COURSE DESCRIPTION

1. Program identification information

1.1 Higher education institution	Politehnica University of Bucharest
1.2 Faculty	Faculty of Electronics, Telecommunications and Information Technology
1.3 Department	Applied Electronics and Information Engineering
1.4 Domain of studies	Engineering in Electronics and Telecommunications
1.5 Cycle of studies	Bachelor
1.6 Program of studies/Qualification	Applied Electronics

2. Course identification information

2.1 Name of the course				Industrial Electronics and Informatics			
2.2 Lecturer				Prof. Constantin RADOI, Ph.D.			
2.3 Instructor for practical activities				Prof. prof. Adriana FLORESCU, Ph.D.			
2.4 Year of studies	III	2.5 Semester	II	2.6 Evaluation type	Examination	2.7 Course choice type	Mandatory subject ELA

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

3.1 Number of hours per week, out of which	3	3.2 course	2	3.3 practical activities	1
3.4 Total hours in the curricula, out of which	42	3.5 course	28	3.6 practical activities	14

Distribution of time	hours
Study according to the manual, course support, bibliography and hand notes	5
Supplemental documentation (library, electronic access resources, in the field, etc)	2
Preparation for practical activities, homework, essays, portfolios, etc.	2
Tutoring	0
Examinations	1
Other activities	0

3.7 Total hours of individual study	10
3.9 Total hours per semester	52
3. 10 Number of ECTS credit points	2

4. Prerequisites (if applicable)

4.1 curricular	Basics of Electrical Engineering, Programmable Techniques, Fundamental electronics circuits, Signals and systems
4.2 competence-based	Knowledge about industrial electronics and electrical power conversion.

5. Requisites (if applicable)

5.1 for running the course	Not applicable
5.2 for running of the applications	Compulsory attendance at laboratories (according to regulations governing the Masters Study in PUB).

6. Specific competences

Professional competences	C1 (according to ACPART-ELA list of competences) Use of fundamental elements about electronic devices, circuits, systems, instrumentation and technology.
Transversal competences	CT1 (according to ACPART-ELA list of competences) Methodically analysis of practical problems, identifying the elements for which there are traditional solutions, thus assuring professional tasks achievement.

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

7.1 General objective of the course	Industrial Electronics and Informatics discipline has the following main objectives: the study, analysis, design and simulation of the devices and their AC/DC and DC/DC electrical power conversion circuits, with applications in industry, IT, telecommunications, medicine etc.
7.2 Specific objectives	Industrial Electronics and Informatics laboratory has the general objective the assimilation of the knowledge presented during the course by measuring and simulating the circuits using lab specific instrumentation and IT that exists in the faculty of ETTI, Department EAII, building Leu, 2nd floor, room B235.

8. Content

8.1 Lectures	Teaching techniques	Remarks
1. Introduction to industrial electronics and informatics	Teaching is based on the use of the blackboard and projector. The oral communication methods used are the expository method and the problem-based method. Course materials are: lecture notes and presentations, exercise book with solved and proposed problems (theoretical and solved using a computer). All materials are available electronically on the course website.	2h
2. Power semiconductor devices: static and dynamic characteristics, practical catalog limiting performance paratemers, command and control circuits, snubber circuits for optimal switching on complex device loading conditions. SPICE simulation of power switching devices.		4h
3. Functions and forms of electronic circuits for energy conversion: optimized structures.		2h
4. Frequency and time domain analysis methods for switching topologies.		4h
5. AC/DC and AC-AC conversion topologies.		12h
6. Computer aideed design and simulation (SPICE, MATLAB) of power processors.		2h
7. Control and command systems using feedback loop. The use of dedicated microcomputers to command and control the power processors.		2h

Bibliography:
(1) C.Rădoi, A.T.Murgan, V.Lăzărescu s.a. - Circuite si echipamente electronice industriale, Editura Tehnică, Bucuresti, 1986, (2) C.Rădoi, V.Grigore, V.Drogoreanu - SPICE – Simularea si Analiza Circuitelor Electronice, Editura Amco Press, Bucuresti, 1994, (3) C.Rădoi - Electronică Industrială, Lito UPB, Bucuresti, 1994, (4) S. Bârcă-Gălăteanu, D.A.Stoichescu, P.Constantin -

<table>
<tr><td colspan="3">Electronică de putere. AplicaŃii, Editura Militară, Bucuresti, 1991, (5) C.Rădoi, V.Drogoreanu, V.Grigore, A.Florescu s.a. - Electronică si informatică industrială. AplicaŃii practice, Editura Tehnică, Bucuresti, 1997, (6) M.H.Rashid - Power Electronics: Circuits, Devices and Applications, Prentice Hall, 1992, (7) N.Mohan s.a.- Power Electronics: Converters, Applications and Design, John Willey&Sons, SUA, 1995</td></tr>
<tr><td>8.2 Practical applications</td><td>Teaching techniques</td><td>Remarks</td></tr>
<tr><td>Introduction in computer aided design of commutation circuits. SPICE models in the study of power bipolar transistors operating during commutation.</td><td rowspan="4">Teaching is based on the use of the projector (covering the communication and demonstrative functions); the oral communication methods used are the expository method and the problem based method, involving all of the students. Students simulate, implement, test and evaluate independently the same problems through the continuous use of laboratory platforms and of the software environment. The teaching materials and laboratory platforms are included in the laboratory guide book.</td><td>4 hours</td></tr>
<tr><td>Bridge AC/DC stabilized converter with SCRs.</td><td>4 hours</td></tr>
<tr><td>Single phase AC/AC converters. Commutation study.</td><td>4 hours</td></tr>
<tr><td>Final laboratory evaluation</td><td>2 hours</td></tr>
<tr><td colspan="3">Bibliography
1. C.Radoi, V.Drogoreanu, V.Grigore, A.Florescu s.a. - Electronica si informatica industriala. Aplicatii practice (Industrial Electronics and Informatics. Practical Applications), Editura Tehnica, Bucuresti, 1997.
2. C.Radoi, V.Grigore, V.Drogoreanu, SPICE – Simularea si Analiza Circuitelor Electronice (SPICE-Modelling and simulation of electronic circuits), Ed. Amco Press, Bucuresti, 1994
3. EII department site: www.eii.pub.ro</td></tr>
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9. Bridging the course content with the expectations of the epistemic community representatives, professional associations and employers representatives for the domain of the program

Industrial Electronics and Informatics domain includes commutation, command, regulation and conversion of the electrical energy from AC to DC or AC with other parameters forms, using electronic devices with their specific measurement and control circuits. Rectifiers (AC?DC converters) and AC?AC converters represent one of the fundamental blocks in modern electronics applications such as communications and mobile cells, media equipments, computers, medical technique and so on.

The course syllabus is adequate to this modern and actual domain of industrial electronics, that gathers and promotes the information available in the electric power conversion of energy in such a manner that the next electronics engineer should have an unlimited access to the knowledge, concepts and basic methodologies in the field.

This provides graduates with the appropriate skills required by current industry demands and with a modern scientific and technical training, both from a qualitative point of view as well as from a competitive one, enabling rapid employment after graduation. This is perfectly framed in the educational policy of Politehnica University of Bucharest, both in terms of content and structure as well as in terms of skills and international openness for students willing to work in the applied electronics industry.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final mark
10.4 Lectures	- Basic knowledge of theoretical concepts; - Knowledge of the application of the theory to solve specific problems; - analysis techniques and theoretical methods specific to the industrial electronics and informatics field.	Two written test examination during the semester at fixed dates at the beginning of the course; the topics cover the whole field, providing a synthesis between comparative theoretical browsing of the subject and exemplification through exercises and problems of application models.	75%
10.5 Practical applications	- knowledge concerning the working of a given problem; - knowing how to transpose the functioning of the proposed power electronics circuits; - Demonstrate the operation of an implemented system.	Final verification comprising using a multiple choice test that contents theoretical, simulation and functioning questions from the power circuits presented in the laboratory etc.	25%
10.6 Minimal performance standard			
- knowing and modelling of the main power electronic devices; - design, implementation, and functionality demonstration of a simple solution for a circuit from industrial electronics and informatics domain.			

Date	Lecturer, Prof. Constantin RADOI, Ph.D.	Instructor for practical activities Prof. Adriana FLORESCU, Ph.D
18.10.2015		
Date of department approval		Director of Department,
21.10.2015		Prof. Sever PAŞCA Ph.D