

## COURSE OUTLINE

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### ECE 370 – Electromechanical Energy Conversion

Term –FALL 2020 (202009)

#### Instructor

Dr. Ashoka Bhat  
Phone: 250-721-8682  
E-mail: [abhat@enr.uvic.ca](mailto:abhat@enr.uvic.ca)

#### Office Hours

Days: Wednesday  
Time: 3:00 to 4:00 PM  
Location/Platform/link: Blackboard Collaborate (Link: will announce)

#### Course Objectives

- To introduce students to the principles of electromechanical energy conversion, transformers and electric machines.

#### Learning Outcomes

You will learn (Summary):

- The basic principles of magnetic circuits, apply equivalent circuits analysis to calculate different parameters like flux, energy density, etc.
- The basic principles of operation and construction details of transformers; use phasor equivalent circuit analysis to evaluate the performance parameters such as regulation and efficiency.
- The basic principles of operation and construction details of dc machines (as a generator and a motor); use equivalent circuits of dc machines to evaluate the performance parameters such as regulation and efficiency.
- The basic principles of operation and construction details of induction motors; apply phasor equivalent circuits to evaluate performance parameters such as regulation and efficiency.
- The basic principles of operation and construction details of synchronous machines (as a generator and as a motor); use their phasor equivalent circuits to evaluate performance parameters such as regulation and efficiency; use in power factor correction.
- The speed-torque characteristics of dc motors and induction motors and how to control motor speed.

#### Syllabus (Approximate number of lectures)

Magnetic Circuits (5 lectures)  
Transformers (8 lectures)  
DC Machines (8 lectures)  
Induction Motors (7 lectures)  
Synchronous Machines (4 lectures)  
Electromechanical Energy Conversion Principles (2 lectures)  
Stepper Motor and Brushless DC Machines (1 lecture)  
Introduction to Electric Drives (1 lecture)

A-Section(s): A01 / CRN 11004

Days: Tuesday, Wednesday, Friday

Time: 11:30 to 12:20

Location/Platform/link: Blackboard

Collaborate (asynchronous/synchronous)  
(link: will announce).

#### Lab TAs:

B01: Torabidavan, Bahareh ([bambtorabi@gmail.com](mailto:bambtorabi@gmail.com))

B02: Arjmand, Reza ([rezarjmand@yahoo.com](mailto:rezarjmand@yahoo.com))

B03: Babaei, Elham ([babaei.lhm@gmail.com](mailto:babaei.lhm@gmail.com))

B04: Seyed Shariatdoust, Mirali ([shariatdoust.ali@gmail.com](mailto:shariatdoust.ali@gmail.com))

B07 & B08 Rastogi, Praneydeep ([praney.deep.rastogi@gmail.com](mailto:praney.deep.rastogi@gmail.com))

B09: Formiga Mamedes, Deisy ([deisymamedes@gmail.com](mailto:deisymamedes@gmail.com))

B10: Arjmand, Reza ([rezarjmand@yahoo.com](mailto:rezarjmand@yahoo.com))

**Marker TAs:** Rahimpour, Alireza ([arahimpour@uvic.ca](mailto:arahimpour@uvic.ca))  
Shirzadi, Hooman ([hooman.shirzadi92@gmail.com](mailto:hooman.shirzadi92@gmail.com))

All labs will be video-taped, assisted by TA: Rastogi, Praneydeep ([praney.deep.rastogi@gmail.com](mailto:praney.deep.rastogi@gmail.com))

**Note on delivery of virtual labs:**

- (i) All the students will submit the mentioned reports on the same days as announced independent of the section in which they are registered. Lab sections are for assigning distribution of marking duties to the teaching assistants.
- (ii) Video recordings of each experiment will be available to the students.
- (iii) All the students have to submit the preparation part for each experiment, and experiment part results and calculations together with comparison of preparation part. Follow the details given in the lab manual. Reports have to be submitted on the announced due date.

**Required Textbook**

- 1. A.K.S. Bhat, ELEC370 Course Notes, 2020: <http://www.ece.uvic.ca/~bhat>  
(will be available on the web during the semester).
- 2. A.K.S. Bhat, "Laboratory Manual for ECE 370 - Electromechanical Energy Conversion ",  
University of Victoria, 2020 (will be available on the web during the semester).

**Optional Textbook**

- 1. P.C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons, 1996. (This is a suggested book for reference, not mandatory to buy). ISBN 978-1-118-07887-7, third edition 2013.

**References:**

- 1. G.R. Slemon, "Electric Machines and Drives", Reading Mass., Addison-Wesley Publishing Company Inc., 1992.
- 2. S.A. Nasar, "Electric Machines and Transformers" Macmillan Publishing Company, 1984.

**Online Course Delivery:**

As this course will be conducted online during this term, students will need to complete assignments/labs online. The students will require access to a computer which has the following software installed: Adobe Acrobat Reader and Blackboard Collaborate.

**Assessment:**

Assignments:	7%	Due Dates: As the course progresses (5 assignments)
Labs	22%	
Mid-term	21%	Date: October 13, 11:30 AM to 12:20 PM (50 minutes) (to be finalized)
Final Exam	50%	

**Important: All deadlines and schedules for this course will reference Pacific Daylight Time until November 1, 2020, and then Pacific Standard Time.**

**Note:** Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.

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 Undergraduate Calendar.

<https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/S1AAgoGuV?bc=true&bcCurrent=14%20-%20Grading&bcGroup=Undergraduate%20Academic%20Regulations&bcItem=policies>

**There will be no supplemental examination for this course.**

[https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/SJ2Rxoz\\_N?bc=true&bcCurrent=13%20-%20Examinations&bcGroup=Undergraduate%20Academic%20Regulations&bcItemType=policies](https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/SJ2Rxoz_N?bc=true&bcCurrent=13%20-%20Examinations&bcGroup=Undergraduate%20Academic%20Regulations&bcItemType=policies)

**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.

**Course Withdrawal Deadlines:**

- September 22, 2020: Withdrawal with 100% reduction of tuition fees
- October 13, 2020: Withdrawal with 50% reduction of tuition fees
- October 31, 2020: Last day for withdrawal (no fees returned)

**Accommodation of Religious Observance:**

<https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/r1q0gofdN?bc=true&bcCurrent=10%20-%20Accommodation%20of%20Religious%20Observance&bcGroup=Undergraduate%20Academic%20Regulations&bcItemType=policies>

**Policy on Inclusivity and Diversity:**

Engineering: <https://www.uvic.ca/engineering/about/equity/index.php>

Academic Calendar:

<https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/HkQ0pzdAN?bc=true&bcCurrent=%20General%20University%20Policies&bcGroup=General%20University%20Policies&bcItemType=policies>

**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.

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

**Academic Integrity**

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 Undergraduate Calendar for the UVic policy on academic integrity.

[https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/Sk\\_0xsM\\_V?bc=true&bcCurrent=08%20-%20Policy%20on%20Academic%20Integrity&bcGroup=Undergraduate%20Academic%20Regulations&bcItemType=policies](https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/Sk_0xsM_V?bc=true&bcCurrent=08%20-%20Policy%20on%20Academic%20Integrity&bcGroup=Undergraduate%20Academic%20Regulations&bcItemType=policies)

**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 an appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning located in the Campus Services Building. <https://www.uvic.ca/services/cal/>. The University of Victoria is committed to promoting, providing, and protecting a positive, 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.

**Sexualized Violence Prevention and Response at Uvic:**

UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the university defines sexualized violence and its overall approach by visiting [www.uvic.ca/svp](http://www.uvic.ca/svp). If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support please contact the sexualized violence resource office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:

**Where:** Sexualized violence resource office in EQHR; Sedgewick C119

**Phone:** 250.721.8021

**Email:** [svpcoordinator@uvic.ca](mailto:svpcoordinator@uvic.ca)

**Web:** [www.uvic.ca/svp](http://www.uvic.ca/svp)

**Office of the Ombudsperson:**

The [Office of the Ombudsperson](https://uvicombudsperson.ca/) is an independent and impartial resource to assist with the fair resolution of student issues. A confidential consultation can help you understand your rights and responsibilities. The Ombudsperson can also clarify information, help navigate procedures, assist with problem-solving, facilitate communication, provide feedback on an appeal, investigate and make recommendations. Phone: 250-721-8357; Email: [ombuddy@uvic.ca](mailto:ombuddy@uvic.ca), Website: <https://uvicombudsperson.ca/>