**Syllabus**

**Course title**: Electric Power Conversion Equipment  
**Course code**: 45511  
**Scientific sector**: ING-IND/32  
**Degree**: Master Energy Engineering  
**Semester**: II  
**Year**: 1  
**Academic year**: 2019/20  
**Credits**: 6  
**Modular**: no

<table>
<thead>
<tr>
<th><strong>Total lecturing hours</strong></th>
<th>36</th>
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<tbody>
<tr>
<td><strong>Total lab hours</strong></td>
<td>24</td>
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<tr>
<td><strong>Total exercise hours</strong></td>
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**Attendance**

**Prerequisites**: Electrotechnics  
**Course page**: [https://www.unibz.it/en/faculties/sciencetechnology/master-energy-engineering/](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. Tinazzi Fabio  
**Scientific sector of the lecturer**: ING-IND/32  
**Teaching language**: English  
**Office hours**: Wednesday – 12-14  
**Teaching assistant (if any)**: Dr. Carabin Giovanni  
**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. |

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<th>3. Banzi, M. Getting started with Arduino O’reilly, 2011</th>
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