



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Matematica e Informatica		
<b>ACADEMIC YEAR</b>	2018/2019		
<b>BACHELOR'S DEGREE (BSC)</b>	COMPUTER SCIENCE		
<b>INTEGRATED COURSE</b>	PHYSICS		
<b>CODE</b>	03245		
<b>MODULES</b>	Yes		
<b>NUMBER OF MODULES</b>	2		
<b>SCIENTIFIC SECTOR(S)</b>	FIS/07		
<b>HEAD PROFESSOR(S)</b>	MANTEGNA ROSARIO	Professore Ordinario	Univ. di PALERMO
	NUNZIO		
<b>OTHER PROFESSOR(S)</b>	MANTEGNA ROSARIO	Professore Ordinario	Univ. di PALERMO
	NUNZIO		
	MICCICHE' SALVATORE	Professore Ordinario	Univ. di PALERMO
<b>CREDITS</b>	12		
<b>PROPAEDEUTICAL SUBJECTS</b>			
<b>MUTUALIZATION</b>			
<b>YEAR</b>	1		
<b>TERM (SEMESTER)</b>	Annual		
<b>ATTENDANCE</b>	Not mandatory		
<b>EVALUATION</b>	Out of 30		
<b>TEACHER OFFICE HOURS</b>	<p><b>MANTEGNA ROSARIO</b> <b>NUNZIO</b> Tuesday 15:00 17:00 Studio del docente presso l'Edificio 18 di Viale delle Scienze previa comunicazione email all'indirizzo rosario.mantegna@unipa.it Professor's office located at Building 18 in Viale delle Scienze upon previous email agreement to rosario.mantegna@unipa.it</p> <p><b>MICCICHE' SALVATORE</b> 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.</p>		

DOCENTE: Prof. ROSARIO NUNZIO MANTEGNA

<b>PREREQUISITES</b>	Mathematical concepts typically acquired in high schools, including trigonometry and logarithms. Knowledge of basic concepts of mathematical analysis such as derivatives and integrals is not necessary although useful.
<b>LEARNING OUTCOMES</b>	<p>Knowledge and ability to understand</p> <ul style="list-style-type: none"><li>- Acquisition of concepts and laws of classical physics. Ability to apply physics laws to the solution of physics problems.</li></ul> <p>Ability to apply knowledge and understanding</p> <ul style="list-style-type: none"><li>- Ability to solve problems of Physics and also to extend the scientific analysis to wider contexts and to apply the scientific method to the solutions of the different problems.</li></ul> <p>Autonomy of judgment</p> <ul style="list-style-type: none"><li>- A critical approach is stimulated in the learning of the various concepts and in the resolution of Physics problems, comparing, where possible, different approaches or methodologies to a solving procedure, possibly discarding the less suitable ones or, where applicable, the inappropriate ones.</li></ul> <p>Communicative skills</p> <ul style="list-style-type: none"><li>- Students are invited to interact during the lesson, exposing their evaluation and their solution to the discussed topic.</li></ul> <p>Learning skills</p> <ul style="list-style-type: none"><li>- The autonomous approach to the written text, its analysis and use is stimulated. All skills are carefully evaluated during the exam.</li></ul>
<b>ASSESSMENT METHODS</b>	<p>The final assessment consists of a written test and an oral test. The written test concerns the resolution, without the aid of textbooks or notes, of some problems concerning some of the main laws of classical physics.</p> <p>The written examination allows to verify the degree of knowledge of the physical laws object of the teaching. In particular, we highlight the ability to analyze a physical phenomenon and its mathematical systematization, as well as the ability to obtain quantitative results.</p> <p>The oral examination consists of an interview concerning the enunciation and discussion of the studied physical laws and their use in solving problems proposed to the candidate. This test makes it possible to evaluate not only the candidate's knowledge and his ability to apply them, but also the possession of properties of scientific language and of clear and direct exposure skills.</p> <p>The final evaluation will be obtained by averaging the assessments of the written and oral tests, also taking into account any ongoing tests. It, appropriately graded, will be formulated on the basis of the following conditions:</p> <ol style="list-style-type: none"><li>a) Basic knowledge of the studied physical laws and limited ability to apply them autonomously, sufficient capacity to analyze the presented phenomena and to show the procedures followed (grade interval 18-21);</li><li>b) Good knowledge of the studied physical laws and ability to apply them autonomously to situations similar to those studied, discrete ability to analyze the presented phenomena and to show the procedures followed (grade interval 22-25);</li><li>c) In-depth knowledge of the studied physical laws and ability to apply them to each physical phenomenon proposed, even with some hesitation, good ability to analyze the presented phenomena and to show the procedures followed (grade interval 26-28);</li><li>d) In-depth and widespread knowledge of the studied physical laws and the ability to apply them promptly and correctly to each proposed physical phenomenon, excellent ability to analyze the presented phenomena and excellent communication skills (grade interval 29-30L).</li></ol> <p>At the end of each of the two units in which the course is divided, two tests will be carried out.</p> <p>The "in itinere" tests are held in the periods provided by the educational calendar or during the examination periods. The procedures for conducting and evaluating the tests are the same as those of the final examination, with the only difference that they will only deal with the part of the program carried out in the unit. The passing of both tests with a minimum grade of 15/30 allows direct access to the oral examination. The students failing to pass the tests will take the written and oral exam scheduled according to the academic calendar.</p>
<b>TEACHING METHODS</b>	The teaching activity is developed through lessons including sessions of problem solving. This approach aims to test skills of students when applying physical concepts and constitute a useful training to the intermediate test and to the final exam.

**MODULE  
POINT MECHANICS**

*Prof. ROSARIO NUNZIO MANTEGNA*

**SUGGESTED BIBLIOGRAPHY**

Testo di riferimento:

R. A. Serway Jewett – Fisica per scienze ed Ingegneria - Volume primo V edizione - ISBN 978-88-7959-834-7 EdiSES

<b>AMBIT</b>	10701-Attività formative affini o integrative
<b>INDIVIDUAL STUDY (Hrs)</b>	102
<b>COURSE ACTIVITY (Hrs)</b>	48

**EDUCATIONAL OBJECTIVES OF THE MODULE**

The aim of the teaching unit is to introduce the student to the knowledge of the variables, concepts and laws of classical mechanics and thermodynamics.

**SYLLABUS**

Hrs	Frontal teaching
2	Introduction - - Measure and measurement error - Significant digits - Dimensional analysis. Units of measurement and international measurement system.
2	One-dimensional motion - Coordinate reference system - Displacement - Average speed and instantaneous velocity - Motion with constant acceleration.
2	Vectors and scalars - Vector operations - Scalar product - Vector product.
2	Two dimensional motion - Projectile motion - Problem solving.
2	Newton's laws.
2	Forces observed in mechanical systems - Tension and friction- Problem solving.
2	Circular motion - Newton's law of universal gravitation - Fundamental forces and derived forces.
2	Work - Kinetic energy - Potential energy - Conservative force and non-conservative force -
2	Mechanical energy and its conservation - Problem solving
2	Momentum - Impact and impulse - Conservation of energy and momentum in collisions - Elastic collisions in one dimension - Inelastic collisions - Center of mass.
2	Conservation of momentum. Problem solving.
2	Harmonic motion - Spring-mass system - Simple pendulum - Damped harmonic oscillator - Forced damped harmonic oscillator - Resonance.
2	Harmonic motion - Problem solving.
2	Waves - Transverse and longitudinal waves - Energy carried by waves - Wave equation in one dimension.
2	Wave reflection and wave interference - Stationary wave.
2	Waves - Problem solving.
2	Temperature and thermometers - Thermal equilibrium and zero principle of thermodynamics - Ideal gas law and absolute temperature - Kinetic theory of gases.
2	Heat as energy transfer - Specific heat - Latent heat - Thermal expansion - Heat transmission: conduction, convection and radiation.
2	Temperature and heat - Problem solving.
2	First law of thermodynamics - Internal energy - Thermodynamic processes: isothermal, isentropic, isobaric and isochoric.
2	First law of thermodynamics - Problem solving.
2	Heat engines -Second law of thermodynamics - Entropy - Statistical interpretation of entropy.
2	Second law of thermodynamics - Problem solving.
2	Special lecture: The kicked pendulum.

**MODULE  
ELECTROMAGNETISM AND OPTICS**

*Prof. SALVATORE MICCICHE'*

**SUGGESTED BIBLIOGRAPHY**

P. Mazzoldi, M. Nigro, C. Voci. Fisica - volume II. Edises. ISBN: 8879591525.  
R. A. Serway, J. W. Jewett. Fisica per scienze ed Ingegneria - volume secondo. Edises. ISBN: 978-88-7959-824-8.

<b>AMBIT</b>	10701-Attività formative affini o integrative
<b>INDIVIDUAL STUDY (Hrs)</b>	102
<b>COURSE ACTIVITY (Hrs)</b>	48

**EDUCATIONAL OBJECTIVES OF THE MODULE**

The aim of the module is to introduce the study of electric and magnetic phenomena and the study of electromagnetic waves.

**SYLLABUS**

Hrs	Frontal teaching
2	Introduction to the Course. The electric charge and the Coulomb Law,
2	The electric field.
2	The electric potential.
2	The circuitation theorem for the electric field.
2	The Gauss theorem.
2	The energy of the electrostatic field.
2	The Ohm's law.
2	Resistors in series and in parallel.
2	Capacitors.
2	RC circuits.
2	Magnetic phenomena and the Biot-Savart Law.
2	The magnetic field.
2	The circuitation theorem for the magnetic field.
2	The flow theorem for the magnetic field.
2	Lorentz's strength.
2	Solenoids.
2	The Law of Faraday-Lenz.
2	RLC circuits.
2	Maxwell's equations.
2	Maxwell's equations in vacuum.
2	Electromagnetic waves.
2	The energy of electromagnetic waves. The electromagnetic spectrum. Photons.
2	Refraction and reflection of electromagnetic waves.
2	Principle of Huygens, construction of Huygens-Fresnel. Recalls of geometric optics. Diffraction. Interference.