### Programme of “Azionamenti Elettrici”:
**“Electrical Drives”**

- **Code:** I2L036  
- **Compulsory**  
- **2nd cycle in Electrical Engineering, 1st year, 2nd semester**

Number of ECTS credits: 9 (workload is 225 hours; 1 credit = 25 hours)

**Teacher:** Francesco Parasiliti Collazo

<table>
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<tr>
<th>Course objectives</th>
<th>The goal of this course is to provide principles of theory and control of the main Electrical Drives.</th>
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| 2 Course content and Learning outcomes (Dublin descriptors) | Topics of the module include:  
- Introduction to adjustable speed drives.  
- Steady state Electrical Machines models: DC Motors, Induction Motors, Synchronous Motors.  
- Stationary and rotating reference models.  
- DC Motor speed control and multi-quadrant operation. Separately excited DC Motors: armature voltage control, armature current control, field control.  
- Induction Motor speed control: variable voltage, constant voltage/frequency control, current control, flux weakening operation, vector control.  
- Synchronous Motor, Permanent Magnet Motor, Reluctance Motor speed vector control.  
- DC Converters: rectifier and chopper.  
- DC Motor Drives: single and multi-quadrant drives.  
- AC Converter: voltage source inverter. Six-step inverter and PWM inverter, modulation techniques, current control.  
- Speed control AC Motor Drives: voltage/frequency control and field-oriented control.  
- AC Motor operation with non-sinusoidal supply waveforms.  

On successful completion of this module, the student should  
- have **knowledge and understanding** of the theory and control of the main Electrical Drives  
- understand and explain the physical mechanisms of the Electrical Drives and the principles of the electrical motor speed control  
- demonstrate **skill and ability** in the choice, design and operation of Electrical Drives and their applications  
- demonstrate **capacity** for reading and understand other texts on related topics. |
| 3 Prerequisites and learning activities | The student must know the contents of the course “Electrotechnics”, “Electrical Machines” |
| 4 Teaching methods and language | Lectures and practical lab experiences, home work  
Language: Italian  
Ref. Text books:  
Lectures Notes;  
J.M.D. Murphy, F.G. Turnbull, Power Electronic Control of AC Motors, Pergamon Press;  
W. Leonahrd, Control of Electrical Drives, Springer-Verlag;  
P. Vas, Vector Control of AC Machines, Oxford Science Publications. |
| 5 Assessment methods and criteria | oral exam |