

WESTERN UNIVERSITY
FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

ECE 9403A – HIGH FREQUENCY POWER ELECTRONIC CONVERTERS

COURSE OUTLINE - 2017 – 2018
(M.E.Sc & Ph.D ONLY)

OBJECT: The main task of power electronics is to use power semiconductor devices in converter structures (topologies) to process and control the flow of electric energy by supplying voltages and currents in a form that is optimally suited for user loads. Such user loads include computer and telecommunications equipment, medical equipment, electric vehicles, motor drives, utility applications, welding, induction heating, etc. The object of the course is to familiarize the student with various advanced power electronic converter topologies and their practical application.

INSTRUCTOR: Dr. G.Moschopoulos, P.Eng
Room:TEB 237
E-Mail: gmoschop@uwo.ca

CONTACT HOURS: 3 lecture hours per week

PREREQUISITES: An undergraduate degree in electrical engineering **AND** an undergraduate course in power electronics **OR** permission from the instructor.

SPECIFIC LEARNING OBJECTIVES:

1. To become familiar with the operation, characteristics, and design of a variety of advanced power electronic converters.
2. To become familiar with power electronic concepts and terminology used in industry.
3. To become familiar with control techniques for switch-mode power supplies.

TOPICS:

The following topics will be covered:

1. Dc-dc switch-mode converters
2. Switch-mode dc power supplies (with transformer isolation)
3. Resonant dc-dc converters
4. Soft-switching PWM converters
5. Input power factor correction
6. Single-stage power converters
7. Miscellaneous topics (i.e. applications, components, control)

TEXTBOOK:

There will be no assigned textbook for the course. Course material in the form of conference papers, lecture notes or photocopies will be provided in class or e-mailed to students..

EVALUATION:

The final course grade will be determined from a student's performance on assignments, a project, and a final examination. The weighting of each of these components is as follows:

Assignments	25%
Project	25%
Final Examination (3 hours)	50%

To obtain a passing grade in the course, a student must obtain a minimum of 50% in all three components of the course. A mark < 50% in any of the components will result in a final course grade of 48% or less.

A project will be assigned to each student and will consist of a report that will be done at the end of the semester. A project topic will be assigned to each student sometime during the semester. A student can work on a project of his or her own choosing provided it is approved by the instructor.

FINAL EXAMINATION: Only the use of **non-programmable calculators** will be allowed for the final examination. **No other aids will be allowed unless specified.**

USE OF ENGLISH: In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

ATTENDANCE: Any student who, in the opinion of the instructor, is absent too frequently from class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the department, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

Students are responsible for any course material pertinent to any course exams, as stated by the instructor, regardless of course attendance.

ABSENCE DUE TO ILLNESS OR OTHER CIRCUMSTANCES: Students should immediately consult with the instructor or department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see the attached "Instructions for Students Unable to Write Tests or Examinations or Submit Assignments as Scheduled"). The student should seek advice from the instructor or department

Chair regarding how best to deal with the problem. Failure to notify the instructor or department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

For more information concerning medical accommodations, see the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

For more information concerning accommodations for religious holidays, see the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

CHEATING AND PLAGIARISM: Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. University policy states that cheating, including plagiarism, is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning.

All required papers may be subject to submission for textual similarity review to commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents on the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between the University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

POLICY ON REPEATING ALL COMPONENTS OF A COURSE: Students who are required to repeat an Engineering course must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment, or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted by the student for grading in subsequent years.

INTERNET AND ELECTRONIC MAIL: Students are responsible for regularly checking their Western e-mail and the course web site (<https://owl.uwo.ca/portal/>) and making themselves aware of any information that is posted about the course.

ACCESSIBILITY: Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 519-661-2111 ext. 82147 for any specific question regarding an accommodation.

SUPPORT SERVICES:

Office of the Registrar, <http://www.registrar.uwo.ca/>

Student Development Centre, <http://www.sdc.uwo.ca/>

Engineering Undergraduate Services, <http://www.eng.uwo.ca/undergraduate/>

USC Student Support Services, <http://westernusc.ca/services/>

Students who are in emotional/mental distress should refer to Mental Health @ Western, http://www.health.uwo.ca/mental_health/, for a complete list of options about how to obtain help.

2017 09 01