

Syllabus

1. Course Staff and Office Hours

Instructor: Peng Zhang
Office Hours: Tuesday 1-2:30pm

TA: Qing Shen qing.shen@stonybrook.edu

Office hours and locations may change. Please check Brightspace for most up-to-date information.

2. Course Description

Fundamental engineering theory for the design and operation of a modern electric power system. Modern aspects of generation, transmission, and distribution are considered with appropriate inspection trips to operating electric power facilities (when available). Topics included are: Three Phase AC systems, phasor and function of time analysis, per unit representation, transmission line parameters, delta-wye transformers, power flow, transient stability, renewable energy integration, and basics of power system protection.

Prerequisites: ESE 271

Credits: 3

3. Reference

Power system analysis, Hadi Saadat 3rdEd., 2011

4. Schedule

Lectures will be held Mon. Fri. 1 - 2:20 PM

Week 1.	Overview: Generation, Transmission Distribution and Utilization of electric power.. Historical perspective of electric power systems development. Single phase function of time and phasor analysis, power factor correction.
Week 2.	Balanced three phase system analysis, phase and line-to-line voltage, current, and complex power, delta-wye conversion
Week 3.	Power system representation: system modeling, per-phase analysis, per-unit representation, one-line diagram.
Week 4.	Three Phase Power Transformers: equivalent circuit, impedance, per-unit analysis, delta-wye phase shift.

Week 5.	Transmission lines; need; overhead lines, bundling, transposition; distributed parameter representation, lumped transmission line models.
Week 6.	Generator modeling (steady state). Review: Week 1 – Week 5
Week 7.	Midterm Exam.
Week 8.	Review and Explain Midterm Exam Solutions. Power flow basics.
Week 9.	Power flow in power systems, example system, bus admittance matrix, Gauss-Seidel power flow solution, solution with Newton-Raphson method.
Week 10.	Decoupled power flow solution. Generator modeling (transient). Automatic generation control.
Week 11.	Lecture on power system protection. Or a (Virtual) Field Trip to an operating power plant.
Week 12.	Transient stability; equal area criterion
Week 13.	Intro to offshore wind energy integration; microgrids, or emerging technologies such as quantum information and AI in power systems.
Week 14	Review for Final.
Week 15	Final Exam (per University schedule)

5. Assignments

The assignments will be available on Brightspace.

6. Grading

- Final grade will be determined as follows:

Homework, Participation	30%
Midterm Exam	30%
Final Exam	40%
	100

7. Academic Honesty

Any academic dishonesty will result in a zero grade for the assignment for all parties involved.

All exam work must be entirely your own with no collaboration or outside materials/information. Any academic dishonesty on the midterm exams or the final exam will result in failing the course. The case will be submitted to the College of Engineering's Committee on Academic Standing and Appeals.

8. Student Accessibility Support Statement

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, 128 ECC Building, (631) 632-6748, or at sasc@Stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

9. Academic Integrity Statement

Each student must pursue their academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

10. Critical Incident Management Statement

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.