Instructor: Navid Zargari

Course Outline

**Introduction to Power Electronics**

**Power Semiconductor Devices**
Diode, Controllable devices (SCR, GTO, MOSFET, IGBT, GCT); characteristics and losses. Introduction to Wide Band Gap devices

**Power Converter Topologies**
Diode rectifiers, Phase controlled converters, dc/dc converters, dc/ac and ac/dc converters, interleaved and multi-level converters, ac/ac converters, review of ac drive topologies

**Control Techniques in Power Converters**
Hysteresis control, Pulse Width Modulation (PWM), Space Vector Modulation, Selective Harmonic Elimination (SHE), modelling of converters and controller design

**Power Quality**
Harmonic distortion, Power Quality Indices, Harmonic standards, input/output filters and design considerations

**Power Electronics Applications**
Switch mode power supplies. Adjustable Speed Drives, HVDC Transmission systems, Grid connected applications, Active power filters

**Project:**
Individual projects will be given in the early part of the course. The deliverable is a report and a possible class presentation (depends on the class size). The project should include literature review, analysis, modelling, simulation results and possible next steps

**References:**
- Mohan, Undeland, and Robbin, Power Electronics: Converter, Application and Design (2nd or 3rd edition)
- D.W. Hart, Power Electronics, McGraw Hill, 2011,
- Mehrdad Kazerani, ECE663 Lecture slides

**LEARN:** LEARN will be used for posting course material, assignments, projects, old exams and announcements. It will be used for uploading the deliverables to the appropriate drop boxes.

**Grading Scheme**
- Midterm Exam: 15%
- Project: 35%
- Final Exam: 50%