UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Biomedicina, Neuroscienze e Diagnostica avanzata
ACADEMIC YEAR	2019/2020
BACHELOR'S DEGREE (BSC)	SPEECH THERAPY
INTEGRATED COURSE	PHYSICS AND STATISTICS - INTEGRATED COURSE
CODE	19651
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	FIS/07, MED/01
HEAD PROFESSOR(S)	MICCICHE' SALVATORE Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	MICCICHE' SALVATORE Professore Ordinario Univ. di PALERMO MATRANGA DOMENICA Professore Ordinario Univ. di PALERMO
CREDITS	6
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	1° semester
ATTENDANCE	Mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**MATRANGA DOMENICA** Friday 12:00 13:30 Stanza della docente, Dipartimento di Promozione della Salute, Materno-Infantile, Medicina interna e specialistica di eccellenza "G. D'Alessandro", Via del Vespro, 133, piano terra **MICCICHE' SALVATORE** Tuesday 15:00 17:00 Dipartimento di Fisica e Chimica, Viale delle Scienze, Ed. 18, Studio del docente. Gli studenti sono pregati di iscriversi tramite portale UNIPA. \\ Department of Physics and Chemistry, Viale delle Scienze, Ed. 18, Lecturer's office. Students are requested to register through the UNIPA portal.

DOCENTE: Prof. SALVATORE MICCICHE'

PREREQUISITES	The prerequisites are those required at national level in order to access to Courses for Health Professions. In fact, to be admitted to the course of Speech Teraphy,
LEARNING OUTCOMES	Knowledge and understanding To know and to understand the basic principles of physics of biological systems, Knowledge and understanding of descriptive statistics methodologies, probability calculus and measurement of accuracy of diagnostic tests. Acquire a specific language of the disciplines of applied physics and medical statistics. Applying knowledge and understanding The student must have full knowledge of the basic principles of physics and medical statistics, and must be able to know how to choose the instrumental technique more suitable for a physiological parameter measurement. He must know how to evaluate the accuracy of the measurement of a physiological parameter. He must be able to assess the physical and biochemical principles that underlie certain physiological mechanisms and their relevance for diagnostic purposes. Finally, the student must know how to apply basic concepts of physics and biochemistry to practical examples and to problem-solving. Students will also be able to apply the acquired knowledge to read and to do critical appraisal of the most important scientific literature in their professional field, and will have the capacity for analysis, synthesis and argumentation and critical and linking skills, with reference to the topics dealt with. They will understand the basic concepts of medical statistics and use them to solve problems. Making Judgments Being able to evaluate and integrate independently the acquired knowledge in physics and biochemistry in the study of organisms and in particular human ones. Communication skills Ability to correctly describe the physical principles underlying a biomedical and biological phenomenon, presenting in a clear and rigorous way the hypothesized model, the mathematical procedure used and the results obtained. Ability to correctly describe the characteristics of a statistical population or sample and to communicate the statistical methodology used for data analysis. Learning skills Capacity to deepen, not in a notional way but rather with a critical and quantitatively founded approach, the concepts presented during the course, even through the study of different texts. Ability to take into account the approximations on which a physical model is based, and therefore of its limitations in effectively describe the biological and biomedical processes. Ability to develop self learning capacities in the biomedical field, in order to continue studying independently.
ASSESSMENT METHODS	The examination consists of a written test that may be followed by an oral test. The written test will consist of multiple-choice and open response tests. The tests will cover all parts of the program. This test aims to assess whether the student has knowledge and understanding of the topics. It is passed if the candidate scores at least 15/30. During the oral examination, the candidate will have to answer questions posed orally on all parts of the program. This check aims at assessing whether the student has knowledge and understanding of the topics and has acquired interpretative and communicative skills. The oral test is compulsory if the written test score is less than 18/30. The oral examination is at the discretion of the Commission if the written test score exceeds 18/30. It may be requested by the student only if he/she has obtained a score higher than 18/30 in the written test. The final evaluation will be graded based on the following scale: A) Excellent knowledge of teaching content; the student demonstrates high analytic-synthetic capacity and is able to apply the knowledge to solve highly complex problems (score 30, 30L; Excellent) B) Excellent knowledge of teaching content and excellent properties of language; students demonstrate analytical and synthetic skills and able to apply their knowledge to solve problems of medium complexity and, in some cases, even higher (score 27-19; Very Good) C) Good knowledge of teaching content and good properties of language; the student is able to apply knowledge to solve problems of medium complexity (score 24-26; Good)

	D) Satisfactory knowledge of teaching content, in some cases limited to the main topic; acceptable ability to use the specific language of the discipline and independently apply the knowledge gained (score 21-23; Satisfactory) E) Minimum knowledge of teaching content, often limited to the main topics; modest ability to use the specific language of the discipline and independently apply the knowledge acquired (score 18-20; Sufficient) F) Do not have an acceptable knowledge of the main teaching content; very little or no ability to use the specific language of the discipline and independently apply the acquired knowledge (score 1-17; Fail)
TEACHING METHODS	Lectures in classroom. During the lectures elementary concepts of physics and medical statistics are taught. Lessons are given through lectures and exercises, also with the help of information technology and slides that can be downloaded from the UNIPA portal.

MODULE
APPLIED MEDICAL PHYSICS

Prof. SALVATORE MICCICHE'

SUGGESTED BIBLIOGRAPHY

D. Scannicchio
Fisica biomedica
Edises, Napoli

E. Ragozzino,
Elementi di Fisica Per studenti di scienze biomediche,
EdiSES, Napoli, 1998.

AMBIT	10318-Scienze propedeutiche
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30

EDUCATIONAL OBJECTIVES OF THE MODULE

- To have a good basic knowledge about different physical phenomena at the root of a biomedical and biological phenomenon.
- Acquire a certain familiarity with the scientific method of investigation and, in particular, with the modeling of biomedical and biological real problems.
- Acquiring skills to critically evaluate the physical models used, identifying their operational benefits and limitations.
- Have adequate understanding of mathematical tools as well as the capacity to use them.

SYLLABUS

Hrs	Frontal teaching
2	Introduction to the course. Primitive and derived physical quantities. the Unit systems. Dimensional equations . Scalar and Vectorial physical quantities. Vectors.
3	Sum and difference of vectors, scalar and vector product. Significant digits. Brief notes on the Theory of errors. Kinematics: space, speed and acceleration. Uniform rectilinear motion and uniformly accelerated motion. Time Law and time diagrams. Brief notes on the uniform circular motion.
2	The First Principle of dynamics. Mass definition, the Second Principle of dynamics. Types of forces: weight force, elastic force, motion of an object in free fall. Projectile motion. Strength of static and dynamic friction.
3	Work of a force, kinetic energy theorem, power. Conservative forces, conservation of energy theorem. Statics of the human body. Size of the vertebrae. Speed in prey and racing animals.
2	Physical quantities of fluid dynamics: pressure and density. Ideal fluids: Stevin's law, Archimedes' principle, Principle of Communicating Vessels.
2	Ideal Fluid Dynamics: Equation of Continuity. Bernoulli's theorem. Stenosis. Aneurysm.
2	Real fluids: Viscosity, Poiseuville Law, hydrodynamic resistance. Dynamics of real fluids: notes on laminar and turbulent motion.
2	Transport in viscous regime: Stokes Law, the erythrocyte sedimentation speed, centrifuges.
2	Electric charges, electric currents and magnetic phenomena. Fora of Coulomb and Fora of Biot-Savart. Resistors, Capacitors, Inductances. Ohm's law. RC circuits. RLC circuits.
2	Waves and their characteristics: amplitude, velocity, wavelength and period. Wave equation. Transverse and longitudinal mechanical waves. Energy of mechanical waves. Superposition of waves. Refraction and reflection. Diffraction (basic concepts).
2	Maxwell equations. Electromagnetic waves. Electromagnetic spectrum. Energy of Electromagnetic waves. Photons. Superposition of waves. Refraction and reflection. Diffraction (basic concepts).
2	Doppler effect. Doppler velocimetry. Echography.
2	The sound and its propagation. Physical properties of the sound. Stethoscope.
2	Sound perception. Unit of measurement of sound pressure (decibel). Spectral deconposition of sound waves. Acoustic impedance. Characteristic impedance of the middle ear.

MODULE
MEDICAL STATISTICS

Prof.ssa DOMENICA MATRANGA

SUGGESTED BIBLIOGRAPHY	
Libro di testo Triola MM Triola MF, Statistica per le discipline biosanitarie, Pearson	
AMBIT	10318-Scienze propedeutiche
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30
EDUCATIONAL OBJECTIVES OF THE MODULE	
The course is aimed to introduce the statistical methodology useful to the skills of the health professional. Students will be introduced to the elementary concepts of descriptive statistics, probability calculation and measurement of accuracy of diagnostic tests.	

SYLLABUS

Hrs	Frontal teaching
3	Sources of health data
2	Basic concepts: qualitative and quantitative characters, discrete and continuous characters, scales of measurement: nominal, ordinal, intervals and ratio
2	Data presentation: frequency and quantity distributions. Graphical representations
4	Measures of mean and variability with exercises
4	Elements of probability theory. Bayes Theorem. Measures of accuracy of diagnostic tests. Roc Curves
3	Theoretical distributions: Gauss and Binomial distribution, with exercises
2	Central Limit Theorem. Sample distributions of sample mean, with exercises
2	Statistical estimate of the mean
2	Statistical tests of significance for the mean

Hrs	Practice
2	Practice on the use of health databases
4	Practice on preparation of tables and graphics to describe and summarize data