

COURSE OUTLINE

ECE 488 – Electrical Power Systems

Term – SPRING 2020 (202001)

Instructor

Dr. T. Ilamparithi
Phone: 250 721 8670.
E-mail: ilampari@uvic.ca

Office Hours

By appointment.
Please email to schedule an appointment.

Course Objectives

Electrical power system is the backbone of modern civilization. The demand of electricity is growing with every passing day. Therefore, the electrical power system is also growing. Along with the size, the challenges in maintaining and operating the power system are also increasing for a variety of reasons such as the penetration of renewable energy sources, increased use of electrical transportation systems, the advent of smart grid and increased cyber-electrical control etc. Consequently, it is important for an upcoming electrical engineer to be familiar with the fundamentals of electrical power systems. ECE 488 provides an ideal opportunity for you to get introduced to the world of electrical power systems. The primary objectives of the course are to:

- (a) Study in detail about the components constituting electrical power systems
- (b) Analyze electrical power systems under normal operating conditions
- (c) Analyze electrical power systems during contingencies

Learning Outcomes

By being a part of ECE 488 and by actively involving yourself in the learning process, you shall be able to

- (i) Calculate per unit impedances of electric power system components
- (ii) Analyze generators, transformers and transmission lines using their equivalent circuit models
- (iii) Represent an electrical power system using single line diagram
- (iv) Perform load flow analysis of a power system
- (v) Analyze the impact of different faults on a power system
- (vi) Familiarize with an industry standard power systems analysis software

Syllabus

The syllabus comprises of

Basic concepts of electric power systems illustrating usage of admittance and impedance matrices for load-flow solutions. Three-phase salient and round rotor synchronous machines. Three-phase transformer. Transmission line parameters. Representation and analysis of transmission lines including ABCD parameters. Symmetrical components and sequence networks. Symmetrical faults such as three phase faults. Unsymmetrical faults such as single line to ground, double line and double line to ground faults. (**Pre-requisite course: ELEC 370**).

A-Section(s): A01 / CRN **20936**

Days: Tuesdays, Wednesdays, Fridays

Time: 10:30 AM to 11:20 AM

Location: Engineering & Computer Science (ECS) 124

Marker TA – TBA via CourseSpace

Required Textbook

Entire course will be based on the following textbook. Therefore, it is essential you have it with you.

Title: Power System Analysis

Author: Hadi Saadat

Publisher: PSA Publishing LLC

Year: 3rd Edition

Reference Book:

J. D. Glover, T. Overbye, and M. S. Sarma, *Power System Analysis and Design*, 6th edition, Boston, MA, CENGAGE Learning.

Required Software:

Software simulation is an essential skill to be acquired by every power engineer. In this course, you will get a chance to familiarize with an industry standard software called PSS/E. In addition, you will be using MATLAB/Simulink. MATLAB/Simulink, student version (<https://matlab.engr.uvic.ca/>) is free for you all. Therefore, please install the software in your personal computer. Please install the following toolbox in addition to MATLAB/Simulink.

- Simscape Power Systems (formerly SimPowerSystems)

Details on how to install PSS/E student version will be provided via CourseSpace.

Assessment:

Validating one's learning is important and hence in ECE 488, many opportunities will be provided to you to assess your learning. In order to ensure you have enough time to take appropriate corrective actions upon assessing, I propose the following periodic assessment scheme:

In-class quizzes	5 x 2 = 10%	Dates: To be announced via CourseSpace
Assignments	4 x 2.5 = 10%	Dates: To be announced via CourseSpace
Mid-term	1 x 20 = 20%	Date: 14-Feb-2020
Software Project	1 x 10 = 10%	Due Date: 5-Apr-2020
Final Exam	1 x 50 = 50%	Date: To be announced

As most of you would be graduating soon after completing ECE 488, I believe it is important that these assessments also help you nurture professionalism. Therefore, about 10% of marks would be allotted towards:

- (a) On-time submission
- (b) Organization & legible presentation

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.

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://web.uvic.ca/calendar2020-01/undergrad/info/regulations/grading.html>

Assignment of an E grade and supplemental examination for this course will be at the discretion of the Course Instructor. The rules for supplemental examinations can be found in the current Undergraduate Calendar.

<https://web.uvic.ca/calendar2020-01/undergrad/info/regulations/exams.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.

Course Withdrawal Deadlines:

- January 19: Withdrawal with 100% reduction of tuition fees
- February 9: Withdrawal with 50% reduction of tuition fees
- February 29: Last day for withdrawal (no fees returned)

Accommodation of Religious Observance:

<https://web.uvic.ca/calendar2020-01/undergrad/info/regulations/religious-observanc.html>

Policy on Inclusivity and Diversity:

<https://web.uvic.ca/calendar2020-01/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.

<https://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 Undergraduate Calendar for the UVic policy on academic integrity. <https://web.uvic.ca/calendar2020-01/undergrad/info/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 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:

As a first time learner of electrical power systems, you are encouraged to study from the textbook. Therefore, I shall refrain from providing lecture notes. On the other hand, I shall supply you with a tentative schedule of topics I intend to discuss during lecture hours. I recommend strongly that you spend time reading about the topic both before and after the lecture. Where-ever appropriate, I might supply a few materials that would supplement the text book.

Unless otherwise noted, all course materials supplied to students in this course 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. 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

Web: 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; Web: <https://uvicombudsperson.ca/>

Course Evaluation: Towards the end of term, as in all other courses at UVic, you will have the opportunity to complete an anonymous survey regarding your learning experience (CES). The survey is vital to providing feedback regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey you will receive an email inviting you to do so. You will need to use your UVic Netlink ID to access the survey, which can be done on your laptop, tablet, or mobile device. I will remind you and provide you with more detailed information nearer the time but please be thinking about this important activity during the course.

Continuous Feedback: I am committed to a memorable learning experience for my students, and I will try my best to help out in whatever way I can. For that I need to receive your input. Oral/written/email feedback are all welcome anytime during the term.