SYLLABUS

1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Electrical Engineering
1.3	Department	Electrotechnics and Measurements
1.4	Field of study	Electrical Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Electrical Systems
1.7	Form of education	Full time
1.8	Subject code	38.00

2. Data about the subject

2.1	Subject name				Power Electronics		
2.2	Course responsible/lecturer				*Teodosescu Petre Dorel – petre.teodosescu@emd.utcluj.ro*		
2.3	Teachers in charge of seminars				*Bojan Mircea – mircea.bojan@emd.utcluj.ro* Szekely Norbert Csaba-*norbert.szekely@emd.utcluj.ro*		
2.4 Year of study	3	2.5 Semester	1	2.6 Assessment			E
2.7 Subject category	Formative category						DS
	Optionality						DI

3. Estimated total time

3.1 Number of hours per week	4	of which	3.2 Course	2	3.3 Seminar	-	3.3 Laboratory	2	3.3 Project	
3.4 Total hours in the curriculum	56	of which	3.5 Course	28	3.6 Seminar	-	3.6 Laboratory	28	3.6 Project	

3.7 Individual study:	
(a) Manual, lecture material and notes, bibliography	18
(b) Supplementary study in the library, online and in the field	3
(c) Preparation for seminars/laboratory works, homework, reports, portfolios, essays	18
(d) Tutoring	2
(e) Exams and tests	3
(f) Other activities	-

3.8 Total hours of individual study (summ (3.7(a)…3.7(f)))	44
3.9 Total hours per semester (3.4+3.8)	100
3.10 Number of credit points	4

4. Pre-requisites (where appropriate)

4.1	Curriculum	Technical physics, electrical circuit theory
4.2	Competence	Measurement of electrical quantities, analysis of electrical circuits, basic principles of electricity.

5. Requirements (where appropriate)

5.1	For the course	Online, Teams platform

5.2	For the applications Seminar /Laboratory/Project	Onsite - Cluj-Napoca Online, Teams platform

6. Specific competences

Professional competences	- Ability to address and manage specific applications of electronics and power electronics. - Ability to design, model, analyze and operate electronic power systems. - Ability to design and conduct practical experiments, as well as to analyze and interpret the information obtained. - Ability to apply knowledge of engineering, engineering sciences and applied informatics. - Ability to use modern engineering techniques, skills and tools required for engineering practice. - Ability to approach and manage specific applications of general electrical engineering. - Ability to work in inter and multidisciplinary teams, to communicate effectively and to understand professional and ethical responsibilities.
Cross competences	-

7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Ability to address and manage specific general electronics and power electronics applications.
7.2	Specific objectives	- Ability to design, model, analyze and operate electronic power systems - Ability to design and perform experiments, as well as to analyze and interpret the information obtained.

8. Contents

8.1. Lecture (syllabus)	Number of hours	Teaching methods	Notes
Course 1. Introduction to power electronics. Basic principles.	2	Power Point presentations and demonstrations	-
Course 2. Power electronics applications.	2		
Course 3. Basic power electronic devices. Features, operating principles, and selection criteria.	2		
Course 4. Power electronics modulations technics	2		
Course 5. Diodes and phase-controlled AC-DC converters. Phase control.	2		
Course 6. DC-DC converters. Part I	2		
Course 7. DC-DC converters. Part II	2		
Course 8. DC-AC converters. Generalities	2		
Course 9. PWM inverters.	2		

Course 10. Space vector PWM modulation	2		
Course 11. Inverters with several voltage levels	2		
Course 12. AC-DC converters with transistors.	2		
Course 13. AC-AC converters.	2		
Course 14. Resonant converters. "Soft" switching. Passive filters in power electronics.	2		
Bibliography			

8.2. Seminar /Laboratory/Project	Number of hours	Teaching methods	Notes
Laboratory 1. Introduction and labour protection. Study of passive R-C circuits	4	Presentation, demonstrations, discussions, measurements, resulting analyzes.	
Laboratory 2. Switching of power electronic devices. Uncommanded rectifiers. Phase control principles. Triac AC-AC converter.	4		
Laboratory 3. AC - DC rectifiers with thyristors.	4		
Laboratory 4. DC - DC converters.	4		
Laboratory 5. DC - AC converters - Single-phase PWM inverter.	4		
Laboratory 6. DC- AC converters. Three-phase PWM inverter.	4		
Laboratory 7. Verification, testing, evaluation, and grading.	4		
Bibliography			

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Power electronics are the basis of all electricity conversion applications.

10. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	- Answers to questions from the topic presented in the course.	Online platform grid type exam – 50 points	50%
10.5 Laboratory	- Portfolio of laboratories and topics - Answers to questions from the laboratory topic	Online platform grid evaluation and laboratory evaluation – 50 points	50%
10.6 Minimum standard of performance			
Minimum 50 points by summing the points obtained on all the activities: Course and Laboratory • 100 points = 10 (final grade)			

Date of filling in:		Title Surname Name	Signature
September 2024	Lecturer	Teodosescu Petre Dorel	
	Teachers in charge of application	Bojan Mircea	
		Szekely Norbert Csaba	

Date of approval in the department ……..

September 2024

Head of department
Prof. dr. ing. Dan Doru Micu

Date of approval in the faculty ……

September 2024

Dean
Conf.dr.ing. Cziker Andrei