EE 442/642 POWER ELECTRONICS
COURSE SYLLABUS

Instructor: Dr. Y. Baghzouz
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Office Hours: T & Th: 1:00-2:30 and 4:00-5::30, and W: 11:00-12:00

Book Title: N. Mohan, T.M. Undeland, W.P. Robbins. *Power Electronics: Converters, Applications and Design*, John Wiley & Sons, Inc., 3rd Edition, 2003.

References:

1. Introduction to Modern Power Electronics, A.M. Trzynadlowski, Wiley-Interscience, 1998.
2. Power Electronics, M.J. Fisher, PSW Kent, 1991.
3. Power Electronics: Principles and Applications, J.M. Jacob, Delmar Thomson Learning, 2002.
4. Power Electronics: Converters, Applications and Design, N. Mohan, T.M. Undeland and W.P. Robbins, John Wiley & Sons, Inc., 1995.
5. P.T. Krein, *Elements of Power Electronics,* Oxford University Press, 1998.

Course Content:

- Overview of electric and magnetic circuit concepts, power semiconductor switches, and computer simulation tools **(Chapters 1-4).**
- AC-DC conversion (diode rectifier, inductive filtering, controlled rectifier, effect of line inductance). **(Chapters 5-6)**
- DC-DC conversion (step-up, step-down, buck-boost, full-bridge) **(Chapter 7)**
- DC-AC conversion (pulse-width-modulation, and other switching schemes). **(Chapter 8)**
- Resonance converters (soft-switching techniques – ZCS and ZVS). **(Chapter 9)**
- DC power supplies (flyback, forward, and push-pull converters, switch control, protection and electrical isolation) **(Chapter 10)**
- Power conditioning and UPS **(Chapter 11)**
- Motor drive applications (speed control of DC, induction and synchronous motors) **(Chapter 12-15).**
- Residential, industrial, and utility applications **(Chapters 16-17).**

Course Objectives:

To teach students how to analyze and design
- AC-DC converter
- DC-DC converters,
- DC-AC converters,
- converters with minimum switching losses,
- DC power supplies,
- power conditioning circuits and un-interruptible power supplies,
- speed controllers for DC motors, induction motors and synchronous motors,
- power electronic circuits in residential, commercial, industrial and utility applications.

Course Outcomes:

Students should be able to:
- Characterize distorted and period waveforms and calculate real power content,
- Analyze and design AC-DC converters,
- Analyze and design DC-DC converters,
- Analyze and design DC-AC converters,
- Analyze and design resonant converters,
- Analyze and design DC power supplies,
- Analyze and design speed controllers for DC, induction, and synchronous motors
- Analyze and characterize power electronics circuits found in residential, industrial and utility applications.

Computer Usage:

PSpice

Tests & Homework:

	Subject	Value
Midterm	AC-DC and DC-DC converters	30 Points
Homework & Projects	Homework assignments involve computer simulations. Projects will be assigned to graduate students.	30 Points
Quizzes	15 min. multiple-choice questions held every 2 weeks	30 Points
Final	Covers all material	30 Points
Total		**120 Points**

Grading:
A ≥ 100 > B ≥ 80 > C ≥ 70 > D ≥ 50 > F

Notes:
- Graduate students will have more challenging questions in the tests and quizzes. Additionally each graduate student will be assigned a research project.
- There will be no make-up tests or quizzes.
- There will be no extra credit work for individuals.
- Class attendance and participation is highly encouraged.

Academic Misconduct – Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution.

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Religious Holidays Policy – Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor no later than the first two weeks of classes of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. This policy shall not apply in the event that administering the test or examination at an alternate time would impose an undue hardship on the instructor or the university which could have been avoided. For additional information, please visit: http://catalog.unlv.edu/content.php?catoid=4&navoid=164.

Tutoring – The Academic Success Center (ASC) provides tutoring and academic assistance for all UNLV students taking UNLV courses. Students are encouraged to stop by the ASC to learn more about subjects offered, tutoring times and other academic resources. The ASC is located across from the Student Services Complex, #22 on the current UNLV map. Students may learn more about tutoring services by calling (702) 895-3177 or visiting the tutoring web site at: http://academicsuccess.unlv.edu/tutoring/.

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