



**ECE 7890 – Power System Control**  
**COURSE OUTLINE – WINTER 2019**

**COURSE DESCRIPTION:**

Control of active and reactive power, Modelling of power system components for small signal stability analysis of power systems, Development of linearized dynamic models for the power system, Design of power system controllers using linear control system design techniques.

**COURSE OBJECTIVE:**

At the end of this course students will be able to:

1. Analyze steady state and dynamic response of system frequency of single-area power system
2. Analyze steady state and dynamic response of system frequency and tie line power flow of two-area power system.
3. Develop and validate linearized models of synchronous generators, HVDC converters and FACTS devices.
4. Develop and validate a linearized model of a power system and analyze its dynamic behaviour using eigenvalue methods.
5. Design damping controllers for power systems using eigenvalue techniques.

**PRE-REQUISITES:**

ECE7070 Power System Analysis

**CONTACT HOURS:**

3.0 Hours/week

**COURSE CONTENT:**

1. Revision of synchronous machine models
2. Small signal model of omib, and design of PSS for omib
3. Multi-machine power system - small signal model
4. Frequency control and voltage control
6. State Space Design – eigenvalues, eigenvectors, modeshapes, controllability, observability, residues, eigenvalue sensitivity etc.
7. State Space Design – pole placement, optimal control, observers, gain scheduling, eigenstructure assignment.
8. Introduction to Dynamic Phasors and its application to small signal stability analysis.

**TEXTBOOK:**

Power System Stability and Control by Prabha Kundur, McGraw Hill, 1994.

**EVALUATION:**

Your final course grade is determined by your performance in assignments, term test, and a final examination. The weighting of each of these components is as follows:

COMPONENT	NO	VALUE %	TOTAL VALUE	DETAILS / ADDITIONAL INFO
Assignments	4	10%	40	
Project	1	20%	20	
Final Examination	1	40%	40	
<b>TOTAL</b>			100	

**INSTRUCTOR INFO:**

Name U.D. Annakkage  
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**Office Hours:** By appointment

**VOLUNTARY WITHDRAW:**

**Friday, Mar. 31, 2017**

**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 about his or her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with incomplete term work, deferred examinations, and attendance and withdrawal.
  - **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

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