



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2022/2023
MASTER'S DEGREE (MSC)	ELECTRONICS AND TELECOMMUNICATIONS ENGINEERING (FULLY ONLINE)
SUBJECT	ELECTRONICS CIRCUITS
TYPE OF EDUCATIONAL ACTIVITY	D
AMBIT	20582-A scelta dello studente
CODE	22085
SCIENTIFIC SECTOR(S)	ING-INF/01
HEAD PROFESSOR(S)	SCIRE' DANIELE Ricercatore a tempo determinato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	162
COURSE ACTIVITY (Hrs)	63
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	SCIRE' DANIELE Wednesday 15:00 16:00 Da concordare con il docente previo appuntamento

PREREQUISITES	To address the topics covered during the course, the student should have knowledge of the analysis techniques for linear circuits, good knowledge of the semiconductor devices, good knowledge of analog and digital electronics.
LEARNING OUTCOMES	<ul style="list-style-type: none">- Knowledge and comprehension capacity At the end of the course, the student will have acquired knowledge and comprehension capacity on: principles of power conversion with switching circuits, main applications of power electronics, basic circuits of power electronics, pulse width modulation, methods of analysis, voltage distortion and power quality- Ability to apply the acquired knowledge At the end of the course, the student will be able to: identify, formulate and analyze the fundamental set of problems related to the use of the power electronic circuits, by means of up-to-date methods, techniques and tools; understand electronic phenomena, circuits and systems; be acquainted with the physical parameters and the terminology related to the power electronics field.- Ability to evaluate scenarios The student will have gained the autonomy required to correctly employ the power electronic circuits.- Communication skills The student will be able to: communicate and express problems related to power electronics; be acquainted with the physical parameters and the terminology of the power electronics fields; talk about the up-to-date subject matters applicable to power electronic circuits; to competently talk about power electronic cases also with the general public.- Learning ability The student will be able to: deal with the study of power electronic circuits; recognize the need for an independent learning during all the lifetime; independently carry out bibliographical researches on power electronic systems; independently read and understand a specialized text; attend seminars and workshops in the power electronic fields and understand the oral speeches and the proceedings.
ASSESSMENT METHODS	<p>At the end of the course there will be an oral interview. The exam begins with the discussion of the report relating to one of the activities carried out during the course. Other questions are then formulated to the student, relating to the theoretical topics covered in the course. The overall grade for the exam is assigned on the basis of the clarity and completeness of the presentation of the required topics and the ability to re-elaborate and apply the learned concepts to real problems</p> <p>The grades, expressed on a 30-point scale, are divided into:</p> <p>(30-30 cum laude, ECTS grade A): excellent knowledge of the topics, excellent use of technical language, good analytical ability, the student is able to apply knowledge to solve the proposed problems;</p> <p>(27-29, ECTS grade B): good knowledge of the topics, good use of technical language, the student is able to apply knowledge to solve the proposed problems;</p> <p>(24-26, ECTS grade C): basic knowledge of the main topics, discrete use of technical language, limited ability to independently apply the knowledge to the solution of the proposed problems;</p> <p>(21-23, ECTS grade D): the student knows the main topics but has not a full grasp of them, satisfactory use of technical language, poor ability to independently apply the acquired knowledge;</p> <p>(18-20, ECTS grade E): minimal knowledge of the main topics and basic use of technical language, very little or no ability to independently apply the acquired knowledge;</p> <p>(Fail, ECTS grade F): the student does not have a minimum acceptable knowledge of the topics covered in the course.</p>
EDUCATIONAL OBJECTIVES	The course is focused on the analysis and design of the main applications of power electronics. The goal is to gain an understanding of the principles of power electronics, have an overview of power electronic circuits, and be able to select appropriate circuits for specific applications, and ultimately be able to analyze and design circuits.
TEACHING METHODS	<p>The course is organized in 8 modules, each one including a set of video lectures (pre-recorded) and a set of e-tivity:</p> <p>For each module, a set of exercises, questionnaires and practical exercitation is proposed as additional learning activities, also devised to facilitate the self-assessment of the learning outcomes. Each student is expected to dedicate about 31 hours for these activities. About one half of the activities are proposed as activities to be carried out autonomously by the students, while another half will be supervised or led by the course tutor.</p> <p>The overall number of hours for the individual study activities is estimated in 130 hours, which include 32 hours for replaying the video lectures.</p>
SUGGESTED BIBLIOGRAPHY	- N. Mohan, T.M. Undeland, W.P. Robbins, Power Electronics - Converters Applications and Design, Wiley, 3rd edition. ISBN: 978-0-471-22693-2

- Slides and notes provided by the lecturer.

SYLLABUS

Hrs	Frontal teaching
1	1-Course Introduction
4	2-Power electronic devices
5	3-Basic Electrical and Magnetic Circuit Concepts
5	4-AC-DC converter
5	5-DC-DC converter
5	6-DC-AC converter
4	7-Switching mode power suppliers
3	8-Applications
Hrs	Practice
31	The exercises will be carried out by assigning activities through exercises, questionnaires and practical exercises relating to the analysis, design and simulation (also with SPICE and CAD software) of some circuits covered in class.