BACHELOR 'S PROGRAMME
1st YEAR OF STUDY, 2nd SEMESTER

COURSE TITLE	ELECTRICITY AND MAGNETISM
COURSE CODE	
COURSE TYPE	full attendance
COURSE LEVEL	1st cycle (bachelor's degree)
YEAR OF STUDY, SEMESTER	1st year of study, 2nd semester
NUMBER OF ECTS CREDITS	6
NUMBER OF HOURS PER WEEK	7 (3 lecture hours + 4 seminar hours)
NAME OF LECTURE HOLDER	PhD. Alexandru STANCU
NAME OF SEMINAR HOLDER	PhD. Alexandru STANCU (seminar), Assoc. Dorin CIMPOESU (laboratory), Lecturer Radu TANASĂ (laboratory)
PREREQUISITES	Advanced level of English language

A GENERAL AND COURSE-SPECIFIC COMPETENCES

General competences:

→ Identifying roles and responsibilities in a team and applying effective relationship and work techniques within the team.

Course-specific competences:

→ C1.1 Deduction of working formulas for physical size calculations using appropriate principles and laws of physics.
→ C1.2 Description of physical systems using specific theories and tools (experimental and theoretical models, algorithms, schemes, etc.)
→ C1.3 Apply the principles and laws of physics in solving theoretical or practical problems, under the conditions of qualified assistance.
→ C1.4 Appropriate application of analysis methods and criteria for choosing the appropriate solutions to achieve the specified performance.
→ C1.5 Comparative assessment of the theoretical results offered by the literature and of an experiment carried out within a professional project.
→ C3.1 Appropriate use in the analysis and processing of physics-specific data of numerical and mathematical statistics
→ C3.2 Drawing of graphs and reports for the purpose of explaining and interpreting physical results obtained by statistical methods.
→ C3.3 Correlation of statistical analysis methods with date problems (measurements / calculations, data processing, interpretation).
→ C3.4 Assessing the confidence of the results and comparing them with bibliographic data or theoretically calculated values, using statistical validation methods and / or numerical methods.
→ C3.5 Elaboration of a project using the principles and methods of mathematical statistics and / or numerical methods in a given physical context
→ C4.1 Applying knowledge in the field of physics both in concrete situations in related fields and in experiments using standard laboratory equipment.
→ C4.2 Explaining and interpreting physical phenomena by formulating hypotheses and operationalizing key concepts and the proper use of laboratory equipment.
→ C4.3 Identification of Physical and Informational Methods, Techniques and Instruments; designing physical experiments using specific laboratory methods and equipment.
→ C4.4 Critical evaluation of the physical model implementation results, including the degree of uncertainty of the experimental results obtained.
→ C4.5 Implement, improve, and expand the use of the physical model. Developing experimental devices capable of validating a physical model.

B LEARNING OUTCOMES

→ Upon successful completion of this discipline, students will be able to:
→ Identify and properly use the main laws and physical principles in a given context.
→ Explode and interpret physical phenomena and operationalize key concepts based on the appropriate use of laboratory equipment.

C LECTURE CONTENT

Electrostatic vacuum interactions. Field and electric flux.
Gauss's theorem. The potential nature of the electric field. Theory of electric field circulation.
Differential and integral equations of field and vacuum electrostatic potential. Poisson-Laplace equations.
Field and potentials of electrostatic balance conductor systems. Electrostatic influences. Coulomb's theorem
Electrical capacitor. Equations of field and potential in the substance. Dielectrics. Polarization vector P. The relation between the vectors E, D and P. The energy density of the electric field.

	Polarization vector P. The relation between the vectors E, D and P. The energy density of the electric field. Static electric current. Ohm's law and Joule's law in integral and differential forms Electric circuits and networks. Kirchhoff's laws. Vacuum magnetic field. Law-Biot Savart-Laplace. Ampère's theorem. The magnetic scalar potential. Potential vector. Integral and differential equations of field and magnetic vector potential. Applications. The magnetic field in the substance. The relationship between vectors B, M, H. Electromagnetic induction The Maxwell-Faraday Law. Magnetic energy. Own and mutual inductance of circuits Circuits in variable mode and periodically sinusoidal. Maxwell's equations
D	RECOMMENDED READING FOR LECTURES
	C. Papusoi, A. Stancu, Tratat de electricitate si magnetism, partea I, Ed. Cartea Universitara, 2006 E.M.Purcell, Electricitate şi magnetism , Cursul de Fizică Berkeley, vol II Ed. Did.&Ped., 1982. Vasile Tutovan, "Electricitate şi magnetism ", vol. I + II, Editura Tehnică Bucureşti 1984, 1985 I.E. Tamm, Fundamentals of the theory of electricity. Moscow: Mir Publishers, 1979 E. M. Purcell, Electricity and magnetism, 2nd ed. Cambridge ; New York: Cambridge University Press, 2011. J. Walker, R. Resnick, and D. Halliday, Halliday & Resnick fundamentals of physics, 10th edition. ed.
E	SEMINAR CONTENT
	Seminar: → Electrostatic vacuum interactions. Field and electric flux. → Gauss's theorem. The potential nature of the electric field. Theory of electric field circulation. → Differential and integral equations of field and vacuum electrostatic potential. Poisson-Laplace equations. → Field and potentials of electrostatic balance conductor systems. Electrostatic influences. Coulomb's theorem → Electrical capacitor. Equations of field and potential in the substance. Dielectrics. Polarization vector P. The relation between the vectors E, D and P. The energy density of the electric field. → Polarization vector P. The relation between the vectors E, D and P. The energy density of the electric field. → Static electric current. Ohm's law and Joule's law in integral and differential forms → Electric circuits and networks. Kirchhoff's laws. → Vacuum magnetic field. Law-Biot Savart-Laplace. Ampère's theorem. → The magnetic scalar potential. Potential vector. Integral and differential equations of field and magnetic vector potential. Applications. → The magnetic field in the substance. The relationship between vectors B, M, H. Electromagnetic induction → The Maxwell-Faraday Law. Magnetic energy. Own and mutual inductance of circuits → Circuits in variable mode and periodically sinusoidal. → Maxwell's equations Laboratory: → Measurement of electrical resistance by bridge, comparison and deviation methods → Methods of Measuring Potential and Current Differences by the Opposition Method → Study of measuring instruments for electric current, electrical voltage and electrical resistance. Shunt and additional resistance → Study of charging and discharging a capacitor. → Electrolysis → Study of DC circuits (Kirchhoff's laws). → Uniform magnetic field sources. Elements of terrestrial magnetism. → Study of alternating current bridges. → Measurement of capacity, inductance and mutual and loss factor. → Oscilloscope study. → Composition of perpendicular oscillations → Study of RLC circuit in sinusoidal mode. → Resonance in AC circuits → Laboratory colloquium
F	RECOMMENDED READING FOR SEMINARS
	Seminar: C. Papusoi, A. Stancu, Tratat de electricitate si magnetism, partea I, Ed. Cartea Universitara, 2006 E.M.Purcell, Electricitate şi magnetism , Cursul de Fizică Berkeley, vol II Ed. Did.&Ped., 1982. Vasile Tutovan, Electricitate şi magnetism, vol. I + II, Editura Tehnică Bucureşti 1984, 1985

	Vasile Tutovan, Ioan Gottlieb, Electricitate și magnetism – Probleme de electrostatică, Editura Tehnică INFO Chișinău, 1998 Vasile Tutovan, Ioan Gottlieb, Electricitate și magnetism – Probleme de magnetostatică și inducție electromagnetică , Editura Tehnică INFO Chișinău, 2003 Culegeri de probleme de liceu I.E. Tamm, Fundamentals of the theory of electricity. Moscow: Mir Publishers, 1979 E. M. Purcell, Electricity and magnetism, 2nd ed. Cambridge ; New York: Cambridge University Press, 2011. J. Walker, R. Resnick, and D. Halliday, Halliday & Resnick fundamentals of physics, 10th edition. ed. Laboratory: - http://stoner.phys.uaic.ro/moodle/ C. Păpuşoi, A. Stancu, L. Mitoşeriu, Lucrari de laborator de electricitate si magnetism, Editura Universitatii "Al.I.Cuza", Iasi, 1995. E. M. Purcell, Electricity and magnetism, 2nd ed. Cambridge ; New York: Cambridge University Press, 2011. J. Walker, R. Resnick, and D. Halliday, Halliday & Resnick fundamentals of physics, 10th edition. ed.
G	EDUCATION STYLE
LEARNING AND TEACHING METHODS	Lecture, didactic explanation, heuristic conversation, video projection, problem solving method, case studies
ASSESSMENT METHODS	• Written and oral examination • Practical evaluation
LANGUAGE OF INSTRUCTION	English