Course Outline for ENGR 459: Power Engineering Laboratory

Elective
Electrical Engineering

Bulletin Description
ENGR 459: Power Engineering Laboratory (1 unit)
Prerequisite: A grade of C or better in ENGR 306.
Use of advanced instrumentation to measure and monitor electrical power systems of commercial and industrial facilities. Use of computers to control experiments, instrumentation, and equipment. Motion Control applications and experiments.

Textbook

References

Coordinator
ShyShenq P. Liou, Professor of Engineering

Prerequisites by Topic
1. Basic Concepts of AC and DC electric circuits.
2. Computer algorithm and numerical methods.
3. Computer Literate and basic understanding of digital instruments.

Course Objectives
1. To acquire the skills of using digital instrumentation and computer to acquire and analyze experimental data. [A.3]
2. To acquire the ability of using commercial program such as LabView from National Instruments to control laboratory instruments. [B.2, B.3]
3. To acquire the skills to use advanced instruments to conduct experiment in motion control application. [B.2, B.3]

Numbers in brackets refer to the educational objectives and outcomes of the School of Engineering.
Topics
1. Introduction of digital oscilloscope and other digital instruments.
2. Introduction to graphical programming language, LabVIEW.
3. Creating a user friendly GUI voltage and current virtual control panel.
4. Using a computer to control an instrument to acquire and store data.
5. Using Excel to analysis AC power in inductor and resistor circuits.
6. Using GPIB to control an H-Bridge DC motor controller.
7. Using DAQ to control an H-Bridge DC motor controller.
8. Observing a 3-phase variable frequency drive operation.

Professional Components
Engineering Science     0%
Engineering Design     100%

Evaluation
1. Lab Project Reports 45%
2. Class Attendance and Participation 45%
3. Midterm Examination 10%

Performance Criteria

Objective 1
1.1 The student will demonstrate an ability to use digital instrumentation to acquire experimental data. [1, 2]
1.2 The student will demonstrate an ability to use computer to analyze the data acquired through digital oscilloscopes. [1, 2]

Objective 2
2.1 The student will demonstrate an ability to use LabView to generate desired waveforms, save them to computer, and retrieve them from computer. [1, 3]
2.2 The student will acquire the ability to use LabView to conduct simple analysis of acquired data. [1, 3]
2.3 The student will acquire the ability to use LabView to control laboratory instrumentation such as a Tektronix Oscilloscope. [1, 3]

Objective 3
3.1 The student will demonstrate an ability to use H-bridge to configure a motion control testing system using DC motor. [1, 2]
3.2 The student will acquire the ability to use a variable frequency drive to configure a motion control testing system using a 3-phase induction motor. [1, 2]

Numbers in brackets refer to the evaluation methods used to assess student performance.
Spring Semester, 2004
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Class/Laboratory Schedule
One 2-hour-45-minute lab session/week

Prepared by
ShyShenq Liou, Spring, 2004