



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Promozione della Salute, Materno-Infantile, di Medicina Interna e Specialistica di Eccellenza "G. D'Alessandro"		
ACADEMIC YEAR	2022/2023		
BACHELOR'S DEGREE (BSC)	MIDWIFERY (QUALIFYING FOR PROFESSIONAL PRACTICE)		
INTEGRATED COURSE	PHYSICS AND COMPUTER SCIENCE- INTEGRATED COURSE		
CODE	10729		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	FIS/07, INF/01		
HEAD PROFESSOR(S)	ABBENE LEONARDO	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)	ABBENE LEONARDO	Professore Associato	Univ. di PALERMO
	TAORMINA VINCENZO	Ricercatore a tempo determinato	Univ. di PALERMO
CREDITS	7		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	TAORMINA VINCENZO Monday 11:00 14:00 Dipartimento di Matematica e Informatica (stanza 222)		

DOCENTE: Prof. LEONARDO ABBENE

PREREQUISITES	basic knowledge of algebra, geometry, and trigonometry
LEARNING OUTCOMES	Knowledge and understanding: organic knowledge of the fundamental laws of Newtonian mechanics, hydrodynamics, classical thermodynamics, electromagnetism and computer science. Applying knowledge and understanding: The student will develop the capability to describe the physical phenomena analytically and to apply them to medicine. Making judgments: students will be able to recognize and classify physical processes, to independently choose the best strategy for the resolution of physical problems and the laws to apply. The student will be able to critically evaluate the results obtained. Communication: Special care will be dedicated to the acquisition of a rigorous scientific language. The student will be able to articulate clearly and concisely the fundamental laws, pinpointing the connections with the other courses. Lifelong learning skills: the students will acquire a method for the study of physical processes which will be useful in subsequent applications to medicine. In particular, they will know how to describe the observed phenomena in quantitative terms, by adopting appropriate physical quantities. They will also be able to decompose complex phenomena into their elementary terms and will interpret them, by using the laws of classical physics.
ASSESSMENT METHODS	The oral exam consists on a minimum of two/three questions on the course program. The student must demonstrate, with adequate language skills, his knowledge and understanding of the course program. The evaluation criteria are as follows: i) Excellent (30-30 cum laude): excellent knowledge and understanding of the topics, excellent language skills, advanced capability of applying the notions acquired for problem solving; ii) Very good (26-29): good knowledge of the course program and good language skills, good capability of applying the notions acquired for problem solving; iii) Good (22-25): good knowledge of the course program, but without a deep understanding of all its aspects, limited capability of independently applying the notions acquired for problem solving iv) Fair (18-21): modest understanding and minimum basic knowledge of the course program, difficulties in the resolution of the exercises, limited language skills; v) Poor: lack of understanding of basic subjects, limited knowledge of the course program.
TEACHING METHODS	Lectures and exercises.

**MODULE
APPLIED MEDICAL PHYSICS**

Prof. LEONARDO ABBENE

SUGGESTED BIBLIOGRAPHY

- F. Borsa, A. Lascialfari: Principi di Fisica per indirizzo biomedico e farmaceutico. II edizione. Edises. ISBN 978 88 7959 816 3.

- D. Scannicchio, E. Giroletti. Elementi di Fisica Biomedica. Edises. ISBN: 9788879598873.

AMBIT	10303-Scienze propedeutiche
INDIVIDUAL STUDY (Hrs)	60
COURSE ACTIVITY (Hrs)	40

EDUCATIONAL OBJECTIVES OF THE MODULE

The aim of this course is to provide an overview of the physical laws concerning the classical physics (mechanics of solids and fluids, thermodynamics and electromagnetism). Special emphasis is given to the application of the scientific approach in problem solving. The educational goal concerns the ability of the students to solve simple problems of classical physics, to apply the general scientific methodology to solve problems and to investigate particular medical applications.

SYLLABUS

Hrs	Frontal teaching
1	Physical quantities and measurements: physical quantities, dimensional analysis, conversion of units, vector and scalar quantities.
3	Kinematics: position, velocity and acceleration, motion in one-two dimensions, circular and harmonic motions.
4	Dynamics of solids: forces, laws of dynamics, viscous forces and sedimentation, centrifugal force and centrifugation.
2	Statics and medical applications.
2	Work, energy and linear momentum.
5	Statics and dynamics of fluids. Applications to the blood flow and the human circulatory system.
6	Thermodynamics: first law of thermodynamics, ideal and real gases, second law of thermodynamics
10	Electromagnetism: electrostatics, electric current, magnetic field, variable electric and magnetic fields.
3	Oscillations and Waves: sound waves, ecography, electromagnetic waves, radiation and matter.
Hrs	Practice
4	Exercises and problems

MODULE COMPUTER SCIENCE

Prof. VINCENZO TAORMINA

SUGGESTED BIBLIOGRAPHY

SC: D. Sciuto, G. Buonanno, L. Mari; Introduzione ai sistemi informatici 4/ed, McGraw-Hill.

EX: A. Brogi, A. Martinelli, V. Gervasi, P. Manghi, A. Fabrizio, G. Pacini; Il foglio elettronico per Medicina e Farmacia, Collana IT4PS, McGraw-Hill.

AMBIT	10315-Scienze interdisciplinari
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30

EDUCATIONAL OBJECTIVES OF THE MODULE

The course proposes the fundamental notions of computer science both from the theoretical point of view and from the applicative point of view.

SYLLABUS

Hrs	Frontal teaching
3	Presentation of the course, introduction, information, definition of computer science and telecommunications, information processing and the computer, hardware and software, basic and application software, the operating system and its functions.
3	Information representation, positional numbering systems, binary encoding, ASCII / UNICODE encoding, binary / decimal and decimal / binary conversion, representation of negative numbers and real numbers, representation of multimedia data, conversion exercises.
3	Von Neumann architecture, hardware components, Input / Output devices, main characteristics of computer memories, mass memory (hard disk, optical, SSD), RAM and ROM, cache memory and memory hierarchy.
3	Von Neumann architecture CPU and fetch-decode-execute cycle, BUS, computer performance, algorithms and programs, instructions, representation of algorithms, control structures, programming language (machine, assembler, high level).
3	Computer networks, telecommunication definition, mainframe-terminale vs client-server architecture, the services offered by a network, network infrastructures, transmission media, network taxonomy, network types, circuit and packet switching.
3	Layered architecture of a set of protocols, ISO / OSI and TCP / IP models, IP address and router, Internet and World Wide Web (WWW), the browser, http protocol, notion of Hypertext and HTML language, e-mail, numeric and symbolic addresses, DNS service, IT security (Ransomware attacks, phishing, etc.).
Hrs	Workshops
12	Laboratory: the spreadsheet (formatting, conditional formatting, statistical logical mathematical formulas, data analysis and graphing, sorts, filters); Elements of medical statistics and practical application in obstetrics, screening studies of clinical cases with confusion matrix, measures of specificity and sensitivity