



BIOMEDICAL INSTRUMENTATION LM	
Enrollment year	2019/2020
Academic year	2019/2020
Regulations	DM270
Academic discipline	ING-INF/06 (ELECTRONIC AND INFORMATION BIOENGINEERING)
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	BIOENGINEERING
Curriculum	Sensoristica e strumentazione biomedica
Year of study	1°
Period	1st semester (30/09/2019 - 20/01/2020)
ECTS	6
Lesson hours	62 lesson hours
Language	Italian
Activity type	WRITTEN TEST
Teacher	BELTRAMI GIORGIO (titolare) - 3 ECTS MATRONE GIULIA - 3 ECTS
Prerequisites	Principles of human physiology. General principles of the interaction between the instrument and the human body. Knowledge of physics, electrical engineering and electronics.
Learning outcomes	The course is made by two parallel paths The first path will examine some types of diagnostic and therapeutic instruments. It describes operating principles, design issues, state of the art and future prospects of further developments, keeping in view the problems of interaction with the human body and patient safety. The second path is dedicated to the design, simulation, fabrication and testing of an electrical circuit aimed to acquire electrocardiac signals

	(ECG). The target is to give to the students all the tools needed to carry out the complete project flow of an electrical circuit, starting from the idea and heading to the fabrication and testing.
Course contents	First path: Respiratory system: measuments and ventilation. Cardiovascular system: The pacemaker (PM) synchronous and asynchronous. The PM-adapting frequency. The electrodes and the power of the PM. Defibrillators: the external defibrillators in alternating current and direct current. The cardioverter. Implanted defibrillators. Infusion pumps. Ultrasonic flowmeters. Medical robots Second path: Design: choice of active and passive components. design of amplification stages, filters, feedback loops and power rails starting from specs and constraints (signal dynamics, noise and linearity). Simulation: professional software (Orcad CIS) for simulation (DC, AC and transient). PCB fabrication: PCB layout with Orcad Layout and fabrication. Components soldering. Testing through STM32 or Arduino and Matlab. Set of acquisitions for final verification.
Teaching methods	Lectures (hours/year in lecture theatre): 24 Practical class (hours/year in lecture theatre): 42 Practicals / Workshops (hours/year in lecture theatre): 0
Reccomended or required readings	Slides given out through KIRO online platform Notes taken during lessons Material and handouts from teachers
Assessment methods	Written test and practical test
Further information	-
Sustainable development goals - Agenda 2030	\$lbl_legenda_sviluppo_sostenibile