Course Syllabus

ELCT 572 – Power Electronics

Course Coordinator: Dr. Enrico Santi

Catalog Description: Basic analysis and design of solid-state power electronic devices and circuitry.

Credit Hours 3

Prerequisite(s) by course ELCT 331 or any introductory feedback control class and ELCT 371 or any introductory electronics class

Prerequisite by topics Control Systems, Electronics


Course Outcomes:
Students who successfully complete the course will be able to:

• Analyze switching power converters in steady state using circuit averaging and determine DC voltages and currents
• Sketch current and voltage waveforms in a converter in steady state
• Size passive filtering components in a converter such as inductors and capacitors to obtain a desired ripple performance
• Derive small-signal linearized models for switching converters
• Understand the effects of negative feedback on converter operation
• Simulate switching converter using both switching models and averaged models

Course Topics:

• Introduction to Power Electronics
• Steady-state operation of switching converters
• Steady-state equivalent circuit modeling, losses and efficiency
• Switch realization
• Power semiconductor devices
• High frequency transformer isolation in switching converters
• Basic magnetic theory
• Inductor and transformer design
• AC equivalent circuit modeling
• Small-signal switching converter transfer functions
• Negative feedback, controller design

Course Contribution to Program Outcomes:
ELCT 572 contributes to an achievement of:

• Outcome A – an ability to apply knowledge of mathematics, science and engineering
• Outcome B -- an ability to design and conduct experiments; analyze and interpret data
• Outcome C -- design a system, component, or process to meet desired needs
• Outcome E -- an ability to identify, formulate, and solve engineering problems
• Outcome K -- an ability to use techniques, skills, and modern engineering tools necessary

General Course Policies

Academic Integrity
Unless otherwise stated, assignments and examination work are expected to be the sole effort of the student submitting the work. Students are expected to follow the University of South Carolina Honor Code and they should expect that every instance of a suspected violation will be reported. Students found responsible for violations of the Code will be subject to academic penalties under the Code in addition to whatever disciplinary sanctions are applied.

Accommodating Disabilities
Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, contact the Office of Student Disability Services: 777-6142, TDD 777-6744, email sasds@mailbox.sc.edu, or stop by LeConte College Room 112A. All accommodations must be approved through the Office of Student Disability Services.

Diversity
When scheduling exams, I have attempted to avoid conflicts with major religious holidays. If, however, I have inadvertently scheduled an exam or major deadline that creates a conflict with your religious observances, please let me know as soon as possible so that we can make other arrangements.

Recommended Study Habits
• Read the assigned material before class.
• Bring thoughtful questions to class for discussion.
• Prepare for the exams in study groups.
• Take notes during class discussions and while completing reading assignments.

Deviations
Minor deviations from the syllabus are a normal part of any adaptive teaching and learning process.