UNIVERSITÀ DEGLI STUDI DI PALERMO

SCHOOL	POLYTECHNIC SCHOOL		
ACADEMIC YEAR	2016/2017		
FIRST CYCLE COURSE	CIVIL AND BUIDING ENGINEERING		
INTEGRATED COURSE	PHYSICS 1		
CODE	03295		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	FIS/03, FIS/01		
HEAD PROFESSOR(S)	MANGIONE ALFONSO	Professore a contratto	Univ. di PALERMO
OTHER PROFESSOR(S)	MANGIONE ALFONSO	Professore a contratto	Univ. di PALERMO
CREDITS	9		
PROPAEDEUTICAL SUBJECTS			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS			

DOCENTE: Prof. ALFONSO MANGIONE

TEACHING METHODS	Lectures and numerical exercises carried out in class.
ASSESSMENT METHODS	Written test and subsequent oral exam.
LEARNING OUTCOMES	Knowledge and understanding The student at the end of the course will have knowledge of the basic laws of mechanics and models that describe it. In particular will have understood and will know the problems regarding the mechanics of the material point, the systems of material points and rigid bodies. Applying knowledge and understanding: The student will be able to use the laws of physics and the mathematical equations that describe them to solve simple mechanical problems. You will be able to outline a physical phenomenon by identifying the evolution and estimating the values of the physical quantities involved. The student will finally be able to assess the validity and the limits of the laws and of the models used. Making judgments The student will be able to observe natural phenomena and recognize the laws that govern them; You will be able to schematize a process, to identify the dominant causes that determine its evolution and to estimate the values of the physical quantities involved. The student will be able to determine whether a given problem must use a "dynamic" approach (analysis of the system in terms of forces) or, otherwise, an "energy" approach (analysis of the system through the application of the principle of conservation of 'energy). communication skills The student will have acquired the ability to exhibit consistently and properties of language problems regarding course content, knowing grasp the connections with the topics covered in the courses taken earlier or in the same semester. It will be able to hold conversations on topics of mechanics, referring to the principles and laws on which it is based and by qualitative considerations on specific issues. learning ability The student will have learned the basic laws of mechanics and the typical methods of the physical sciences to be applied to engineering problems, critically and independently.
PREREQUISITES	Basic knowledge of mathematics and physics

MODULE
MODULE I

Prof. ALFONSO MANGIONE

SUGGESTED BIBLIOGRAPHY

J.Serway, FISICA per Scienze ed Ingegneria, Volume I , 4° Edizione, EdiSES- Napoli
Mazzoldi-Nigro-Voci, Elementi di FISICA" Meccanica e Termodinamica, EdiSES-Napoli
Halliday-Resnick-Krane, FISICA vol.I, Editrice Ambrosiana- Milano

AMBIT	50280-Fisica e chimica
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54

EDUCATIONAL OBJECTIVES OF THE MODULE

To master the basic principles of mechanics and thermodynamics. Solve simple mechanical exercises.

SYLLABUS

Hrs	Frontal teaching
2	Measurement and physical quantities: The physics and the scientific method. Measurement of a physical quantity. direct and indirect measurement. fundamental and derived quantities. Systems of measurement units and dimensional equations. The International System.
2	Vector algebra: scalar and vector quantities. Decomposition and composition of vectors: geometric and analytical method. Scalar and vector products. Derivative of a vector. Moments of applied vectors. Position vector and Coordinate Systems Vector
6	Kinematics of a particle: Reference system. The law of motion of a material point. Equation of the trajectory. Rectilinear motion. Speed and acceleration in rectilinear motion. Uniform rectilinear motion and uniformly accelerated. free fall motion of bodies. unsteady motion. simple harmonic motion. Rectilinear motion damped exponentially. Motion of a particle with trajectory lying in a plane. Speed and acceleration in the plane motion. Projectile Motion. Uniform circular motion and varied. Angular quantities. Relations between the linear and angular quantities. Motion in 3D space. Composition of motions. Kinematics of relative motions. Relationship between the speed and the accelerations with respect to two reference systems in relative motion. Coriolis acceleration.
6	Dynamics of a particle: Interactions and forces. inertial reference systems. Newton's laws. Constraint reactions. Mass and weight. Applications of Newton's laws. Friction forces. Elastic forces and Hooke's law. Classification of forces. Impulse and momentum. Dynamics of circular motion. Central forces. Momentun. Theorem of the linear and angular momentum. Dynamics laws in a non-inertial reference frame.
6	Work and Energy: Work of a force. kinetic energy and energy theorem (or kinetic energy). Conservative force fields. Potential energy. non-conservative forces. Mechanical energy and its conservation. The law of energy conservation. force-energy potential relationship. The power.
7	Dynamics of particle systems: Center of mass. Theorem of motion of center of mass. Principle of conservation of momentum. Theorem of angular momentum. Conservation of angular momentum. Theorem of kinetic energy. Reference frame on the mass center. Koenig theorems. Systems of parallel forces and center of gravity. Dynamics cardinal equations system. Collisions between particles. variable mass systems.
6	Rigid body dynamics: Degrees of freedom. Kinematics of rigid bodies: translational motions, rotational motions with fixed or variable axis. Moment of inertia. Huygens-Steiner theorem. Dynamics of a rigid body with a fixed axis. Kinetic energy of a rigid body. Work of the forces acting on a rigid body. True rolling motion. free rigid body. Conservation laws in the motion of a free rigid body. Collisions between material points and rigid bodies and between rigid bodies. static equilibrium of rigid body.
2	Vibrations: The simple harmonic oscillator. energy considerations on the simple harmonic motion. Pendulum simple and compound. Damped vibrations. forced vibrations.
4	Elements of Thermodynamics and heat transfer

MODULE MODULE II *Prof. ALFONSO MANGIONE*	
SUGGESTED BIBLIOGRAPHY	
J.Serway, FISICA per Scienze ed Ingegneria, Volume I , 4° Edizione, EdiSES- Napoli Mazzoldi-Nigro-Voci, Elementi di FISICA" Meccanica e Termodinamica, EdiSES-Napoli Halliday-Resnick-Krane, FISICA vol.I, Editrice Ambrosiana- Milano	
AMBIT	10653-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	48
COURSE ACTIVITY (Hrs)	27
EDUCATIONAL OBJECTIVES OF THE MODULE	
Applications related to the fundamental principles of mechanics and thermodynamics.	

SYLLABUS

Hrs	Practice
2	Vector algebra.
7	Kinematics of of a single particle
7	Dynamics of a single particle
7	Work, Energy and Power
7	Dynamics of material particles
7	Dynamics of a rigid body.
5	Thermodynamics and heat transfer