LA CARRUBBA VINCENZO      Professore Associato      Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	3
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	<b>LA CARRUBBA VINCENZO</b> Tuesday    11:00    12:00    Studio docente, edificio 6 secondo piano Thursday    11:00    12:00    Studio docente, edificio 6 secondo piano

**DOCENTE:** Prof. VINCENZO LA CARRUBBA

<b>PREREQUISITES</b>	Knowledge of mechanics: - stress/deformation, types of loads (tensile, compressive, shear), mechanical properties Knowledge of biology - Cell biology, biomacromolecules, central dogma of biology Knowledge of anatomy and physiology - musculoskeletal system - cardiovascular system
<b>LEARNING OUTCOMES</b>	Knowledge and understanding At the end of the course, the student will acquire understanding, knowledge and methodologies of biomedical devices for clinical applications.  Ability to apply knowledge and understanding The student will acquire knowledge and methodologies to analyze and solve problems in the design and production of biomedical devices.  Judgment autonomy The student will acquire the ability to integrate knowledge and manage the complexity of the design of an implantable prosthesis and other biomedical devices for therapeutic treatment.  Communication skills The student will be able to communicate with language skills and properties, to interlocutors of different training such as medical or in a context of a non-expert audience.  Learning skills The student will develop those learning skills that will allow him to autonomously explore topics of interest for the development of new biomedical devices and their transfer to clinical practice.
<b>ASSESSMENT METHODS</b>	The final examination consists of a written test followed by an oral examination. The written test, of the duration of about 3 hours, contains 5 questions concerning all the subjects treated during the course. The oral examination will focus on aspects not sufficiently clarified by the student in the written test. The final assessment, properly graded, will be made on the basis of the following conditions: a) sufficient knowledge of subjects and theories addressed in the course; sufficient degree of awareness and autonomy in the application of theories to solve chemical problems (rating 18-21); b) Good knowledge of subjects and theories addressed in the course; fair degree of awareness and autonomy in the application of theories to solve chemical problems (rating 22-25); c) Good knowledge of subjects and theories addressed in the course; good degree of awareness and autonomy in the application of theories to solve chemical problems (rating 26-28); d) Excellent knowledge of subjects and theories addressed in the course; excellent level of awareness and autonomy in the application of theories to solve problems (rating 29-30L).
<b>EDUCATIONAL OBJECTIVES</b>	1 introduce the student to biomedical devices used for diagnosis, therapy and rehabilitation in the cardiovascular and musculoskeletal fields 2 present the biomechanical aspects necessary for the design and production of biomedical devices, implantable prostheses and artificial organs 3 deepen the regulatory aspects and tests to verify the correct functioning and safety of biomedical devices.
<b>TEACHING METHODS</b>	Frontal teaching, Practise
<b>SUGGESTED BIBLIOGRAPHY</b>	Scientific articles, book chapters, Reviews and slides supplied in electronic format

## SYLLABUS

Hrs	Frontal teaching
5	Part 1 Introduction to biomedical devices and artificial organs for diagnosis, therapy and rehabilitation. Biomedical devices of the cardiovascular and musculoskeletal system
5	Part 2 - Operation of Pacemakers, ICD and external implantable defibrillators
7	Part 3 - Biological and mechanical prosthetic valves, synthetic valves and valves for endogenous regeneration, transcatheter valves
10	Part 4 - Catheters, metallic stents, drug-eluting stents and biodegradable stents, instruments for measuring pressure
5	Part 5 - Ventricular Assisting Devices (VAD), LVAD and BiVAD, total artificial heart.
5	Part 6 - Mechanical Ventilation, artificial lung

## SYLLABUS

Hrs	Frontal teaching
7	Part 7 - Bone and hip prostheses, biodegradable magnesium alloy screws, rehabilitation systems
Hrs	Practice
10	Examples of design of biomedical devices