ECE 482/582 Syllabus  
Power Converter Design  
Fall 2015

Instructor: Dr. Reza Ahmadi  
Email: ahmadi@siu.edu

Office Hours: Monday, Wednesday, Friday – 9:00 a.m. to 10:00 a.m. – 11 a.m. to 1 p.m.

Lecture: MWF, 10:00 – 10:50 a.m., ENGR A-210

Lab: Thursday, 4:00 – 4:50 a.m., ENGR A-308

Grading/Evaluation:
- Homework 40%
- Midterm Exam 1 20%
- Midterm Exam 2 20%
- Final Exam 20%

Grading Distribution: Grade cut-offs for ECE 482 will be set at 85% (A), 70% (B), 60% (C), and 50% (D). Grade cut-offs for ECE 582 will be set at 90% (A), 80% (B), 70% (C), and 60% (D). The instructor reserves the right to adjust the cut-offs downward, but not upward, at his sole discretion. Cumulative totals less than 50% are extremely likely to result in failing grades.

Course Summary: The primary focus of the course is on topology exploration, electrical analysis, dynamic modeling, and magnetic design for power electronic converters and energy conversion systems. This course relies heavily on simulations based design for integration of the mentioned techniques into a design methodology.

Course Website: Desire 2 Learn

Prerequisite: Completion of ECE 385 and ECE 356;

Course Text: Elements of Power Electronics by Philip T. Krein (optional).

Classroom Policies:

A. Homework: Approximately every week, there will be a homework assignment. The problems will be chosen to ensure that you learn the desired material. Homework grades will be 50% for completeness, 50% for accuracy. Each assignment will be announced on the class or through e-mail and will be posted by the end of the day on the course website. You are responsible for checking the course website each week to find the posted assignment. Homework is due at the BEGINNING of the class session exactly a week from the date assigned. After 10:30 am, a 10% penalty applies. After 5:00 pm, no late work will be accepted. You may turn in homework early in the event of a conflict. Verified emergencies will also be accommodated. Assignments don’t show a due date on them, you are responsible for keeping track of the due dates and turn in your homework before the due date.
B. **Exams:** The exams are composed primarily of problem solving. There will be situations that call for integrating multiple concepts. The final exam is cumulative. There will be a greater emphasis on integrating concepts.

Schedule conflicts should be brought to the instructor’s attention as soon as possible. If you must miss an exam for an excusable reason, you may take it early. Conflicts with the final will be addressed in accordance with university policy.

Calculators are allowed on exams (nothing more than TI-89), however any calculator with any means of wireless communication with other devices is not allowed. Cell phones or other communications devices are NOT allowed—not even the calculator function on the phone.

C. **Documented Disability:** If you have a documented disability and anticipate needing accommodations in this course, you are strongly encouraged to meet with me early in the semester. You will need to request that the Disability Services staff send a letter to me verifying your disability and specifying the accommodation you will need before I can arrange your accommodation. See http://disabilityservices.siu.edu/ for more details.

D. **Academic Dishonesty:** Academic dishonesty will be addressed in accordance with university policies. On homework assignments, you are allowed to collaborate with peers, but ultimately, the work you turn in MUST be your own. In case of homework copying, in the first instance you will receive a zero grade on the copied homework, in the second instance your grade for all homeworks will be reduced to zero. On exams, you may only use your own notes (if cheat sheet allowed) and a calculator; any other aids will be considered cheating.

E. **Mobile Technology Policy:** Use of cellphones for any reason during the lectures, lab sessions, and exams is prohibited.

**Required Knowledge for the Course:**

We will be using principles of circuit analysis, electronics, electrical power systems, electrical machinery, linear control system theory, digital signal analysis, and MATLAB Simulink extensively in this course. Therefore, review the materials that you have studied before and make yourself familiar with the materials that you don’t already know.

For the linear control systems you need to review the following topics:

- The Laplace transform for solving linear time-invariant differential equations.
- State-space representation of dynamic systems.
- Transient and steady-state response analysis of first order and second order systems (including the error constants).
- Pole-zero plane and basic Root-Locus analysis.
- Bode plots and basic frequency response analysis.
- Basic control system design in time and frequency domain.

An excellent text to review the above topics is “Modern Control Engineering” by katsuhiko Ogata available through the Morris library (call# TJ213.O282010).
ECE 482/582 Syllabus Spring 2014

For the electronics you need to review semiconductor switching devices and their properties. You should be familiar with power diodes, MOSFETs, IGBTs, SCRs and power transistors.

You should also review principles of power systems such as three-phase systems, power factor correction, complex and instantaneous power, and power transformer models.
University Policies

A. Incomplete Grades: An INC is assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments. An INC must be changed to a completed grade within a time period designated by the instructor but not to exceed one year from the close of the term in which the course was taken, or graduation, whichever occurs first. Should the student fail to complete the course within the time period designated, not to exceed one year, or graduation, whichever comes first, the incomplete will be converted to a grade of F and the grade will be computed in the student’s grade point average. Students should not reregister for courses in which an INC has been assigned with the intent of changing the INC grade. Re-registration will not prevent the INC from being changed to an F.

B. Academic Integrity: You are expected to submit your original work and adhere to the academic policies as stated in the SIU Student Conduct Code: http://srr.siu.edu (listed under Additional Links). Any act of academic dishonesty, cheating, or plagiarism in any form, including anonymous internet sources used in student papers, will be reported. These acts are taken seriously and the consequences may range from failing an assignment to expulsion from the university.

C. SIU Email: Your SIU email account is an official form of University communication. Your instructor will use SIU email as a primary means of electronic communication with students. Please make sure that you maintain a valid password and acquire the habit of regularly checking your SIU email account for important instructor and University announcements. You may view the official SIU Student Email Policy at: http://policies.siu.edu/policies/email.html.

D. Emergency Procedures: SIU is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with SIU Emergency response Plan and building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT’s website at http://www.bert.siu.edu/, the SIU Department of Public Safety’s website www.dps.siu.edu (disaster dropdown and video, “Shots Fired”), and in the Emergency Response Guideline pamphlet. Know how to respond to each type of emergency. Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency. The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.
E. **Supplementary Assistance:** SIU is committed to assisting students with disabilities. With the cooperation of SIU’s Disability Support Services (DSS), each student who qualifies for reasonable supplementary assistance has the right to receive it. Students requesting supplementary assistance must first register with DSS in Woody Hall, B-150, 618-453-5738 or 618-453-2293 (TTY), by email DSS@siu.edu, or http://disabilityservices.siu.edu/. Notice: If you have any type of special need(s) or disability for which you require accommodations to promote your learning in class, please contact me as soon as possible. The Office of Disability Support Services (DSS) offers various support services and can help you with special accommodations. You may wish to contact DSS to verify your eligibility and options for accommodations related to your special need(s) or disability.

**Student Services**

A. **Learning Support Services:** The Center for Learning Support Services (CLSS) assists students of all cultures, abilities, backgrounds and identities with enhancing their self-management and interdependent learning skills. Programs offered by CLSS include: group study sessions; math tutoring; academic coaching; early intervention program; and study skills seminars. For additional information please contact CLSS in Woody Hall, Room A-313, 618-453-2925, or www.tutoring.siu.edu.

B. **Writing Center:** The Writing Center offers free tutoring services and assistance with improving writing skills to all SIU undergraduate students and faculty. For center locations and hours, to schedule an appointment online, and to view information regarding the Online Writing Lab (OWL) contact the Writing Center at 618-453-1231 (Morris Library location); 618-453-2927 (Trueblood location), or www.write.siu.edu.

C. **Saluki Cares:** The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial or personal. By working closely with faculty, staff, students and their families, SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. To make a referral to Saluki Cares click, call or send: http://salukicares.siu.edu/index.html; 618-453-5714, or siucares@siu.edu.