UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Matematica e Informatica
ACADEMIC YEAR	2021/2022
BACHELOR'S DEGREE (BSC)	MATHEMATICS
SUBJECT	PHYSICS 1
TYPE OF EDUCATIONAL ACTIVITY	A
AMBIT	50196-Formazione Fisica
CODE	13867
SCIENTIFIC SECTOR(S)	FIS/01
HEAD PROFESSOR(S)	EMANUELE ANTONIO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	145
COURSE ACTIVITY (Hrs)	80
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	

DOCENTE: Prof. ANTONIO EMANUELE

PREREQUISITES	Prerequisites are the topics of Maths and Physics requested to access the Course. Attendance of Mathematical Analysis 1 is necessary to fully achieve the learning outcomes.
LEARNING OUTCOMES	Knowledge and understanding: organic knowledge of the fundamental laws of Newtonian mechanics, hydrodynamics, and classical thermodynamics; basic knowledge of mechanical waves. Applying knowledge and understanding: The student will develop the capability to describe the physical phenomena analytically and to express the mechanical and thermodynamic processes in terms of simple systems, thus developing appropriate models. 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 of Newtonian mechanics and classical thermodynamics, 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 and further studies. 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	Written and oral exam. The written test is aimed at verifying the capability of the students to solve problems of classical physics by applying the notions acquired. The test consists of 5 exercises (two exercises on kinematics and particle mechanics; one exercise on the mechanics of rigid bodies and systems of particles, one exercise on hydrodynamics, and one on thermodynamics), to be solved in three hours. 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 of the whole exam are as follows: i) Excellent (30-30 cum laude): excellent knowledge and understanding of the topics, excellent language skills, advanced capability of applying (unaided) 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 (unaided) 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 applying (unaided) the notions acquired for problem solving; sufficient language skills; iv) Fair (18-21): modest understanding and minimum basic knowledge of the course program, capability of resolution of the exercises only with help, limited language skills; v) Poor: lack of understanding of basic subjects, limited knowledge of the course program. A pass result of the midterm written exam (evaluated according to the aforementioned criteria) will allow the students to give only the oral exam in every exam session of the academic year.
EDUCATIONAL OBJECTIVES	Deep knowledge and understanding of classical physics (mechanics, hydrodynamics, and thermodynamics); knowledge of the scientific method; ability to address and discuss problems of classical physics (mechanics, hydrodynamics, and thermodynamics).
TEACHING METHODS	Lectures and exercises. There is 1 midterm (not compulsory) written test. The test (lasting two hours) consists of 3 exercises (two exercises on kinematics and particle mechanics; one exercise on the mechanics of rigid bodies and systems of particles.The student can directly access the final oral exam in case of positive evaluations of the intermediate written tests.
SUGGESTED BIBLIOGRAPHY	- R.A. Serway, R.Jewett, Fisica per Scienze ed Ingegneria, Vol. I, V Edizione (2015), Edises. - S. Focardi, I. G. Massa, A. Uguzzoni, M. Villa, Fisica Generale - MECCANICA E TERMODINAMICA, II Edizione, Casa Editrice Ambrosiana, 2014. Testi di consultazione: - E. Fermi, Termodinamica, Bollati Boringhieri Editore

SYLLABUS

Hrs	Frontal teaching
6	Physical quantities, definition and measures. Scalars and vectors. 1-3 dimensional particle kinematics.
8	Newton's laws and particle mechanics with applications. Newton's law of universal gravitation. Inertial and non-inertial systems

SYLLABUS

Hrs	Frontal teaching
6	Work and work-energy theorem. Mechanical energy. Conservative forces and potential energy.
6	Impulse and impulse-momentum theorem, momentum, angular momentum. Conservation laws of momentum and angular momentum. Two-body unidimensional collisions. Small oscillations.
6	Kinematics and dynamics of particles systems and rigid bodies. Rigid body statics
6	Ideal fluid hydrostatics. Ideal fluids hydrodynamics. Real fluids.
6	Zeroeth law of thermodynamics and thermal equilibrium. Thermometry and calorimetry. Kinetic theory of ideal gas.
6	Thermodynamic processes. First law of thermodynamics. heat engines, Carnot cycle and Carnot theorem.
4	Second law of thermodynamics and entropy. Boltzmann statistical definition of entropy.
2	Introduction to mechanical waves

Hrs	Practice
12	Solving excercises and problems on kinematics and mechanics of a particle, of rigid bodies and of particle systems.
4	Solving excercises and problems on hydrodynamics
8	Solving excercises and problems on thermodynamics