# EE 523 Power System Stability and Control

Catalog Description (3 credits):
Dynamic analysis of interconnected electric power system; modeling of synchronous generators, loads and transmission network; small-signal stability and transient stability analysis; dynamic stability controls.

Offered:
Spring 2023

Structure:
Two 75 minute lecture classes per week. Grading will be based on homeworks, class participation, projects and examinations.

Course Text-book: Power System Stability and Control
Author: P. Kundur, Publisher: McGraw Hill , ISBN: 007035958X

Course topics:
1. Power system dynamics overview (Week 1)
2. Review of static analysis (Week 2)
3. Dynamic models of interconnected power system (Weeks 3-6)
  Generator models; Load models; Control models; Interconnected system models
4. Small-signal stability analysis (Weeks 7-8)
  Eigenvalue computations; Large-scale computations; Power system stabilizers
5. Transient stability analysis (Weeks 9-11)
  Numerical algorithms; Energy function methods
6. Power system controls (rest)
  Generator controls; Wide-area frequency controls; Thyristor controls

Learning Outcomes:
1) Able to model the mid-term dynamic behavior of interconnected large-scale electric power systems using differential-algebraic equations
2) Able to analyze small-disturbance properties of interconnected power systems using linear system theory methods
3) Able to simulate nonlinear large-disturbance responses of interconnected power systems using numerical integration algorithms
4) Able to model and adjust performance of typical stability controls used in electric power systems

Instructor:
Dr. Mani V. Venkatasubramanian, Email: mani@eecs.wsu.edu, Phone: 509-335-6452

Composition of final grades:
Class Participation: 10%
Homeworks: 20%

Course Project: 30%
Midterm Examination: 20%
Final Examination: 20%

Letter Grade Equivalencies:
***Rough outline*** of course grades:
A or A- grade: total score over 85 out of 100
B or B+ grade: total score between 76 and 85 out of 100
Lower grades: total score below 75

Attendance policy:
Attendance of lectures and participation in class discussions are important for effective learning of the course material. For genuine reasons, absence in lectures may be excused subject to prior approval from the instructor. Class participation points are for participating in class discussions, and not just for attendance.

Office Hours, and location:
Tuesdays 9 am to 10 am on zoom or by email request.

Students with Disabilities:
Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.

WSU Safety Information:
Instructor will review WSU safety related sites noted below and discuss classroom emergency plan with students:
http://safetyplan.wsu.edu
http://alert.wsu.edu
http://oem.wsu.edu/emergencies

Academic Integrity Policy:
The course will adhere to EECS academic integrity policy listed at
http://www.eecs.wsu.edu/~schneidj/Misc/academic-integrity.html
and WSU academic integrity policies listed at
http://www.conduct.wsu.edu/default.asp?PageID=343
http://www.wsulibs.wsu.edu/plagiarism/main.html

Specifically each student is expected to develop all the Matlab code required for completing the homeworks and the course project primarily **based on his/her own effort**. This is essential for meeting the learning objectives of the course. **Copying related code from other students or from public domain software will lead to a Fail grade in the course.**