Politehnica University of Bucharest Faculty of Electronics, Telecommunications and Information Technology

# **COURSE DESCRIPTION**

#### 1. Program identification information

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1.1 Higher education institution	Politehnica University of Bucharest
1.2 Faculty	Faculty of Electronics, Telecommunications and
	Information Technology
1.3 Department	Electrical Engineering Department
1.4 Domain of studies	Electronic Engineering, Telecommunications and Information
	Technologies
1.5 Cycle of studies	Bachelor
1.6 Program of studies/Qualification	Technologies and Systems of Telecommunications – TST
	(English)

#### 2. Course identification information

2.1 Name of the course			Electrical Engineering 2 (Basic Electrotechnics 2)				
2.2 Lecturer Asso			Assoc. Prof.	Assoc. Prof. PhD. Eng. Oana Drosu,			
2.3 Instructor for practical activities			Lecturer PhD. Eng. Marilena Stanculescu				
2.4 Year	1	2.5	II	2.6	Exam	2.7	compulsory
of studies		Semester		Evaluation		Course	
				type		choice	
						type	

#### 3. Total estimated time (hours per semester for academic activities)

<b>5. Total estimated time</b> (notifs per senie			activit	103)	
3.1 Number of hours per week, out of	4	3.2	3	3.3 practical	1
which		course		activities	
3.4 Total hours in the curricula, out of	56	3.5	42	3.6 practical	14
which		course		activities	
Distribution of time		•			hours
Study according to the manual, course support, bibliography and hand notes					46
Supplemental documentation (library, electronic access resources, in the field, etc)					5
Preparation for practical activities, homeworks, essays, portfolios, etc.				20	
Tutoring					0
Examinations					3
Other activities				0	
3.7 Total hours of individual study	74	4			
3.9 Total hours per semester	1.	30			
3. 10 Number of ECTS credit points	5				

### 4. Prerequisites (if applicable)

4.1 curricular	Algebra, Mathematical analysis, Physics, Circuit theory
4.2 competence-based	It is not the case

# **5.** Requisites (if applicable)

5.1 for running the	It is not the case
course	
5.2 for running of the	It is not the case
applications	

# 6. Specific competences

Professional	C1.5 Theoretical grounding of the characteristics of the designed				
competences	systems				
	<b>C2.1</b> Identifying and describing the structural elements of hardware and communications systems.				
	<b>C2.2</b> Explaining the specific steps of the development of hardware and communications systems.				
	<b>C5.1</b> Appropriate use of the principles of operation of electronic devices				
	and circuits, as well as methods for measuring electrical quantities				
	C5.2 Interpretation, design, execution and measurement of the				
	electronic circuit of low / medium complexity.				
Transversal	Honorable, responsible, ethical behavior within the law in order to				
Competences	ensure the reputation of the profession				

# 7. Course objectives (as implied by the grid of specific competences)

7.1 General objective	-For the course:
of the course	Basic knowledge of electromagnetic field theory through the
	applications of high interest in electronics, telecommunications and
	information technology is presented. Students develop skills in
	understanding the assumptions of the theory of electrical circuits field
	and electric and magnetic field phenomena.
	- For applications:
	Learning and research the methods to solve simple applications of
	electromagnetic field.
4.2 Specific	Students' skills are developped in order to apply basic knowledge of
objectives	electromagnetic field theory to understanding, modeling and analysing
	the field problems, as well as understanding the limits of the used
	models

# 8. Content

8.1 Lectures	Teaching techniques	Remarks
The laws of electromagnetism. Theorems. Behavior of the	Teaching is based on	15 hours
field quantitites in the vicinity of the surfaces.	oral presentation.	
Electrostatics. Theorems of electrostatics. Relationships	Expositive and	6 hours
between charges and potentials (Maxwell). The capacitor.	questioning methods	
Capacitors networks. The energy and co-energy of the	are used. Course	
electric field.	materials are lecture	
Electrokinetics. Theorems of Electrokinetics . Analogy with	notes and	3 hours
Electrostatic. The resistor.	presentations, as well	
Stationary magnetic field. Theorems of the stationary	as exercise books.	6 hours

magnetic field. The flux of a wire. Ideal coil. Relation	ns			
between fluxes and currents (Maxwell). The inductant	nces of			
fascicles of coils. Energy and co-energy of magnetic field				
produced by a system of wires. Generalized forces within				
the magnetic field. Vector magnetic potential. Biot-Savart-				
Laplace formula.				
Magnetic circuits. The branch of the magnetic circui	t. The	6 hours		
reluctance. Kirchhoff's Laws for magnetic circuits. S				
methods for magnetic circuits. Permanent magnets.				
magnetic field produced by permanent magnets. Max				
energy of the magnetic field produced by permanent				
magnets. Magnetic circuits with permanent magnets				
Quasistationary sinusoidal magnetic field. Penetratio	n of the	3 hours		
electromagnetic field in the conductive space. Eddy				
losses.				
The variable state of the electromagnetic field. The		3 hours		
electromagnetic field energy. Electromagnetic power				
transfer through a closed surface. Volume energy der				
the electromagnetic field. Warburg's theorem. (Losse	•			
hysteresis.)	5			
8.2 Practical applications	Teaching techniques	Remarks		
Problems of electrostatics (Coulomb's integrals,	Oral communication	4 hours		
Gauss Method)				
Problems of capacitors		2 hours		
Applications of Faraday's law of		2 hours		
induction				
Applications of Ampere Theorem		2 hours		
Problems of stationary magnetic field (magnetic				
Problems of stationary magnetic field (magnetic 4 hours circuits, Biot-Savart-Laplace formula)				
Bibliography				
O. Drosu, "Electrical Engineering 2-Electromagneti	cs":			
http://elth.pub.ro/~oanad/cursuri%20online/ElectromagneticsBE2/				
F.M.G. Tomescu – Fundamentals of electrical engineering. Electromagnetic field,				
electromagnetic systems, Editura Matrix Rom București, 2011.				
3. Hantila F. s.a. Electrotehnica teoretica, Editura Electra, 2002, http://ferrari.lce.pub.ro/studenti/				
4. Hantila F., Vasiliu M., Campul electromagnetic va				
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<u>http://ferrari.lce.pub.ro/studenti/</u>. A.Cazacu, E Cazacu, A. Amuzescu, Bazele Eletrotehnicii 1-Electromagnetism-Seminar, Editura Printech Bucuresti, 2000

# **9.** Bridging the course content with the expectations of the epistemic community representatives, professional associations and employers representatives for the domain of the program

The fundamental nature of the discipline of Electrical Engineering Fundamentals compel the lecturers to keep a close contact with the faculty leadership and with lecturers of the specialized disciplines. In order to complete the content and to choose the teaching / learning methods the lecturers of this discipline have organised specific seminars within the department. During the meetings with relevant personnel from Electronic Engineering field their needs and expectations have been discussed.

#### **10. Evaluation**

10. Evaluation				
Type of activity	10.1 Evaluation	10.2 Evaluation methods	10.3 Weight in	
	criteria		the final mark	
theoretical notions - Knowledge of the application of theory to specific problems;		Partial exam: 3 subjects (theory and applications) with different shares, testing students' theoretical knowledge and his ability to give solution to electromagnetic field problems.	40%	
	of techniques and theoretical methods.	Partial exam: 3 subjects (theory and applications) with different shares, testing students' theoretical knowledge and his ability to give solution to electromagnetic field problems.	40%	
10.5 Practical applications	Students'abilitytoapplytheoreticalknowledgetosolutioningtechnicalproblems.	Participating to activity during application classes. Preparing a notebook with problems proposed at homework within seminars.	20%	
10.6 Minimal performance standard				
- solutioning simple real problems of electromagnetic field				

Date

Lecturer

Instructor for practical activities

25.09.2017 Assoc.Prof Eng. Oana Drosu, PhD

Lect. Eng. Marilena Stanculescu, PhD

Date of department approval 25.09.2017

Head of Department, Assoc. Prof. Eng. Mihai Maricaru, PhD