Syllabus

Descrizione corso

Titolo insegnamento	Applicazioni industriali elettriche
Codice insegnamento	42156
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	ING-IND/32
Lingua	Inglese
Corso di Studio	Corso di laurea in Ingegneria Industriale Meccanica
Altri Corsi di Studio (mutuati)	
Docenti	dott. Emanuele Fornasiero, Emanuele.Fornasiero@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/40134
Assistente	
Semestre	Primo semestre
Anno/i di corso	3
CFU	6
Ore didattica frontale	60
Ore di laboratorio	0
Ore di studio individuale	90
Ore di ricevimento previste	18
Sintesi contenuti	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.
Argomenti dell'insegnamento	- Introduction about the role of electrical energy in nowadays world with some focus on primary energy sources - Production, transmission and distribution of electrical energy analysing the grid structure and with hints about electrical energy production - Comparison between different ways to transmit electrical energy and role of the three phase systems - Components of the transmission and distribution lines, and line models - Criteria for sizing electrical distribution lines with examples - Power factor compensation - Electrical safety hints, low voltage distribution systems and their main characteristics - Electrical energy static conversion, introducing rectifiers, inverters, switching power supply devices, choppers and their princicple of working - Principles of operation of electrical machines - DC machines, structure, principle of working and main characteristics - AC machines, structure, principle of working and main characteristics - Induction (asynchronous) machines - Synchronous machines - Applications and choice of electrical motors for simple applications - Complementary topics: harmonic analysis on networks and associated problems, thermal considerations on electrical systems, devices and machines.
Parole chiave	Electrical energy, electrical machines, static converters, electrical systems, electrical energy transmission
Prerequisiti	Elettrotecnica e macchine elettriche
Insegnamenti propedeutici	
Modalità di insegnamento	Frontal lectures, exercises, practical pc activities.
Obbligo di frequenza	Not mandatory
Obiettivi formativi specifici e risultati di apprendimento attesi	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. 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.
Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)	Knowledge and understanding: 1 Master the most important concepts about industrial electrical applications 2 understand the design principles of electrical equipment and installations. Applying Knowledge and understanding: 3 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: 4 Ability to select the more adequate electrical system for a certain industrial application.

	Communication skills: 5 Acquisition of the field related technical terminology. 6 Ability to describe the state of the art of the technology adopted in electrical industrial systems. Learning skills: 7 Ability to learn autonomously is improved by acquiring analytical approaches, inter disciplinary skills and by reading and understanding scientific and technical documentation.
Modalità di esame	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: nof foreseen - Summative Assessment: 50% written exam, exercises: 3 exercises (3 hours); ILOs assessed: 1 ,2, 3, 4; 50% written exam, theory: 20 multiple choice questions (1 hour); ILOs assessed: 5, 6.
Criteri di valutazione	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.
Bibliografia obbligatoria	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.
Bibliografia facoltativa	• 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

Altre informazioni	Software used: Matlab, Simulink
Obiettivi di Sviluppo Sostenibile (SDGs)	Istruzione di qualità, Innovazione e infrastrutture, Energia rinnovabile e accessibile