



Course Syllabus

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| Course Code | Course Title | ECTS Credits |
| ECE-462 | Power Electronics | 6 |
| Prerequisites | Department | Semester |
| ECE-210, ECE-212 | Engineering | Fall, Spring |
| Type of Course | Field | Language of Instruction |
| Elective | Engineering | English |
| Level of Course | Lecturer(s) | Year of Study |
| 1 st Cycle | Dr Andreas Michaelides | 4 th |
| Mode of Delivery | Work Placement | Co-requisites |
| Face-to-face | N/A | None |

Course Objectives:

The main objectives of the course are to:

- Provide the fundamental knowledge of converting and controlling electrical power through power semiconductor devices.
- Become acquainted with automated production lines.
- Decide the sequence of operation, speed, torque etc. of motors to provide the power.
- Design electronic circuits to perform standard conversions.
- Use power electronic modules to control electric motors.

Learning Outcomes:

After completion of the course students are expected to:

- Differentiate between structural parameters of usual (low current) diodes, transistors, FETs and the corresponding power diode/transistor/FET.
- Design circuits with thyristors and triacs and trigger them for specific applications.
- Apply conventional network theory to analyze DC-DC converters, choppers and their preferable applications.
- Adjust single-and three-phase voltage source inverters to suit the load requirements.
- Analyze AC/AC converter, single-phase and three-phase voltage.
- Controllers with respect to the specific application.
- Propose designs supporting renewable energy sources using power electronics.
- Operate simple automated (controlled) domestic and industrial power systems and to some extent operate them.

Course Content:

- Introduction to power electronics
- Diode circuits and rectifiers
- Power diodes, transistors and thyristors
- Thyristor commutation techniques
- Controlled rectifiers
- Static switches
- AC voltage controllers
- DC choppers
- Inverters

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises. Controlling various motors types with the appropriate power electronics training modul units from LabVolt.

Assessment Methods:

Homework, semester project, midterm exam, final exam.

Required Textbooks / Readings:

| Title | Author(s) | Publisher | Year | ISBN |
|---|--------------------------------|------------------|-------------|---------------|
| Power Electronics: Circuits, Devices and Applications | M.H. Rashid | Prentice Hall | 2005 | 9788120325036 |
| Power Electronics: Converters, Applications & Design | N. Mohan, T.M. Underland | John Wiley | 2002 | 9780471226932 |

Recommended Textbooks / Readings:

| Title | Author(s) | Publisher | Year | ISBN |
|---|---------------------------------|----------------------------------|-------------|---------------|
| Fundamentals of Power Electronics | R.W. Erickson, D. Maksimovic | Kluwer Academic Publishers | 2001 | 9780792372707 |