EXPANDED COURSE DESCRIPTION
ELECTRICAL ENGINEERING AND COMPUTER SCIENCE
Lassonde School of Engineering
Electrical Engineering Computer Science
LE / EECS 4613 4.0 SECTION Z
POWER ELECTRONICS
FALL 2018 / WINTER 2019

Last Modified Date: 08/29/2018

COURSE CALENDAR DESCRIPTION

The objective of this course is to understand the basic operating principles of power conversion using advanced electronic devices. The structure and characteristics of several switching devices are reviewed. Basic power electronic converters and inverters such as AC/DC rectifiers, DC/DC switch mode converters and voltage source DC/AC inverters are studied. Resonant DC/DC converters are introduced. Computation of circuit quantities such as average and RMS value, average power, power factor, total harmonics distortion and power efficiency are also studied. Prerequisites: cumulative GPA of 4.50 or better over all major EECS courses (without second digit "5"); LE/EECS 2030 3.00 or LE/EECS 1030 3.00; LE/EECS 2210 3.00. Corequisite: LE/EECS 3603 4.00.

INSTRUCTOR(S)

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<tr>
<th>Name</th>
<th>Section / Format / Term</th>
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<td>Lam, John Chi Wo</td>
<td>Sec. Z / LECT / W</td>
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ADDITIONAL INFORMATION

COURSE DESCRIPTION:

This course focuses on the basic operating principles of the power conversion using advanced electronic devices. The structure and characteristics of switching devices are first reviewed. Basic semiconductor devices used in power electronics circuits are discussed. Fundamental power converters such as AC/DC rectifiers, DC/DC switching converters and voltage source DC/AC inverters are studied. Resonant power converters and inverters are introduced. Weekly laboratory/tutorial will be given.

Topics to be covered include: switching devices in power electronics, single-phase AC/DC uncontrolled rectifiers, three-phase uncontrolled AC/DC rectifiers; single-phase AC/DC controlled rectifiers; DC/DC converters; isolated DC/DC converters; single-phase DC/AC converters; resonant DC/DC converters and inverters; applications of power electronics.

COURSE LEARNING OUTCOMES:

- Understand the basic operating principles of power conversion in power electronics
- Understand the operating principles of AC/DC rectifiers, DC/DC converters, DC/AC inverters
- Demonstrate the ability to mathematically compute average and RMS value, average power, power factor and total harmonics distortion
- Demonstrate the ability to mathematically compute switching losses, conduction losses, and power efficiency
- Demonstrate the ability to determine the suitable control method for the corresponding converter or inverter
- Derive mathematical equations that characterize the voltage gain of basic DC/DC
- Demonstrate the ability to draw steady-state operating waveforms of AC/DC rectifiers, DC/DC converters, DC/AC inverters
- Understand the features and drawbacks of different isolated DC/DC converters
• Understand the basic operating principles of resonant power
• Demonstrate the ability to design simple power electronic circuits for real-life

TEXTBOOK:

ACADEMIC INTEGRITY LINKS
• Senate Policy on Academic Honesty - http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/
• Academic Integrity - http://lassonde.yorku.ca/academic-integrity

STUDENT LINKS
• Student Rights and Responsibilities - http://oscr.students.uit.yorku.ca/student-conduct
• Religious Observance - https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/wa/regobs
• Academic Accommodation for Students with Disabilities - http://secretariat-policies.info.yorku.ca/policies/academic-accommodation-for-students-with-disabilities-policy/
• Counselling and Disability Services - http://cds.info.yorku.ca/
• York University’s Policies on Sexual Violence - http://secretariat-policies.info.yorku.ca/policies/sexual-violence-policy-on/
• York University’s Policies on Gender/LGBTQ*/Positive Space - http://rights.info.yorku.ca/lgbtq/

LAND ACKNOWLEDGEMENT
• We acknowledge our presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been taken care by the Anishinabek Nation, the Haudenosaunee Confederacy, the Huron-Wendat, and the Métis. It is now home to many Indigenous Peoples. We acknowledge the current treaty holders, the Mississaugas of the New Credit First Nation. This territory is subject of the Dish With One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.
• The Indigenous Framework for York University: A Guide to Action can be found here: http://indigenous.info.yorku.ca/
• Meaning of a land acknowledgement: http://healthydebate.ca/opinions/indigenous-land-acknowledgements

Many courses utilize Moodle, York University’s course website system. If your course is using Moodle, click here to access it.
Moodle @ York University