



Course Code ECE-562	Course Title Power Electronics	ECTS Credits 8
Department Engineering	Semester Fall, Spring	Prerequisites None
Type of Course Elective	Field Engineering	Language of Instruction English
Level of Course 2 nd Cycle	Year of Study 1 st	Lecturer(s) Dr Andreas Michaelides
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

This course provides the fundamental knowledge of converting and controlling electrical power through power semiconductor devices. In automated production lines the sequence of operation, speed, torque etc. of motors are provided by power electronic devices which in turn receive their instructions from a computer. The course leads initially through a qualified study of the components comprising the power electronics devices as power diodes/transistors, thyristors etc. and further elaborates on the concept and functioning of basic power electronic devices.

Learning Outcomes:

After completion of the course students are expected to:

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

Course Contents:

1. Introduction to power electronics
2. Diode circuits and rectifiers
3. Power diodes, transistors and thyristors
4. Thyristor commutation techniques
5. Controlled rectifiers

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| 6. Static switches
7. AC voltage controllers
8. DC choppers
9. Inverters |
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Learning Activities and Teaching Methods:

Lectures, presentation of functioning semiconductor devices in class, project, independent study assignment

Assessment Methods:

Homework, projects, independent study assessment, mid-term exam, final exam

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
N. Mohan, T.M. Underland	Power Electronics: Converters, Applications & Design	John Wiley	2002	9780471226932

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
M.H. Rashid	Power Electronics: Circuits, Devices and Applications	Prentice Hall	2005	9788120325036
R.W. Erickson, D. Maksimovic	Fundamentals of Power Electronics	Kluwer Academic Publishers	2001	9780792372707