

Course Description

Power computation, diodes and rectifier circuits, power factor correctors, switch mode power converters, magnetic components, switch capacitor power converters, linear regulators, and integrated circuit techniques for controller design. *Prerequisite(s)*: ELEC 3400

List of Topics

Week 1	Introduction; Power Computation
Week 2	Power Factor and Crest Factor; Diodes Circuits
Week 3	Rectifier Circuits; Voltage Doubler
Week 4	Switching Converters; Steady State Operation
Week 5	Other Switching Converter Topologies and Their Characteristics
Week 6	Non-ideal Performance of Switching Converters; DCM Operation
Week 7	Control Methodology; Band-Band Control
Week 8	PWM Control; PFM Control
Week 9	Current-Mode Control; Peripheral Building Blocks
Week 10	SMPC Closed-Loop Response and Stability; Magnetic Materials
Week 11	Air-gap and Inductor Design
Week 12	Linear Regulators; Shunt and Series Regulators
Week 13	Stability and Compensation Technique; Protection Circuitry

Statement of Objectives/Outcomes:

On successful completion of this course, students will be able to:

CO1 - recognize magnetic quantities such as magnetic flux, permeability and reluctance, and compute magnetic quantities relating to inductors and transformers.

CO2 - recognize and compute electrical quantities such as power and work done related to both DC and AC circuits.

CO3 - compute operating parameters and characterize the performance of power converters and regulator circuits.

CO4 - analyze and design component parameters for power converters and regulator circuits.

CO5 - apply software (CAD) tools to design, simulate and analyze power converters and regulator circuits.

Textbook(s):

Lecture notes will be available on the course webpage.

References:

1. D.W. Hart, *Power Electronics*, McGraw-Hill, 2011.
2. P.T. Krein, *Elements of Power Electronics*, Oxford, 1998.
3. R.W. Erickson and D. Maksimovic, *Fundamentals of Power Electronics*, Second Edition, KluwerAcademic Publishers, 2001.

Relationship of Course to Program Outcomes:

Please refer to the Report Section 4.3.2 (iii).

Grading Scheme:

Homework	10%
Project	15%
Midterm Examination	25%
Final Examination	50%