



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Ingegneria
<b>ACADEMIC YEAR</b>	2016/2017
<b>FIRST CYCLE COURSE</b>	ELECTRICAL ENGINEERING
<b>SUBJECT</b>	POWER ELECTRONICS
<b>TYPE OF EDUCATIONAL ACTIVITY</b>	B
<b>AMBIT</b>	50298-Ingegneria elettrica
<b>CODE</b>	02957
<b>SCIENTIFIC SECTOR(S)</b>	ING-IND/32
<b>HEAD PROFESSOR(S)</b>	MICELI ROSARIO          Professore Ordinario          Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	
<b>CREDITS</b>	9
<b>INDIVIDUAL STUDY (Hrs)</b>	153
<b>COURSE ACTIVITY (Hrs)</b>	72
<b>PROPAEDEUTICAL SUBJECTS</b>	
<b>MUTUALIZATION</b>	
<b>YEAR</b>	2
<b>TERM (SEMESTER)</b>	2° semester
<b>ATTENDANCE</b>	Not mandatory
<b>EVALUATION</b>	Out of 30
<b>TEACHER OFFICE HOURS</b>	<b>MICELI ROSARIO</b> Monday    12:00    13:00    ufficio personale Tuesday    15:00    18:00    studio terzo piano Friday      15:00    18:00    studio terzo piano

DOCENTE: Prof. ROSARIO MICELI

<b>PREREQUISITES</b>	Basic skills of physics, electrotechnics and electronics are needed.
<b>LEARNING OUTCOMES</b>	<p>- Knowledge and understanding skills At the end of the class the student will have acquired the knowledge of the working principles, mathematical models, control and design issues of power electronic converters. Particularly he will be able to choose and to design electric components, basing on specific requirements, in the field of power electronic converters. The student will be aware in advanced topics in the field of power electronic converters.</p> <p>- Ability in applying knowledge and understanding The student will be able to use the mathematical, physical and engineering instruments for the investigation, the design and the realization of systems, or parts of them, within power electronic converters. He will be able to pose or hold reasonings dealing with the study, the application, the design and the setting up of power electronic converters.</p> <p>- Autonomy of judgement The student will be able to know and interpret the main electromechanical data and parameters of power electronic converters; he will be able to collect the data in order to carry out the correct sizing, to interpret their operation and to evaluate their correct operation during service. He will be able even to acquire a sufficient general knowledge of many aspects dealing with the power electronic converters.</p> <p>- Communication skills The student will acquire skills to communicate information and ideas and to express issues related to the course topics. In addition, he will be not only able to hold discussions on topics concerning the power electronic converters design, but also to highlight problems on the choice and on the adequate use of power electronic converters, proposing possible solutions.</p> <p>- Learning skills The student will gain learning skills on further comprehension of power electronic converters and their operating principles. He will acquire the ability to synthesize information and to judge the interactions between different topics and between the fundamental branches of knowledge regarding electrical engineering. These abilities will allow the student to continue the study with higher autonomy and discernment.</p>
<b>ASSESSMENT METHODS</b>	<p>Oral test with the presentation and discussion of the numeric exercises carried out during the course.</p> <p>- Learning evaluation The examination consists of an oral test, which will be performed after the conclusion of the semester of the present class. The student must answer at least to three oral questions based on the topics of the class. The oral test evaluation will be expressed in marks out of 30. The pass mark (18/30) will be reached only if the student demonstrates adequate knowledge and comprehension of at least the general outlines of the topics discussed during the course. Moreover, he must own adequate application skills, allowing the resolution of specific case studies. Particular attention will be given to his clarity of exposition and argumentation, so that his knowledge can be transmitted to the examiner. Otherwise, the test will be declared inadequate. In dependence of both the argumentation/exposition skills of the student with the examiner (more than sufficient, fair, good, more than good, excellent) and the level of knowledge/application skills of the topic shown by the student (more than sufficient, fair, good, more than good, excellent), the rating can be increased up to 30/30 "cum laude".</p>
<b>EDUCATIONAL OBJECTIVES</b>	Knowledge of the working principles, mode of operation and construction of power electronic converters.
<b>TEACHING METHODS</b>	Lectures, numeric exercises and laboratory tests.
<b>SUGGESTED BIBLIOGRAPHY</b>	<p>N. Mohan, T. M. Undeland, W. P. Robbins, "Power Electronics: Converters, Applications, and Design". Second edition, John Wiley &amp; Sons, Inc., New York, 1995 (consigliato rispetto alla versione italiana).</p> <p>· N. Mohan, T. M. Undeland, W. P. Robbins: "Elettronica di Potenza: Convertitori e Applicazioni", HOEPLI, Milano, 2005 (versione tradotta in lingua italiana).</p> <p>· Fotocopie dei trasparenti utilizzati.</p> <p>· H. Bühler: Electronique de réglage et de puissance, Ed. Georgi, 1979.</p>

## SYLLABUS

Hrs	Frontal teaching
4	Components employed in power electronic converters
5	Passive components employed in power electronic converters (inductors, capacitors and transformers)
5	Fourier series, THD, active, reactive and apparent power in distorted steady state
8	Diode rectifiers
10	Thyristor controlled rectifiers
3	Application of AC/DC converters in electrical drives and power plants
6	DC/DC converters with high frequency insulation transformers
9	Control techniques of DC/DC converters
10	Control techniques of DC/AC converters
2	Control techniques of AC/AC converters
Hrs	Practice
10	Numeric exercises and laboratory tests on AC/DC, DC/DC and DC/AC power converters