SYLLABUS[1]

1. Information about the program

1.1 Higher education institution	POLYTECHNIC UNIVERSITY OF TIMISOARA
1.2 Faculty[2] / Department[3]	ELECTRONICS, TELECOMMUNICATIONS AND INFORMATION TECHNOLOGIES ENGINEERING/ APPLIED ELECTRONICS
1.3 Chair	—
1.4 Field of study (name/code[4])	ELECTRONICS, TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY
1.5 Study cycle	BACHELOR
1.6 Study program (name/code)/Qualification	TELECOMMUNICATIONS TECHNOLOGIES AND SYSTEMS/ L20202010020 / TELECOMMUNICATIONS TECHNOLOGIES AND SYSTEMS

2. Information about the discipline

2.1 Name of discipline			POWER ELECTRONICS				
2.2 Coordinator (holder) of course activities			DAN LASCU				
2.3 Coordinator (holder) of applied activities [5]			IOANA POP				
2.4 Year of study[6]	3	**2.5** Semester	6	**2.6** Type of evaluation	E	**2.7** Type of discipline	COMPULSORY

3. Total estimated time (hours / semester of didactic activities)

3.1 No. of hrs. / week	4 , of which:	**3.2** course	2	**3.3** seminar/laboratory/ project/training	2
3.4 Total no. of hrs. in the education curricula	56 , of which:	**3.5** course	28	**3.6** applied activities	28

3.7 Distribution of time for individual activities related to the discipline	hrs.
Study using a manual, course materials, bibliography and lecture notes	10
Additional documentation in the library, on specialized electronic platforms and on the field	6
Preparation for seminars / laboratories, homeworks, assignments, portfolios, and essays	10
Tutoring	2
Examinations	6
Other activities	
Total hrs. of individual activities	34

[1] The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex3).
[2] The name of the faculty which manages the educational curriculum to which the discipline belongs.
[3] The name of the department entrusted with the discipline, and to which the course coordinator / holder belongs.
[4] Fill in the code provided in GD no. 493/17.07.2013.
[5] The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).
[6] The year of study to which the discipline is provided in the curriculum.

3.8 Total hrs. / semester[7]	90
3.9 No. of credits	4

4. **Prerequisites** (where applicable)

4.1 Curriculum	• Linear electrical circuits, fundamentals of periodic signals
4.2 Competencies	•

5. **Conditions** (where applicable)

5.1 of the course	• videoprojector
5.2 to conduct practical activities	• Laboratory class with basic measurement equipment, Matlab package and Caspoc dedicated simulator

6. **Specific competencies acquired**

Professional competencies[8]	• Applying basic principles for signal acquisition and processing • Design and use of reduced complexity hardware and software applications that are typical for the applied electronics field • Applying of basic knowledge, concepts and methods regarding power electronics, control systems, electrical energy management and electromagnetic compatibility
Transversal competencies	• Defining milestones for different activities and allotting them to the team members while, clearly explaining the individual tasks in accordance to the hierarchy and facilitating efficient information exchange and inter human communication

7. **Objectives of the discipline** (based on the grid of specific competencies acquired)

7.1 General objective of the discipline	• Getting competences in understanding power devices operation, power quality merit parameters, power switching circuits operation and the ability of designing simple switching power converters
7.2 Specific objectives	• Getting familiar to main power devices characteristics • Getting familiar to power quality main merit parameters • Analysis, design and usage of main non isolated switching converters • Analysis, design and usage of main switching converters with isolation • Getting familiar to main modulation methods and control techniques of switching converters

8. **Content**

[7] It is obtained by summing up the number of hrs. from 3.4 and 3.7.

[8] The professional competencies and the transversal competencies will be treated according to the Methodology of OMECTS 5703/18.12.2011. The competencies listed in the National Register of Qualifications in Higher Education [Registrul Naţional al Calificărilor din Învăţământul Superior RNCIS] (http://www.rncis.ro/portal/page?_pageid=117,70218&_dad=portal&_schema=PORTAL) will be used for the field of study from 1.4 and the program of study from 1.6 of this form, involving the discipline.

8.1 Course	No. of hours	Teaching methods
Power devices	2	Course by the aid of a videoprojector, delivering explanations and performing calculations on the board, accompanied by simulations presented at the course classes. Interactive teaching, making use of stimulating course homeworks with the solutions uploaded on the Virtual Campus
Power quality and merit parameters	2	
DC-DC switching converters analysis. Synchronous rectifier	4	
Non isolated switching converters synthesis	2	
Converters with isolation	6	
Analog and digital modulation techniques	3	
Current mode control and other control techniques	3	
Converter modelling. Small-signal transfer functions of power converters. Controller design	4	
PWM rectifiers	2	
Bibliography[9] 1. R. W. Erickson, D. Maksimovic, Fundamentals of Power Electronics, 2nd edition, Springer, 2001 2. S. Ang, A. Oliva, Power Switching Converters, 2nd edition, CRC Press, 2005 3. D. Lascu, Tehnici şi circuite de corecţie activă a factorului de putere, Editura de Vest, 2004, 4. J. Kassakian, M. Schlecht and G. Verghese, Principles of Power Electronics, 1st ed. Addison-Wesley, 1991		
8.2 Applied activities[10]	No. of hours	Teaching methods
Merit parameters of power quality	2	
Integrated circuits for switching converters control	2	

[9] At least one title must belong to the department staff teaching the discipline, and at least 3 titles must refer to national and international works relevant for the discipline, and which can be found in the Politehnica University Library.

[10] The types of applied activities are those specified in footnote 5. If the discipline contains several types of applied activities, then these will be written consecutively in the lines of the table below. The type of activity will be written in a distinct line, as „Seminar:", „Laboratory:", „Project:" and/or „Practice/Training:".

Basic non isolated switching converters	2	
Non isolated flyback and forward converters	2	
Control to output and audiosusceptibility transfer functions of a forward converter. Controller design	2	
PFC circuits employing CCM boost and DCM buck-boost converters	4	
Design and realization of an energy conversion system intended to lift a weight using a dc motor, handling the energy delivered by a solar cell. A closed loop isolated converter will be used	14	

Bibliography [11]

1. D. Lascu, s.a., Short Manuals for Distance Laboratories of PEMC WebLab, Academické Nakladatelstvi Cerm, 2008, ISBN 978-80-7204-625-6,

2. Viorel Popescu, Dan Lascu, Electronică Industrială -îndrumător de laborator- Centrul de multiplicare al Universităţii Politehnica Timişoara, 1996

3. Dan Lascu, Tehnici şi circuite de corecţie activă a factorului de putere, Editura de Vest, 2004

4. R. W. Erickson, D. Maksimovic, Fundamentals of Power Electronics, 2nd edition, Springer, 2001

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

- After several meetings, the content of the discipline was agreed by the local economic partners, the most important being Continental Timisoara, Hella Romania and Flextronics

10. Evaluation

Type of activity	**10.1** Evaluation criteria	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course	The ability to apply the acquired knowledge on 22 short theoretical questions and to solve 2-3 more complex problems	Written exam	66%
10.5 Applied activities	**S:**		
	L: Proving of being familiar to the operation of power devices and power circuits, ability to carry out simulations of these converters, to fix minor design errors, to manipulate the equipment and	Supervising the practical activities and check the reports	16%

[11] At least one title must belong to the staff teaching the discipline.

	to explain the results obtained		
	P: The ability to solve non ideal converters, efficiency and individual losses calculation, identifying CCM and DCM operation, design of a dc-dc converter starting from specifications, converter simulation and practical experimentation	Presentation of the project by all team members, revealing its practical functionality, followed by a session of questions	17%
	Pr:		

10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified)

- Basic knowledge regarding ideal and non ideal dc-dc converters operation, both non isolated and isolated.
- The ability to provide correct dc analysis of a dc-dc lossy converter
- Verification is performed through the requirements regarding minimal 50% correct answers at the exam, applied to both theory and problems and also to laboratory tests and reports and project defense.

Date of completion	**Course coordinator**	**Coordinator of applied activities**
	(signature)	**(signature)**
10.11.2016		
	.....	.....
Head of Department	**Date of approval in the Faculty Council**[12]	**Dean**
(signature)		**(signature)**
	12.15.2016	
.....		.....

[12] Avizarea este precedată de discutarea punctului de vedere al board-ului de care aparţine programul de studiu cu privire la fişa disciplinei.