SYLLABUS

1. Information about the program

1.1 Higher education institution	UNIVERSITY POLITEHNICA OF TIMISOARA
1.2 Faculty[1]/ Department [2]	ELECTRONICS, TELECOMUNICATON AND INFORMATION TECHNOLOGIES / BFI
1.3 Field of study (name/code[3])	ELECTRONIC ENGINEERING, TELECOMUNICATION AND INFORMATION TECHNOLOGIES
1.4 Study cycle	License
1.5 Study program (name/code/qualification)	TST-ENG/20/20/10/100/10/TST-ENG

2. Information about the discipline

2.1 Name of discipline/ formative category[4]			Fundamentals of Electrical Engineering /DD				
2.2 Coordinator (holder) of course activities			Ursu Dragos				
2.3 Coordinator (holder) of applied activities[5]			Ursu Dragos				
2.4 Year of study[6]	2	**2.5** Semester	3	**2.6** Type of evaluation	D	**2.7** Regime of discipline[7]	DI

3. Total estimated time – hours / semester: direct teaching activities (fully assisted or partly assisted) and individual training activities (unassisted) [8]

3.1 Number of fully assisted hours / week	3 of which:	**3.2** course	2	**3.3** seminar / laboratory / project	1/0/0
3.1* Total number of fully assisted hours / semester	42 of which:	**3.2*** course	28	**3.3*** seminar / laboratory / project	14/0/0
3.4 Number of hours partially assisted / week	of which:	**3.5** training		**3.6** hours for diploma project elaboration	
3.4* Total number of hours partially assisted / semester	of which:	**3.5*** training		**3.6*** hours for diploma project elaboration	
3.7 Number of hours of unassisted activities / week	4.14 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			1.14
		hours of individual study after manual, course support, bibliography and notes			1
		training seminars / laboratories, homework and papers, portfolios and essays			2
3.7* Number of hours of unassisted activities / semester	58 of which:	additional documentary hours in the library, on the specialized electronic platforms and on the field			16
		hours of individual study after manual, course support, bibliography and notes			14
		training seminars / laboratories, homework and papers, portfolios and essays			28
3.8 Total hours / week [9]	7.14				
3.8* Total hours /semester	100				
3.9 Number of credits	4				

4. **Prerequisites** (where applicable)

[1] The name of the faculty which manages the educational curriculum to which the discipline belongs
[2] The name of the department entrusted with the discipline, and to which the course coordinator/holder belongs.
[3] The code provided in HG - on the approval of the Nomenclature of fields and specializations / study programs, annually updated.
[4] Discipline falls under the educational curriculum in one of the following formative disciplines: Basic Discipline (DF), Domain Discipline (DD), Specialist Discipline (DS) or Complementary Discipline (DC).
[5] Application activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).
[6] Year of studies in which the discipline is provided in the curriculum.
[7] Discipline may have one of the following regimes: imposed discipline (DI) or compulsory discipline (DOb)-for the other fundamental fields of studies offered by UPT, optional discipline (DO) or optional discipline (Df).
[8] The number of hours in the headings 3.1 *, 3.2 *, ..., 3.8 * is obtained by multiplying by 14 (weeks) the number of hours in headings 3.1, 3.2, ..., 3.8. The information in sections 3.1, 3.4 and 3.7 is the verification keys used by ARACIS as: (3.1) + (3.4) ≥ 28 hours / wk. and (3.8) ≤ 40 hours / wk.
[9] The total number of hours / week is obtained by summing up the number of hours in points 3.1, 3.4 and 3.7.

4.1 Curriculum	• Vector algebra and vector analysis, Basic computer user, Physics
4.2 Competencies	• Mathematical skills, understanding of physical principles

5. Conditions (where applicable)

5.1 of the course	• A well ventilated classroom, with a white (or black) board and projector facilities
5.2 to conduct practical activities	• Same as point 5.1

6. Specific competencies acquired through this discipline

Specific competencies	• Comprehensive understanding of the electromagnetic field and its interactions with various materials • Solving problems involving electrical and magnetic fields in different circuit components and circuit networks
Professional competencies ascribed to the specific competencies	• Use of fundamentals in terms of devices, circuits, systems, instrumentation and electronics technology. • Solving technological problems in fields of applied electornics.
Transversal competencies ascribed to the specific competencies	• Methodical analysis of field-related problems aimed at identifying acknowledged solutions, thus ensuring the accomplishment of professional tasks.

7. Objectives of the discipline (based on the grid of specific competencies acquired - pct.6)

7.1 The general objective of the discipline	• Presentation of the fundamental scientific principles from the field of electric and electronic engineering, based on the laws of electromagnetics according to Maxwell-Hertz theory
7.2 Specific objectives	• Development of skills and aptitudes of the students in order to have a correct understanding of electromagnetic phenomena and ability to handle the methods for solving problems in the domain of electromagnetics. An engineering approach of problems and the development of the capacity for measurements and results interpretation

8. Content [10]

8.1 Course	Number of hours	Teaching methods [11]
1. Electrostatic Field. Coulomb's Law and Electric Field Intensity; Electric Flux Density and Gauss's Law	3	• Whiteboard presentation • Slide-show presentation • Videos
2. Energy and Electric Potential Energy of an Electrostatic System; Potential Difference and Electric Potential; Energy Density in Electrostatic Field.	3	
3. Conductors, Dielectrics, Capacitance Current and Current Density; Continuity of Current; Metallic Conductors; Conductor	6	

[10] It details all the didactic activities foreseen in the curriculum (lectures and seminar themes, the list of laboratory works, the content of the stages of project preparation, the theme of each practice stage). The titles of the laboratory work carried out on the stands shall be accompanied by the notation "(*)".
[11] Presentation of the teaching methods will include the use of new technologies (e-mail, personalized web page, electronic resources etc.).

Properties in Electrostatic Field, Boundary Conditions; Semiconductors; Resistors; Joule's Law; Nature of Dielectric Materials; Capacitance		
4. The Steady Magnetic Field Biot Savart Law and Ampere's Circuital Law, Magnetic Flux and Magnetic Flux Density;Magnetization and Permeability;Magnetic Circuits;Inductances;Potential energy and Forces in Magnetic Field;Numeric Computation of Magnetic Field	8	
5. Time-Varying Fields and Maxwell's Equations Faraday's Law; Displacement Current; Maxwell's Equations in Point Form and Integral Form; Retarded Potentials	4	
6. Electromagnetic Waves; Uniform Plane Waves; Poynting Vector; Wave Propagation in Dispersive Media; Skin Effect	4	
Bibliography [12] 1. W.H.Hayt,J.A.Buck,Engineering Electromagnetics,McGraw-Hill,2001 2. D.D.Irimia,C.Blaj,Campuri si unde electromagnetice,Editura Politehnica,Timisoara,2014 3. D.Fleish A student's Guide to Maxwell's Equations, www.cambridge.org/978052177619 4. R.Bansal, Fundamentals of Engineering Electromagnetics, Taylor & Francis Group, 2006		

8.2 Applied activities [13]	Number of hours	Teaching methods
1. Calculus reminder	2	Homeworks and tests based on the proposed problems
2. Calculation of Electric Field and Capacitance	4	
3. Massive Resistors and current Distribution	2	
4. Faraday's Law	2	
5. Ampere's Circuital Law for time Varying Fields	2	
6. Electromagnetic Waves;	2	
Bibliography [14] Same as for course		

9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

- Updating the course each year. Basic understanding of Maxwell's Hertz theory assures a long time capability of adaptation to the newest technological discoveries. Main knowledge of Electromagnetics are indispensables for other courses (electronic engineering courses)

10. Evaluation

Type of activity	**10.1** Evaluation criteria [15]	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	Problem solving ability	Written exam	50%

[12] At least one title must belong to the discipline team and at least one title should refer to a reference work for discipline, national and international circulation, existing in the UPT library.
[13] Types of application activities are those specified in footnote 5. If the discipline contains several types of applicative activities then they are sequentially in the lines of the table below. The type of activity will be in a distinct line as: "Seminar:", "Laboratory:", "Project:" and / or "Practice/training".
[14] At least one title must belong to the discipline team.
[15] Syllabus must contain the procedure for assessing the discipline, specifying the criteria, methods and forms of assessment, as well as specifying the weightings assigned to them in the final grade. The evaluation criteria shall be formulated separately for each activity foreseen in the curriculum (course, seminar, laboratory, project). They will also refer to the forms of verification (homework, papers, etc.)

10.5 Applied activities	**S:** Problem solving ability	2 Tests	50%
	L:		
	P[16]**:**		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified [17])			
• Understanding the 4 basic Maxwell equations and their applications to specific field problems.			

Date of completion	**Course coordinator (signature)**	**Coordinator of applied activities (signature)**
20.06.2023		

Head of Department (signature)	**Date of approval in the Faculty Council** [18]	**Dean (signature)**
	14.09.2023	

[16] In the case where the project is not a distinct discipline, this section also specifies how the outcome of the project evaluation makes the admission of the student conditional on the final assessment within the discipline.
[17] It will not explain how the promotion mark is awarded.
[18] The endorsement is preceded by the discussion of the board's view of the study program on the discipline record.