DIPARTIMENTO DI MATEMATICA INFORMATICA ED ECONOMIA

COURSE/MODULE: Physics, Electromagnetism (Physics module II)			
CADEMIC YEAR: 2019-2020			
TYPE OF EDUCATIONAL ACTIVITY: Basic			
PROFESSOR: Paolo Di Girolamo			
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Language: Italian			
ECTS: (lessons e tutorials/practice) 6	n. of hours: (lessons e tutorials/practice) 24	Campus: Potenza Dept./School: DIMIE Program: Information Sciences and Technologies	Semester: II

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

This course starts the teaching of Physics within the Program of Information Sciences and Technologies and examines the introductory and preliminary elements of Classical Physics. The main objective of the course is to provide the students with the basic information to face the study of Classical Physics.

The primary knowledge provided by the course includes the fundamentals of Classical Physics.

- **Knowledge:** Basics of vector fields and algebra, the four Maxwell laws of Electromagnetism. Electric and Magnetic fields, electric and electronics devices, Kirchoff laws and d.c., a.c. currents. The magnetism of matter: paramagnetism, diamagnetism, ferromagnetism. Magnetic materials and devices. Knowledge of the basic Physics, which governs information technology.
- **Skills**: Ability to formalize and solve problems of Electromagnetism. Capability to deal with problems, which require usage of basic concepts of Physics and tools of linear algebra, analytical geometry and calculus.

PRE-REQUIREMENTS

Physics module I on Newton Mechanics. Additionally, it is highly desired that students attending this course have gained previous background in algebra, analytical geometry and calculus and knowledge of mathematical analysis.

SYLLABUS

- Electric Charge and Electric Field (10 hours teaching+ 2 hours tutorial and practice)
  - Electrical charges and forces; the conservation of charge Electrostatics; Coulomb's law; superposition; Electric potential. The flux of **E**; Gauss' law. Field of a sphere of charge; field lines; equipotential surfaces. The electric dipole;
- Electrical Properties of Matter (8 hours teaching + 2 hours tutorial and practice)
  - Condensers; parallel plates, spherical and cylindrical condensers. Electrostatic Energy. The energy of a condenser. Energy in the electrostatic field Dielectrics: The dielectric constant; the electrostatic equations with dielectrics; Fields and forces with dielectrics; Molecular dipoles.
- Current and Circuits (4 hours teaching + 2 hours tutorial and practice)
  - Circuits: Ohm and Kirchoff laws. RC circuits.
- Magnetic Field (12 hours teaching + 2 hours tutorial and practice)
  - Magnetostatics: the magnetic field; electric current and the magnetic force on a current; the magnetic field of steady currents; Ampère's law; the magnetic field of a straight wire and of a solenoid; atomic currents. The flux of **B.** The Laws of Induction;
- The Physics of Induction and Magnetic Devices (5 hours teaching +1 hours tutorial and practice)
  - The physics of induction; Alternating-current generator; Self-inductance; Inductance and magnetic energy. Induced Currents Motors and generators; inductances; Forces on induced current Electrical technology. RL circuits. The Maxwell Equations. Principles of Magnetism of Matter, the field **H.** Diamagnetism, paramagnetism and ferromegnetism; transformers

TEACHING METHODS

Theoretical lessons (39 hours) and exercises (9 hours)

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EVALUATION METHODS

Written examination followed by an oral discussion. The written examination consists of 4 exercises to be solved in a time of 2.5 hours. The exam is passed if the total score reach 14. 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. The examination is integrated with that concerning the first module on Physics, Kinematics and Dynamics. A final mark is formed, which applies to both modules. The final mark assigned to each student is the sum of scores of the two modules divided by two.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- o D. Halliday, R. Resnick. Fondamenti di fisica. Ed. Ambrosiana.
- J. Walker, Halliday, Resnick Fondamenti di Fisica , Casa Editrice Ambrosiana
- Halliday, Resnick, Krane, Fisica 2, Casa Editrice Ambrosiana
- P. Tipler, G. Mosca, Corso di Fisica 2: Elettricità Magnetismo e Ottica, Zanichelli

INTERACTION WITH STUDENTS

During the introductory lecture, after describing the educational goals of the course, the program and the evaluation methods, the Professor provides the students with details on the suggested text books. During this introductory lecture, the Professor also files the list of students attending the course, including first and last name, matriculation number, email address and mobile phone number for each student, in order to allow him to contact the students for any communication related to the course. The Professor provides the students with his email address and mobile phone number to be used by the students to contact him.

Receiving hours: Wednesday from 15:00 to 16:00 and Thursday from 15:00 to 16:00 in the Professor office, i.e. room 33 ter, fifth floor, Engineering School Building.

EXAMINATION SESSIONS (EXPECTED)[1]

24/06/2020,15/07/2020,23/09/2020,21/10/2020,17/12/2020

SEMINARS BY EXTERNAL EXPERTS YES □ NO x

FURTHER INFORMATION

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