ENEE 719B: Advanced Power Electronics – Course Outline

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Grading: TBA
Class hours: TBA
Office hours: TBA

Course Description:
Advanced power electronic converters, techniques to model and control switching circuits, pulse width modulation, resonant switch converters, resonant DC-link converters, series and parallel loaded resonant (SLR, PLR) DC-DC converters, zero-voltage switching clamped-voltage (ZVS-CV) converters, ZVS resonant-switch DC-DC converters are explained. In addition, this course deals with small-signal and large-signal modeling and control of switched mode power converters, sliding-mode operation, state space models, generalized state-space averaging, and feedback linearization techniques. Multiple-input converters and their operational principles are explained. Furthermore, practical design procedures for type II and type III compensators with voltage-mode error-amplifier for DC/DC converters are explained.

Course Purpose:
There is a growing demand towards power electronic switching circuits in a broad variety of applications from low-power personal computers, laptops, digital cameras, cell phones, home appliances, to medium-power telecommunication systems, switching power supplies, hybrid electric, plug-in hybrid electric vehicles, more electric aircrafts, sea vehicles, undersea vehicles and industrial motor drives, to high-power active filters, renewable (Solar, wind, and ocean) energy systems, and flexible AC transmission systems for terrestrial power systems. In fact, power electronics provides the basis for a variety of new electrical circuit architectures that allow substantial improvements in performance and flexibility. The purpose of this course is to present the advanced topics in power electronics.

Course Text:
There is no textbook. Instructor will use technical papers and notes. The following books can be used as reference.