Fakultät für Ingenieurwesen
Facoltà di Ingegneria
Faculty of Engineering

COURSE DESCRIPTION – ACADEMIC YEAR 2023/2024

Course title	**Electrotechnics/Electrical Machines**
Course code	42130
Scientific sector	ING-IND/32
Degree	Industrial and Mechanical Engineering
Semester	2
Year	2
Credits	6
Modular	No

Total lecturing hours	36
Total lab hours	24
Attendance	Not compulsory
Prerequisites	
Course page	Microsoft Teams and https://ole.unibz.it/

Specific educational objectives	The course is dedicated to the study of electrical engineering and electrical machines in the industrial sector. The initial part of the course introduces the basic theory of electrical engineering, the fundamental laws and the characteristic analysis methods of the matter. Subsequently, the study of the main industrial applications of electrical engineering will be addressed, in particular static and rotating electrical machines.

Lecturer	Emanuele Fornasiero
Contact	emanuele.fornasiero@unibz.it
Scientific sector of lecturer	ING-IND/32
Teaching language	Italian
Office hours	By appointment
Lecturing Assistant (if any)	None
Contact LA	
Office hours LA	
List of topics	**Components of electrical circuits** Electric charges and electric currents, electric field and electric voltage, conduction phenomena and resistors, electric generators, electrostatics and capacitors, magnetic phenomena and inductors, bipoles, double bipoles and electric power **Circuit topology** General properties of electrical networks, graphs, Kirchhoff principles, steady-state networks **Analysis methods** Principle of superposition of effects, theorems of equivalent generators **Analysis of AC and DC circuits** Magnetic circuits, sinusoidal and phasor functions, sinusoidal networks, three-phase networks

	• **Electrical machines** Transformers, rotating electrical machines, general information and structure of electrical machines, principles of electromechanics, operating principle of the main rotating machines.
Teaching format	Lectures on the blackboard with numerical exercises

Learning outcomes	Knowledge and understanding
	    Know the basic laws of electrical engineering with particular attention to industrial applications.
	    Know the theory of electric machines and the principle of electromechanical conversion.
	
	Applying knowledge and understanding
	    Ability to solve numerical exercises of electrical networks.
	    Ability to design small systems and real-world applications.
	
	Making judgement
	    Ability to choose the most suitable and advantageous technological solution for a specific application.
	
	Communication skills
	    Ability to present the skills acquired with their own vocabulary relevant to the discipline.
	
	Learning skills
	    Ability to extend one's knowledge through tools for acquiring technical information and updating.
	    Ability to analyze more complex systems.

Assessment	• Written exam – excercises: 4 nuerical excercises, 3 hours • Written exam – quiz: evaluation of the theoretical part of the course with multiple choice questions, true or false, short descriptions, etc., 1 hour
Assessment language	Italian
Assessment Typology	Monocratic
Evaluation criteria and criteria for awarding marks	Assignment of a single final grade (50% exercises, 50% quiz). Mark attribution criteria: correctness of the exercises and answers given, with particular attention to the resolution procedure adopted. Clarity of the answer and language properties (also in relation to the language of the course). Rework ability. Order and clarity of the text and passages facilitate the teacher's understanding and contribute to the student's demonstration of mastery.

Required readings	• Lecture notes

	• M. Guarnieri, A. Stella "Principi ed applicazioni di elettrotecnica" Volumi 1 e 2, 3^ edizione, Edizioni Progetto Padova
Supplementary readings	• Chales K. Alexander, Matthew N.O. sadiku, "Circuiti Elettrici", 4^ edizione, McGraw-Hill Education Italia • M. Guarnieri, D. Desideri, F. Dughiero, F. Gnesotto, A. Maschio; Esercizi di Elettrotecnica – Reti elettriche, Societa´ editrice Esculapio, 2013
Software used	