

Fall 2021

Power Systems Transients Simulation

COURSE DESCRIPTION:

An Introduction to modern computer-based algorithms for the modelling and simulation of Modern Power Generation and Transmission Networks.

COURSE OBJECTIVE:

The course will present methods for the simulation of transients in modern power networks. These will include methods for the automatic formulation of network equations, solution methods and stability and accuracy considerations. Advanced methods for handling non-linearities and power semiconductor-based switching equipment will be presented. The course will include modelling of rotating machines and distributed parameter-based models of transmission lines and cables. The course will also include methods to represent power system controls.

PRE-REQUISITES:

Undergraduate background in Electrical Power Systems and Power Electronics.

CONTACT HOURS:

3-hours per week

COURSE CONTENT:

The following topics will be discussed:

- Nodal Analysis and State Variable based algorithms for simulating RLCM networks;
- Stability and Accuracy of Simulation Algorithms;
- Consideration of Matrix Sparsity;
- Modelling of Non-linearities;
- Modelling of Switches and other controlled power Electronic Components
- Modelling of Transmission lines and Cables;
- Modelling of Rotational Electrical Machinery , Mechanical Inertia, Governors, Exciters and Loads
- Modelling of Analog and Digital (sampled Data) Control systems

Additional advanced research topics as determined by the instructor.

HOMEWORK:

Homework will consist of assignments, preparation of a seminar on an assigned article from the research literature.

TEXTBOOK:

TBD

GRADE ANNOUNCEMENTS:

Grades for this course will be announced by February 2021

EVALUATION:

Your final course grade is determined by your performance in the components list below in the Evaluation Table (seminar, assignments, project, mid-term, and a final examination. **Students must receive a minimum of 50% on the final examination and must complete and pass all components in the course in order to be eligible to receive a passing grade.**

Each component is weighted as follows:

COMPONENT	NO	VALUE %	TOTAL VALUE	DETAILS / ADDITIONAL INFO
Assignments	6	60%	60	All assignments will carry equal marks
Mid-Term Exam	1	15%	15	
Final Examination	1	25 %	25	The final exam may have an individual project component
TOTAL			100	

GRADE SCALE:

LETTER	MARK	LETTER	MARK	LETTER	MARK	LETTER	MARK
A+	95-100	B+	85-89	C+	65-74	D	50-54
A	90-94	B	75-84	C	55-64	F	<50

INSTRUCTOR INFO:

Name: Ani Gole
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Office Hours:..... By appointment

VOLUNTARY WITHDRAW:

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REQUIREMENTS/REGULATIONS

Student Responsibilities: It is the responsibility of each student to contact the instructor if he/she is uncertain about his/her standing in the course and his/her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with, among others, incomplete term work, deferred examinations, attendance and withdrawal, etc..

Lectures: Attendance at lectures is essential for successful completion of this course. Students must satisfy each evaluation component in the course.

ACADEMIC INTEGRITY

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations and Requirements of the University of Manitoba, Section 7.1, students are

reminded that plagiarism* or any other form of cheating is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university) regardless of media

- examinations
- assignments
- laboratory reports
- term exams

A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty

Please refer any questions regarding Academic Integrity to your course instructor.

***Plagiarism:** to steal and pass off (the ideas or words of another) as one's own; use (another's production) without crediting the source