UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2021/2022
BACHELOR'S DEGREE (BSC)	ELECTRONICS ENGINEERING
SUBJECT	ELECTRICAL MACHINES
TYPE OF EDUCATIONAL ACTIVITY	D
AMBIT	10432-A scelta dello studente
CODE	04812
SCIENTIFIC SECTOR(S)	ING-IND/32
HEAD PROFESSOR(S)	DI TOMMASO ANTONINO OSCAR Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	144
COURSE ACTIVITY (Hrs)	81
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	ELECTRIC MACHINES - Corso: INGEGNERIA ELETTRICA PER LA E-MOBILITY
	ELECTRIC MACHINES - Corso: ELECTRICAL ENGINEERING FOR THE E-MOBILITY
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**DI TOMMASO ANTONINO OSCAR**
	Monday 15:00 16:00 Laboratorio "EDALab" (all'interno della sala macchine) - Edificio nr. 9, ex DEIM. E' gradito un contatto (telefono o e-mail) almeno un giorno prima.
	Tuesday 15:00 16:00 Laboratorio "EDALab" (all'interno della sala macchine) - Edificio nr. 9, ex DEIM. E' gradito un contatto (telefono o e-mail) almeno un giorno prima.
	Wednesday 15:00 16:00 Laboratorio "EDALab" (all'interno della sala macchine) - Edificio nr. 9, ex DEIM. E' gradito un contatto (telefono o e-mail) almeno un giorno prima.
	Thursday 15:00 16:00 Laboratorio "EDALab" (all'interno della sala macchine) - Edificio nr. 9, ex DEIM. E' gradito un contatto (telefono o e-mail) almeno un giorno prima.
	Friday 15:00 16:00 Laboratorio "EDALab" (all'interno della sala macchine) - Edificio nr. 9, ex DEIM. E' gradito un contatto (telefono o e-mail) almeno un giorno prima.

DOCENTE: Prof. ANTONINO OSCAR DI TOMMASO

PREREQUISITES	Basic skills of mathematics, physics, electrotechnics are required.
LEARNING OUTCOMES	- 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 electrical machines. Particularly he will be able to choice and to design electrical machines, basing on specific requirements, in the field of electric power systems, industrial automated systems. The student will be aware in advanced topics in the field of electrical machines. To reach these targets frontal lessons, cases study discussion and guided exercises are expected. These targets verification in the oral test has been expected. - 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 setting up of electrical machines. He will be able to pose or hold reasonings dealing with the study, the application and the setting up of electrical machines. The student will be aware in advanced topics in the field of electrical machines. To reach these targets frontal lessons, cases study discussion, guided exercises, autonomous exercises, specialistic softwares and commercial catalogs are expected. These targets verification in the oral test has been expected. - Autonomy of judgement The student will be able to know and interpret the main electromechanical data and parameters of electrical machines; 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. To reach these targets frontal lessons, cases study discussion, guided exercises, autonomous exercises, specialistic software and a design implementation are expected. These targets verification in the oral test has been expected with the presentation of a own design. - 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 electrical machines, but also to highlight problems on the choice and on the adequate use of electrical machines, proposing possible solutions. To reach these targets frontal lessons, cases study discussion are expected. These targets verification in the oral test has been expected. - Learning skills The student will gain learning skills on further comprehension of electrical machines 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. To reach these targets frontal lessons and numerical applications are expected. These targets verification in the oral test has been expected.
ASSESSMENT METHODS	Oral test with the presentation and discussion of the numeric exercises carried out during the course. - 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".
EDUCATIONAL OBJECTIVES	Knowledge of the working principles, mode of operation and construction of transformers and alternating and direct current machines.
TEACHING METHODS	Lectures, numeric exercises, laboratory tests and visits.
SUGGESTED BIBLIOGRAPHY	M. Kostenko, Piotrovsky, Electrical Machines (Vol. I e II), MIR Publishers, Moscow. S. Crepaz, Macchine Elettriche, CLUP, Milano. M. Perez de Vera, Macchine elettriche (Vol. I e II), Liguori, Napoli.

	M. Andriollo, G. Martinelli, A. Morini: " I Trasformatori. Esercizi con elementi di teoria + Macchine elettriche rotanti. Teoria ed esercizi". - Libreria Cortina. Padova.

SYLLABUS

Hrs	Frontal teaching
2	Introduction on electrical machines
2	Elementary knowledge on magnetic materials, conductors and insulation materials for electrical machines
4	Operation principle of the transformer
4	Mathematical models of the transformer
2	Parallel operation of transformers
4	Operation principle of the synchronous machine
3	Mathematical models of of the synchronous machine with linear and non-linear magnetic circuits
2	Characteristics of synchronous machines
2	Parallel operation of synchronous machines on an infinite power bus
4	Synchronous motors
4	Stability of synchronous machines
2	Operation principle of the induction machine
2	Construction characteristics of the induction machines
4	Mathematical model of the induction machine
4	Operation principle of the direct current machine
4	Direct current generators
4	Windings of electrical rotating machines
2	Direct current motors

Hrs	Practice
26	Numeric exercises on transformers, synchronous machines and induction motors. No-load and short circuit tests on a transformer