Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	Electric Power Conversion Equipment
Course code	45511
Scientific sector	ING-IND/32
Degree	Master Energy Engineering
Semester	II
Year	1
Academic year	2020/21
Credits	6
Modular	no

Total lecturing hours	36
Total lab hours	24
Total exercise hours	
Attendance	
Prerequisites	Electrotechnics
Course page	https://www.unibz.it/en/faculties/sciencetechnology/master-energy-engineering/

Specific educational objectives	The course discusses the theoretical basis and the practical applications of electrical energy conversion (electrical to electrical and electro-mechanical). The main conversion topologies are introduced and studied. Practical aspects and applications will be considered, highlighting the advantages achievable with state-of-the-art technologies. Practical work through laboratory exercises will be organized during the course.

Lecturer	Dr. Nuzzo Stefano
Scientific sector of the lecturer	ING-IND/32
Teaching language	English
Office hours	on appointment
Teaching assistant *(if any)*	
Office hours	
List of topics covered	Static conversion of electrical energy: power electronics components, static conversion principles and applications of static converters, inverter, uninterruptible power systems. Electromechanical energy conversion: nomenclature and characteristics, working principles, fundamentals and applications of DC and AC electrical machines and transformers. Electric drives: generalities of variable speed electric drives, DC and AC motor drives. Practical laboratory experiments on power conversion and

	control using simple digital programmable platforms.
Teaching format	Frontal lectures, exercises in lab

Learning outcomes	**Knowledge and understanding:** Master the most important concepts about electrical energy conversion, understand the design principles of common conversion systems. **Applying knowledge and understanding:** Understanding the main components of actual conversion systems (e.g. multiple stage). Practical experience on simple prototypes. **Making judgments:** Ability to select the more adequate conversion system for a certain application. **Communication skills:** Acquisition of the field-related technical terminology Ability to describe the state-of-the-art of the technology adopted in energy conversion systems. Writing technical reports on laboratory activities. **Learning skills:** Improvement in the ability to autonomously extend the knowledge acquired during the study course, by reading and understanding scientific and technical documentation.
Assessment	The assessment of the course consists of two parts: • Lab reports: evaluation of the laboratory reports (homework) • Final practical project: assessed through a project report and an oral presentation with a demo (at the end of the course). Both parts must be positive for passing the exam. The final grade is the weighted average of the two marks.
Assessment language	English
Evaluation criteria and criteria for awarding marks	The final grade is the weighted average of the marks for final practical project and oral exam. Both parts must be positive. The following aspects will be considering in the evaluation: • Lab reports: clarity and correctness of answers, technical language, ability to summarize and evaluate results, presentation quality and ability to understand relationships between different topics • Final practical project: ability to work in a team, problem solving ability, skills in critical thinking, ability to summarize and communicate concepts and to evaluate results.

Required readings	There is no single textbook covering the entire course content. The material is collected from various sources, which will be announced during the course.
Supplementary readings	1. Hart, D. Power electronics McGraw-Hill, 2011 2. Hughes, A. Electric motor and drives Elsevier, 2013

	3. Banzi, M. Getting started with Arduino O`reilly, 2011 4. Margolis, M. Arduino Cookbook O'reilly, 2012