

## EGEN 5305: Power Systems

### Course schedule:

**Lecture** Mon 14:35-17:25 Southam Hall 409

**Instructor:** Hima Dhulipati, [himadhulipati@cunet.carleton.ca](mailto:himadhulipati@cunet.carleton.ca)

**Teaching assistant:** TBD

### Course description:

Calendar description - Introduction to power system and their transient states. Power system voltage stability; PV and QV curve methods. Power system angular stability; transient stability and equal area criterion; steady-state stability and power system stabilizer. Electromagnetic transients in power systems, insulation coordination and equipment protection.

- Power flow solution by Gauss Siedel method and Newton- Raphson method, load flow calculations
- Regulating Transformers in power flow analysis
- Electrical transients in power systems
- Transients in circuits with one storage element and AC energization
- Transients in circuits with two storage elements excited by DC source and AC source

*It is important to remember that COVID is still present in Ottawa. The situation can change at any time and the risks of new variants and outbreaks are very real. There are a number of actions you can take to lower your risk and the risk you pose to those around you including being vaccinated, wearing a mask, staying home when you're sick, washing your hands and maintaining proper respiratory and cough etiquette.*

**Precluded courses:** none

**Prerequisites:** enrolment in the M.Eng.- Engineering Practice program and an undergraduate degree in Electrical Engineering or permission of the Director.

### Textbooks:

***Power system Analysis, J. J. Grainger and W. D. Stevenson, McGrawHill Co.***

***Power System Stability and Control by P. Kundur, McGraw Hill Inc., 1993***

*IEEE Xplore*

*University Library*

### Projects

Each project will result in a detailed 20-25 page written technical report. In addition to this, computer programs or any other related information can be added in appendix sections of the report. The project report should be neat, readable, and self-contained. Therefore, students should include adequate references and/or background materials and use tables, diagrams, graphs and figures to enhance readers' comprehension of the project. Originality is expected in the proposal and execution of the project. Original theoretical or computational contribution will be graded higher. Repetition of class lecture or already published paper, without improvement, may be approved but not graded high. A detailed guideline will be posted soon on the course website.

Initial project proposal presentation date: October 16, 2023 (10 minutes per student)

Final project presentation date: November 27, 2023 (15 minutes per student)

### Important Dates

Midterm examination for the course      November 6, 2023

Final examination for the course      TBA

**Evaluation :**

Method of Evaluation	% of Final Grade
Project	30
Midterm exam (closed-book)	25
Final exam (closed-book)	40
Participation	5

**Final Examination** -The final exam is for evaluation purposes only and will not be returned to the student.

Students who are unable to write the final examination due to serious illness, emergency or other circumstances beyond their control may apply for accommodation by contact the Registrar's office. Consult [Section 4.3 of the University Calendar](#).

**Missed term work** - Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor. In all cases this must occur no later than three (3) days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. Consult [Section 4.4 of the University Calendar](#).

**Copyright:** The materials (including the course outline and any slides, posted notes, videos, labs, project, assignments, quizzes, exams and solutions) created for this course and posted on the web site are intended for personal class use and may not be reproduced or redistributed or posted on any web site without prior written permission from the author(s).

**Generative Artificial Intelligence (AI):** Use of generative AI tools (such as ChatGPT) in course work is prohibited unless explicitly authorized by the course instructor for specific elements of the course. Submission of AI generated work without authorization may lead to an academic integrity investigation.

**Other Electronic Devices Aside from Calculators:** Electronic devices aside from calculators are NOT permitted during tests/exams.

**Acceptable use of technology during class:** The use of technology during lectures is limited to resources associated with this course, such as lecture notes and property data information. Social media and general web surfing are never acceptable uses of technology during class; additionally, you distract the students around you. If a situation arises where you need to communicate by e-mail or cell phone, please respect your fellow students and leave the classroom to attend to the matter. You may return to class when the matter is resolved.

**Academic integrity and plagiarism**

a) Please consult the Faculty of Engineering and Design information page about the Academic Integrity policy and our procedures: <https://carleton.ca/engineering-design/current-students/fed-academic-integrity>

Violations of the Academic Integrity Policy will result in the assignment of a penalty such as reduced grades, the assignment of an F in a course, a suspension or, expulsion.

b) One of the main objectives of the Academic Integrity Policy is to ensure that the work you submit is your own. As a result, it is important to write your own solutions when studying and preparing with other students and to avoid plagiarism in your submissions. The University Academic Integrity Policy defines plagiarism as “presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one’s own.” This includes reproducing or paraphrasing portions of someone else’s published or unpublished material, regardless of the source, and presenting these as one’s own without proper citation or reference to the original source.

Examples of violations of the policy include, but are not limited to:

- any submission prepared in whole or in part, by someone else;
- using another's data or research findings without appropriate acknowledgement;
- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own; and
- failing to acknowledge sources of information through the use of proper citations when using another's work and/or failing to use quotation marks.

### Advising and Counselling services

#### a) **Engineering Academic Advising**

The Engineering Academic Support Service : <https://carleton.ca/engineering-design/current-students/undergrad-academic-support/> assists undergraduate engineering students with course selection, registration, and learning support from first-year through to graduation.

Academic advisors contact information: <https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/>

#### b) **Student Mental Health Service**

As a University student you may experience a range of mental health challenges that significantly impact your academic success and overall well-being. Carleton's Wellness Services Navigator <https://wellness.carleton.ca/navigator/> is designed to help students connect with mental health and wellness resources. If you need to talk to someone, please reach out for assistance: <https://carleton.ca/health/emergencies-and-crisis/>.

### Learning and working environment

The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at [equity@carleton.ca](mailto:equity@carleton.ca). We strive to create an environment of mutual respect for all through equity, diversity, and inclusion within this course. The space which we work in will be safe for everyone. Please be considerate of everyone's personal beliefs, choices, and opinions.

### Academic Accommodation

[Academic accommodation](#) refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. At no time should academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University.

- a) **Academic Accommodations for Students with Disabilities:** The [Paul Menton Centre](#) for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation.

If you are already registered with the PMC, contact your PMC coordinator to initiate a Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with the instructor to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

- b) **Accommodation for Student Activities:** Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation will be provided to students who compete or perform at the national or international level. Contact the instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

- c) **Pregnancy obligation:** contact the instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For accommodation regarding a formally-scheduled final exam, you must complete the Pregnancy Accommodation Form.
- d) **Religious obligation:** contact the instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist.
- e) **Survivors of Sexual Violence:** As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: <https://carleton.ca/equity/sexual-assault-support-services>