COURSE DESCRIPTION – ACADEMIC YEAR 2025/2026

Course title	**Industrial Electrical Applications**
Course code	42156
Scientific sector	ING-IND/32
Degree	Industrial Mechanical Engineering (L-9)
Semester	1
Year	3
Credits	6
Modular	No

Total lecturing hours	60
Total lab hours	-
Attendance	
Prerequisites	Recommended: Electrotechnics
Course page	Microsoft Teams and https://ole.unibz.it/

Specific educational objectives	*The aim of the course is to provide the most significant elements on the applications of electrical engineering concepts.* *Students will learn the basics of electrical systems, machines, converters and plants, also dealing with the related safety issues.* *By means of case-studies, energy efficiency and costs aspects will also be considered, considering both classical and innovative applications.*

Lecturer	Dr. Emanuele Fornasiero
Contact	emanuele.fornasiero@unibz.it
Scientific sector of lecturer	ING-IND/32
Teaching language	English
Office hours	By appointment
Lecturing Assistant (if any)	
Contact LA	
Office hours LA	
List of topics	The course covers the topics of electrical power generation, distribution, conversion and usage, from a system-level point of view. The main topics are as follows: ● Production, transmission and distribution of electrical energy; sizing of electrical distribution lines ● Electrical energy static conversion ● Principles of operation of electrical machines ● Applications and choice of electrical motors for simple applications Application examples will be also addressed. Other sub-topics are about thermal aspects, grid harmonics, electrical safety.
Teaching format	Frontal lectures, exercises, practical pc activities.

Learning outcomes	Knowledge and understanding: • Master the most important concepts about industrial electrical applications • understand the design principles of electrical equipment and installations. Applying Knowledge and understanding: • Using proper criteria and tools for designing or choosing electrical systems and devices. The elements learnt are applied to real-world case-studies. Making judgments: • Ability to select the more adequate electrical system for a certain industrial application. Communication skills: • Acquisition of the field-related technical terminology. • Ability to describe the state-of-the-art of the technology adopted in electrical industrial systems. Learning skills: • Ability to learn autonomously is improved by acquiring analytical approaches, inter-disciplinary skills and by reading and understanding scientific and technical documentation.

Assessment	The assessment of the course is by a written exam and a quiz. The written exam comprises 3 numerical exercises, one about the design of an electric line, one about the choice of an electric motor for a specific application, and one chosen from one of the following topics: i) dc machines; ii) static converters; iii) harmonic suppression. The quiz part consists of 20 generic theory questions covering the theoretical part of the course (multiple choice, open answer, true or false). **Formative assessment** **Form** | **Length /duration** | **ILOs assessed** In class exercises | Total of about 24 hours during the course | 1, 2, 3, 4, 5 **Summative assessment** **Form** | **%** | **Length /duration** | **ILOs assessed** Written exam – exercises | 50% | 3 exercises (3 hours) | 1 ,2, 3 Written exam – theory | 50% | 20 multiple choice questions (1 hour) | 4, 5
Assessment language	English
Assessment Typology	Monocratic

Evaluation criteria and criteria for awarding marks	Final mark, 50% written part, 50% theory questions Relevant for assessment: correctness and clarity of written answers, correct exercise results, proper explanation of the assumptions.

Required readings	There is no single textbook covering the entire course content. The material is collected from various sources, which will be announced and delivered during the course.
Supplementary readings	• Chitarin, G.; Gnesotto, F.; Guarnieri, M.; Maschi, A. & Stella, A. Elettrotecnica 2: Applicazioni, Editrice Esculapio • Fauri, Gnesotto, Marchesi, Maschio, "Lezioni di Elettrotecnica – Applicazioni elettriche", Editrice Esculapio • Giorgio Rizzoni, „Elettrotecnica: principi ed applicazioni", edizione italiana a cura di Paolo Gubian, Francesco Vacca, Silvano Vergura, McGraw-Hill • Hughes, A. Electric motor and drives, Elsevier
Software used	Matlab, Simulink