ACADEMIC YEAR: **2019-2020**

COURSE: **PHISICS**

TYPE OF EDUCATIONAL ACTIVITY: Basic

TEACHER: Francesco Di Paola

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Language: Italian

ECTS: 6	n. of hours: 56	Campus: Potenza	Semester: I
- Lessons: 5 - Tutorials/practices: 1	- Lessons: 40 - Tutorials/practices: 16	Dept./School: SAFE Program: Agricultural technology	

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

Contents and knowledge

The course of Physics is a teaching based on the scientific method for the treatment of Newtonian mechanics, thermodynamics, electrostatics and magnetism.

The main objective of the course is to provide students with the foundation for studying and carrying out numerical problems related to all of the debated topics.

The main knowledge provided will be:

- Basic elements of the unit of measurement and dimensional analysis;
- Main elements for vector calculus;
- Knowledge of the unidirectional and bidirectional motion;
- Basic knowledge needed to deal with the energy studies;
- Key features of the dynamics of the point particle;
- Basic knowledge needed to deal with the study of static and dynamic fluids;
- Key Features of Thermodynamics;
- Fundamentals of Electrostatic;
- Fundamentals of magnetism and electromagnetic waves.

Skill

The main skills related to the capacity to apply the knowledge gained will be:

- Analyze the questions related to each topic by schematizing and simplifying the problem;
- Identify a valid reasoning for the resolution of the problem;
- Assessing the various ways to approach the study of the problem;
- Use the laws of physics to develop and resolve the question.

PRE-REQUIREMENTS

For the understanding of the course content, you must have acquired and assimilated the following basic knowledge derived from analytic geometry and trigonometry courses:

- Basic knowledge of geometry;
- Basic knowledge of mathematics;
- Knowledge of the basic concepts on the units of measurement and in particular those relating to the conversion of the same;
- Knowledge of the trigonometric functions, and especially the theorems associated with right triangles and any triangles;
- Mathematical methods for solving equations and systems of grade I and II

SYLLABUS

ECTS 1

Scientific Method (2 hours of lessons)

Grandezze fondamentali e derivate, Sistema Internazionale delle unità di misura, Analisi Dimensionale.

Scalar and vector quantities (4 hours of lessons + 2 hours of practice)

Difference between scalar and vector, unit vector, vectors and operations of sum, difference between scalar and vector product, scalar and vector components.

ECTS 2

Kinematics (8 hours of lessons + 4 hours of practice)

Average and instant velocity and acceleration, constant velocity, Linear uniform motion, Uniformly accelerated linear motion, equation of a falling body, projectile motion, uniform circular motion.

ECTS 3

Dynamic (6 hours of lessons + 4 hours of practice)

Principles of dynamics, gravitational force, normal reaction, voltages, static and dynamic friction force, elastic force, Studio of the inclined plane.

Work and Energy (4 hours of lessons)

Mechanical work of a constant force (Weight Force), work of the elastic force, Kinetic Energy, Potential Energy, Mechanical Energy, Theorem of Lives forces, mechanical energy theorem.

ECTS 4

Fluid Mechanics (6 hours of lessons + 4 hours of practice)

Ideal Fluid, Stevin Law, Principle of communicating vessels, the Pascal principle, Archimedes' principle, Continuity equation, volumetric and mass flow, Bernoulli's Theorem.

ECTS 5

Thermodynamics (6 hours of lessons + 2 hours of practice)

Thermodynamic system, zeroth law of thermodynamics, Heat and Energy, heat capacity, calorimetry, specific heat, First Law of Thermodynamics, thermodynamic Job, Ideal gas, Gay Charles Law, Boyle's Law, The ideal gas law, thermodynamic transformations: Isochore, isobaric, Isothermal, Adiabatic.

ECTS 6

Electrostatic (2 hours of lessons)

Coulomb's law for point charges, electric field and electric potential, capacitors and resistors in series and in parallel, equivalent electrical capacity.

Magnetism (2 hours of lessons)

Magnetic field, Interaction between moving charge and magnetic field, Faraday's law of induction, electromagnetic waves.

TEACHING METHODS

Theoretical lessons 40 hours, Exercitation: 16 hours

EVALUATION METHODS

The aim of the examination is to test the level of achievement of educational targets through the following tests:

Written test based on the resolution of 3 numerical exercises and 3 open-ended questions, with a maximum score of 5/30 for each exercise and question. The written test will last two hours and during the same is not permitted to use handouts, smartphones and PC, with the exception of scientific calculator. To pass the test you must acquire at least a score equal to 18/30.

Oral examination based on two or three questions concerning the various topics of the program to assess the student's ability to link and compare different aspects covered during the course

The final grade is derived from the arithmetic mean between the written test score and the oral examination score.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- D. Halliday, R. Resnick, J. Walker, Fondamenti di Fisica, sesta edizione, casa editrice Ambrosiana;
- Philip R. Kesten, David L. Tauck, Fondamenti di Fisica: Meccanica, Termodinamica, Onde, Elettromagnetismo, casa editrice Zanichelli.
- Guida allo studio e alla soluzione dei problemi, Principi di Fisica, Terza Edizione, Serway & Jewett, Casa Editrice Edises.
- Lecture notes available on the teacher's web site: https://sites.google.com/a/agrariaunibas.net/dipaola/

INTERACTION WITH STUDENTS

At the beginning of the course, the teacher provides educational materials (shared folders) to the students. Simultaneously, he collects a list of students together with name and email.
Student Reception: by appointment at the "docenti a contratto" room located on the 2nd floor of the SAFE school management building, at the Campus Macchia Romana in Potenza.
Prof. Di Paola is also available by email for students' communication (francesco.dipaola@imaa.cnr.it).

EXAMINATION SESSIONS (FORECAST)[1]

Written test:
13/12/2019, 24/01/2019, 21/02/2020, 21/03/2020, 17/04/2020, 22/05/2020, 19/06/2020, 24/07/2020, 18/09/2020, 23/10/2020, 20/11/2020
Oral examination:
20/12/2019, 31/01/2019, 28/02/2020, 28/03/2020, 24/04/2020, 29/05/2020, 26/06/2020, 31/07/2020, 25/09/2020, 30/10/2020, 27/11/2020

[1] Dates may change: please, consult the professor's web page or the Department / School website for updates

FURTHER INFORMATION

Evaluation Committee:
Presidente Prof. Francesco Di Paola
Componente Prof. Giuseppe Altieri
Supplente Prof. Giovanni Carlo Di Renzo
Supplente Dott. Angelo Pace

SEMINARS BY EXTERNAL EXPERTS NO