



ECE 589A – Selected Topics in Power Electronics: Soft-Switching Power Conversion

Term – Summer 2018 (201805)

Instructor

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Office Hours

Days: Mondays
Time: 3:00 to 4:00 PM
Location: EOW413

Course Objectives

- To introduce the basic and advanced principles of high-frequency soft-switching power conversion.

Learning Outcomes

- You will learn basic principles of operation and analysis techniques of soft switching power converters that include load resonant converters and zero-voltage transition converters. Also, you will learn how to design these converters and then simulate them to evaluate their performance.

Syllabus

Introduction to soft switching power conversion. Resonant converter topologies.
Variable-frequency and fixed frequency control. Zero-voltage and zero-current switching operation.
Steady state and transient analysis of resonant converters.
Quasi-resonant and quasi-square-wave converters and their operation.
Zero-voltage and zero-current transition converters. DC side commutated resonant link power converters.

A-Section(s): A01 / CRN 30324

Days: Monday and Friday

Time: 17:00 to 18:20

Location: ECS130

Required Text

None. Based on the notes and reading material supplied by the instructor.

References:

Selected papers from journals and conference records (main source - IEEE Power Electronics Specialists Conference Records, IEEE Applied Power Electronics Conference Records, IEEE Industry Applications Conference Records, IEEE Trans. on Power Electronics, IEEE Trans. on Industrial Electronics).

Assessment:

Assignments: 8%
Mid-term: 32%
Final Exam: 60%

Due Dates: Will be announced as the course progresses
Date: June 29 or July 6 (to be decided during the first week of classes)

* Each student will be assigned a project. Topics of projects will be discussed with each student during the third week of June. Projects involve analysis, design and simulation or experimental verification of selected soft-switching power converter circuits.

Note:

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Graduate Calendar. <https://web.uvic.ca/calendar2018-05/grad/academic-regulations/grading.html>

Note to Students: Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Assistant to set up an appointment.

Accommodation of Religious Observance:

<https://web.uvic.ca/calendar2018-05/grad/registration/Registration.1.16.html>

Policy on Inclusivity and Diversity:

<https://web.uvic.ca/calendar2018-05/general/policies.html>

Standards of Professional Behaviour: You are advised to read the Faculty of Engineering document Standards for Professional Behaviour, which contains important information regarding conduct in courses, labs, and in the general use of facilities.

<http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf>

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the entry in the current Graduate Calendar for the UVic policy on academic integrity.

<https://web.uvic.ca/calendar2018-05/grad/academic-regulations/academic-integrity.html>

Equality: This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Resource Centre for Students with a Disability located in the Campus Services Building.

The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

Course Lecture Notes

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.