Syllabus of the Power Electronics course

Course type: elective course for the B.Sc degree in Electrical and Electronic Engineering.
Prerequisites: basic courses of Electricity and Electronics.
Number of weekly academic hours: 2 hours – lecture, 1 hour – tutorial
Lecturer and tutor name: Dr. Elena Trotskovsky

Recommended textbooks:
[1] M. H. Rashid, Circuits, Devices & Applications, 3th Edition. Pearson Education Limited, 2004.
[2] Power Electronics Handbook, 3th Edition. Editor - M. H. Rashid. Elsevier, 2011.
[3] N. Mohan, T. M. Undeland, and W. P. Robbins. Power Electronics: Converters, Applications, and Design, 3rd Edition. John Wiley & Sons, 2003.

Contents:

Subject	Week
Introduction: scope and applications of Power Electronics. Power switches: common characteristics. Ideal and real switches.	1
Power diode. Schottky diode. Flywheel connection of diode.	2
AC/DC converters – uncontrolled rectifiers. Single phase diode rectifiers: half-wave and full-wave configurations. Single phase rectifier with RL load. Average and ripple improvement using filters.	3
Three-phase uncontrolled rectifiers: star and full bridge configurations. Three-phase rectifiers with RL load. Average and ripple improvement using filters.	4
Thyristors. Different types of thyristors: diac, SCR, triac, GTO, MCT, LASCR, photo triac.	5
Single phase controlled rectifiers on thyristors: half-wave and full-wave configurations.	6
Three-phase controlled rectifiers on thyristors: star and full bridge configurations.	7
Power transistors: BJT, MOSFET. IGBT.	8
DC/DC converters. Step – Down (Buck) converter.	9

Step – Up (Boost) converter. Buck – Boost converter.	10
Cuk converter. Full bridge DC/DC converter.	11
DC/AC converters. PWM inverter.	12
Resonant Pulse Inverter.	13
Zero – voltage switching. Summary.	14