

1. Course number and name

EE 362: Power System Laboratory

2. Credits and contact hours

3.0 credits (one lecture hour and six laboratory hours per week)

3. Instructor's or course coordinator's name

Tosh Kakar

4. Text book, title, author, and year

Stephen J. Chapman. 2001. *Electric Machinery and Power System Fundamentals*.

Other supplemental materials

Knowledge of the material covered in EE 361- Electrical Power Systems

Instructor's notes/slides will be provided for some topics.

Data sheets and technical specifications of laboratory equipment

Any Electrical Circuits book such as the textbook for EE 261

Any Electromagnetic book such as the textbook for EE 331

5. Specific course information

a. *Catalog description:* Practical Laboratory for understanding the components (e.g. transformers, rotating machines) of a power system through performing experiments and analyzing the results

b. *Prerequisites or co-requisite:* EE262: Electrical Circuits Laboratory (With a Grade of C or Better), EE352: Electrical Engineering Laboratory (With a Grade of C or Better) EE 361 and EE 341: Concurrent Enrollment

6. Specific goals for the course

At the end of the course, the students must be able to perform experiments to:

- Test and analyze single phase and three phase circuits under different operating conditions and to compare experimental and theoretical results (1, 3, 5, 6, 7)
- Test and analyze loads in terms of complex power and design and implement solutions for economical operation of power systems using power factor correction and to compare experimental and theoretical results (1, 2, 3, 5, 6, 7)
- Test and analyze nonlinear magnetic circuits and harmonics and to compare experimental and theoretical results (1, 3, 5, 6, 7)
- Test to determine the model parameters and to test and analyze the behavior of single phase and three phase transformers under different operating conditions and to compare experimental and theoretical results (1, 2, 3, 5, 6, 7)
- Test to determine the model parameters and to test and analyze the behavior of an induction motor under different operating conditions and to compare experimental and theoretical results (1, 3, 5, 6, 7)
- Test to determine the model parameters and to test and analyze the behavior of a synchronous generator under different operating conditions and to compare experimental and theoretical results (1, 3, 5, 6, 7)

- Test to determine the model parameters and to test and analyze the behavior of a DC motor under different operating conditions and to compare experimental and theoretical results (1, 3, 5, 6, 7)
- In addition, at the end of the semester each individual student must design and perform her/his experiment to test and analyze the behavior of a synchronous motor under different operating conditions and to compare experimental and theoretical results (1, 2, 3, 6, 7)

7. Brief list of topics to be covered

- Introduction to Laboratory Safety and Facilities
- Single and Three-Phase AC Circuits
- Nonlinear Magnetic Circuits, Harmonics, and Single Phase Transformers
- Three Phase Transformers
- Induction Machines
- Synchronous Machines
- DC Machines
- Individual Design Lab