Description: This course deals with the physics, design and operation of the electric power systems, essentially the grid. We will first discuss the engineering principles of the electric power systems. We will cover the basic components of electric power systems, including generation technologies, transmission and distribution, electricity loads, transformers and safety equipment. We will then discuss the design and operation of the power systems. We will cover power system planning, power system operation and control, and emerging technical and policy issues in the electricity industry.

Learning Objectives:

- Get an overview of the electric power systems and its changing landscape.
- Demonstrate a strong working knowledge of physics, concepts, and components of the electric power systems and how all those fit together.
- Understand the design and operation of the electric power systems.
- Demonstrate a basic understanding of the emerging technical and policy challenges to modern electric power systems.

Office Hour: Wednesdays 2-4PM, 1420 Old Computer Science, appointment link.

Main References: This is a restricted list of various interesting and useful books that will be touched during the course. You need to consult them occasionally.


Tentative Course Outline:

1. (Jan 23) Introduction
2. (Jan 30) Fundamentals

Note: The syllabus is up to change, please check blackboard for updates. Material for this course benefits from course material shared by Alexandra von Meier, Duncan Callaway and many others. All errors are my own.
3. (Feb 6) AC Power
4. (Feb 13) Grid Components
5. (Feb 20) Generation: coal/gas/wind/solar/hydro
6. (Feb 27) Power Flow
7. (Mar 6) Load
8. (Mar 13) Spring recess
9. (Mar 20) System Control and Operation
10. (Mar 27) Frequency Response and ancillary service
11. (Apr 3) Electricity Market
12. (Apr 10) Power systems regulation and planning
13. (Apr 17) Emerging technologies and smart grid
14. (Apr 24) Recap and Review
15. (May 1) Presentations and final paper due (May 11)

Grading Policy: Participation(10%), Homework(40%), Final paper proposal (10%), Final presentation (20%), Final paper (20%).

Class Policy: Late submission: One point is subtracted for each 24-hour submitted late (rounded up to the nearest integer). One free late day is allowed of your choice. Request an approval for sick leave and a doctors note might be needed by University policy. Laptop or other electronic devices for class purpose only.

Academic Integrity: “Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person’s work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the Academic Integrity website.

Disability Support Services: “If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.”

Critical Incident Management: “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.”

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