Stampare su carta intestata del CdS

General information	
Academic subject	GENERAL PHYSICS I Module A: Kinematics and Dynamics of the material point, systems and rigid bodies Module B: Oscillations; Waves; Fluid dynamics
Degree course	MATERIALS SCIENCE AND TECHNOLOGY L-30
Academic Year	I
European Credit Transfer and Accumulation System (ECTS)	11 (6 mod. A + 5 mod. B)
Language	Italian
Academic calendar (starting and ending date)	Module A: I semester (October 2021 - December 2021) Module B: II semester (March 2022 - May 2022)
Attendance	according to didactic rules

Professor/ Lecturer	
Name and Surname	Silvia Rainò
E-mail	Silvia.raino@uniba.it
Telephone	+39 080 5443174
Department and address	Dipartimento Interateneo di Fisica - Office R77 University Campus Via Orabona 4, I-70125 Bari Italy
Virtual headquarters	Teams channel code: 4hh7len
Tutoring (time and day)	In presence or virtual, days and times agreed with the students after contact by e-mail

---

Syllabus	
Learning Objectives	Obtain the basic knowledge concerning the mechanics of the material point and rigid bodies, oscillations, mechanical waves and fluid dynamics, in order to describe phenomena through quantitative relationships between physical quantities. Reach the ability to describe the behavior of mechanically stressed materials in an elementary way.
Course prerequisites	Elementary algebric calculus - Basic concepts of analytic geometry and trigonometry - Elementary notions of differential and integral calculus
Contents	**Module A:** Introductory concepts - Physical quantities - Vectors - Kinematics of the material point - Relative motions - Dynamics of the material point - Static and dynamic frictional forces - Centripetal force - Resistive forces - Variable mass systems - Mechanical work - Kinetic energy - Power - Kinetic energy theorem - Conservative forces; potential energy ; conservation of mechanical energy - Generalization of energy conservation - Dynamics of rotations: moment of a force; Angular momentum - Elastic and inelastic collisions - Concept of - Dynamics of particle systems - Center of mass - Dynamics of rigid bodies: moment of inertia - Equilibrium of rigid bodies - Competing forces - Pair of forces - Parallel forces - Center of gravity - Levers: genres; mechanical gain. Module B: Dynamics of oscillatory motions: simple harmonic motion; harmonic oscillator; Mathematical pendulum and compound pendulum - Superposition of simple harmonic motions - Damped and forced oscillatory motion - Amplitude resonance and energy resonance - Power transfer - Non harmonic periodic motions - General information on wave propagation - Beats - Stationary waves - Waves in a tightrope - Sound waves - Doppler effect – Shock waves and Mach

	number - Fluids - Fluid statics - Surface tension - Capillarity phenomena - Fluid dynamics - Continuity principle - Bernoulli's theorem - Real fluids: Hagen-Poiseuille law
Books and bibliography	P. Mazzoldi, M. Nigro, C. Voci: Elementi di Fisica (meccanica – termodinamica) – EdiSES II Edizione
Additional materials	The slides of the course, which can constitute a useful outline for the preparation of the exam, will be made available to students on an online platform.

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
275	Module A 32 h Module B 24 h	Module A: 30 h Module B: 30 h	159
ECTS			
11	Module A: 4 ETCS Module B: 3 ETCS	Module A: 2 ETCS Module B: 2 ETCS	

Teaching strategy	
	- Frontal lessons in the classroom using a video projector - Classroom exercises using a video projector and blackboard The teaching will be delivered online (using Microsoft Teams platform), if the conditions determined by the COVID-19 pandemic would require it.
Expected learning outcomes	
Knowledge and understanding on:	○ Knowledge of the basic features related to the study of motions and interactions between bodies and their description through general laws
Applying knowledge and understanding on:	○ Ability to independently recognize the main characteristics of a physical phenomenon and describe it through relationships between physical quantities
Soft skills	• Making informed judgments and choices ○ Ability to independently recognize the main characteristics of a physical phenomenon and describe it through relationships between physical quantities • Communicating knowledge and understanding ○ Ability to explain, with scientific rigor, in a clear way and with appropriate language the topics of the course • Capacities to continue learning ○ Acquire the ability to refine and deepen their knowledge even independently, identifying the appropriate tools to be used for this purpose.

Assessment and feedback	
Methods of assessment	At the end of Module A (January-February 2022) • Partial Written Test for Module A only • Partial Oral Exam for Module A only At the end of Module B (from June 2022): • Partial Written Test for Module B only

	• Partial Oral Exam only for Module B or (from June 2022): • Total Written Test Module A + B • Total Oral Test Module A + B During the semester, class exercises will be proposed to evaluate the level of learning while lessons are ongoing. In the event of a positive evaluation, the ongoing tests will be considered as a substitute for the partial written test of the specific module.
Evaluation criteria	• Knowledge and understanding o A qualitative but precise knowledge of the principles underlying the kinematics and dynamics of the material point, simple systems, rigid bodies and fluids is considered sufficient; o The formal knowledge of the general laws governing the motions and interactions between bodies, the behavior of rigid bodies and fluids is positively evaluated. • Applying knowledge and understanding o The ability to independently recognize the main characteristics of a physical phenomenon is considered sufficient; o The ability to analytically derive the fundamental equations that describe the dynamic behavior of the material point, simple systems, rigid bodies and fluids and to use them appropriately in solving proposed problems is positively evaluated. • Autonomy of judgment o The ability to evaluate the dimensional appropriateness of the relationships between physical quantities is considered sufficient; o The ability to analyze the conceptual correctness of models and relationships between physical quantities is positively evaluated. • Communication skills o The ability to expose the basic principles regarding motions and interactions between bodies, the behavior of rigid bodies and fluids, is considered sufficient; o The ability to exhibit the models that describe the phenomena relating to the dynamics of bodies and fluids with scientific rigor is positively evaluated.xxxxxxxxxxxxxx • Capacities to continue learning o The ability to process the content provided in class and use the tools useful to solve simple problems is considered sufficient. o The ability to deepen one's knowledge, even independently, is positively assessed, identifying the appropriate tools to be used for this purpose.
Criteria for assessment and attribution of the final mark	The final mark, expressed out of thirty, will be the average value of the outcome of the tests of the mod. A and mod. B. For each module, the assessment will take into account the outcome of the written test (or equivalently the ongoing tests) and, to a prevalent extent, the progress of the oral test, in which the mastery of the course topics and the ability to explain them will be assessed. and to connect different parts of the program, using the physical language and the mathematical formalism in an adequate way,

	compatibly with the above criteria.
Additional information	