



COURSE: Principles of Physics			
ACADEMIC YEAR: 2019/20			
TYPE OF EDUCATIONAL ACTIVITY: Basic			
TEACHER: Guido Masiello			
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Language: Italian			
ECTS: 9 = 6+3 (6 lessons, 3 practice)	n. of hours: 90= 60+30 (60 lessons, 30 practice)	Campus: Potenza School of Engineering Program: Techniques for Building and Land Management (L23)	Semester: II

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

- **Knowledge:** Basics of vector algebra, Cinematics and Newton's laws of dynamics for point particle and for system of particles, Energy, Kinetic and Potential Energy, Mechanical Energy Conservation, Conservative and dissipative forces. Elasticity. The harmonic damped and forced oscillator. Statics and dynamics of Rigid Body. Electric fields, electric and electronics devices, Kirchoff laws and d.c. currents.
 - **Skills:** Ability to formalize and solve problems of cinematics, mechanics and electricity. Capability to deal with problems, which require usage of basic concepts of Physics and tools of linear algebra, analytical geometry and calculus.
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PRE-REQUIREMENTS

Basics of algebra, analytical geometry and calculus

SYLLABUS

1. **Measurements and Physics quantities** (6 hours of lessons) Scientific method, System of units, Scalars and vectors, Operations between vectors.
 2. **Kinematics of the Material Point** (6 hours of lessons + 3 hours of practice). Position and displacement vectors, mean and instantaneous velocity vector, mean and instantaneous acceleration vector, one-dimensional motions, plane motions.
 3. **Dynamics of the Point particle** (12 hours of lessons + 6 hours of practice). Inertial frames of reference, Newton's Laws of motion. Examples of force: weight force, elastic force, constraint reactions, friction force. Dissipative phenomena, friction of the medium. Work and energy. Kinetic energy. Conservative forces. Potential energy. The Work-Energy Theorem. Conservation of Mechanical Energy. Harmonic, damped, driven oscillator.
 4. **Dynamics of system of particles** (12 hours of lessons + 6 hours of practice). Center of mass, Internal and External Forces, linear momentum, law of conservation of linear momentum, Collisions and impulse.
 5. **Statics and dynamics of Rigid Body** (12 hours of lessons + 6 hours of practice). Angular Momentum, Torque, Static Equilibrium, Rotational inertia and rotational kinetic energy, Euler's equations, law of conservation of angular momentum.
 6. **Electricity** (12 hours of lessons + 9 hours of practice): Electrical charges and forces; the conservation of charge Electrostatics; Coulomb's law; superposition; Electric potential. The flux of \mathbf{E} ; Gauss' law. Field of a sphere of charge; field lines; equipotential surfaces. Electrical Properties of Matter. Condensers; parallel plates, spherical and cylindrical condensers. Electrostatic Energy. The energy of a condenser. Energy in the electrostatic field Dielectrics: The dielectric constant. Electric Resistance and electric conduction. Ohm's law. Circuits: Ohm and Kirchoff laws.
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TEACHING METHODS

Theoretical lessons for a total of 60 hours. Classroom practical tests for a total of 30 hours. Mock examinations are organized to prepare students for the final, written, examination.

EVALUATION METHODS

Written examination, eventually followed by an oral discussion.



The written examination consists of 5 exercises to be solved in a time of 2.5 hours. Students mark a score of 6 for each correctly solved exercise, otherwise they mark 0. The final mark assigned to each student is the sum of scores. The exam is passed if the total score reach 18. If not, the examination has to be repeated. At the end of the written examination there is an interview for the assessment of the final grade. Students who have marked more than 18 can ask to skip the interview; in that case the final mark is that of the written examination.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Textbooks

- J. Walker, Halliday – Resnick Fondamenti di Fisica, Casa Editrice Ambrosiana
 - Halliday, Resnick, Krane, Fisica 1 e 2, Casa Editrice Ambrosiana
 - P. Tipler, G. Mosca, Corso di Fisica 1 e 2: Meccanica Onde Termodinamica, Zanichelli
 - Gettys W. E., F.J. Keller, M.J. Skove. Fisica classica e moderna. 1 e 2. McGraw-Hill
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INTERACTION WITH STUDENTS

On the very first day of lessons, the teacher organizes the classroom by presenting the main objectives of the course together with textbooks. A list is formed of students who intend to enrol. They are asked to register as students of the course using the dedicated web site.

Tutorial activities and interaction with the teacher are programmed each Wednesday and Thursday, 11 to 13 a.m. Students can interact with the teacher also via e-mail.

EXAMINATION SESSIONS (FORECAST)¹

01/07/2020, 28/07/2020, 02/09/2020, 29/09/2020, 21/12/2020, 28/01/2021, 25/02/2021, 05/05/2021

SEMINARS BY EXTERNAL EXPERTS YES NO

FURTHER INFORMATION

¹ Subject to possible changes: check the web site of the Teacher or the Department/School for updates.