

ECE 403 –ENERGY CONVERSION LAB

Type (check one): Required: X Elective:

2005-2006 Catalog Data: ECE 403. (Formerly EE 403) Laboratory experiments paralleling ECE 401. Single phase transformers. Induction and synchronous machines. Use of variable frequency sources for speed control of induction motors, voltage and speed control circuits of d.c. machines. Structured, written laboratory reports. Prerequisite: ECE 222. Corequisite: ECE 401. Offered in the Fall semester. *One semester; one credit.*

Prerequisites: ECE 222 – Electric Circuit Analysis II

Co-Requisites: ECE 401 – Electromechanical Energy Conversion Laboratory

Textbook: Yamayee, Z. A. and Bala, J.L., Jr., *Electromechanical Energy Devices and Power Systems*, (1994) John Wiley: New York, NY. ISBN: 0-471-57217-9 and Lab manual

Other Required Materials: None

Other References: None

Instructor: Dr. Fred Terry, Professor of Electrical and Computer Engineering

Course Objectives:

1. Basic competence in the analysis of the processes of converting, transmitting, and utilization of electric power.
2. Use of fundamental electrical power concepts in DC, single phase, and balanced three phase applications.
3. Applied knowledge of mathematical problem description and algorithm formulation.

Prerequisites by Topics:

1. Basic Circuit Analysis Techniques
2. Physics of Magnetic Fields
3. Differential and Integral Calculus
4. Facility with Spreadsheets and Circuit Analysis Software

Topics:

1. Preliminary Study of a Transformer
2. No-Load and Load Transformer Tests
3. Three Phase Induction Motor
4. Synchronous A.C. Generator
5. Shunt Field D.C. Motor
6. Control Parameters of a D.C. Motor

Class Schedule: One two-hour session per week

Prepared by: Fred H. Terry, Ph.D., P.E. **Date:** August 2005

**Professional Component:
ECE 403 – ENERGY CONVERSION LAB**

Category (check one)	<input type="checkbox"/> Math/Basic Science <input checked="" type="checkbox"/> Engineering <input type="checkbox"/> General Education <input type="checkbox"/> Other
Design (check one)	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Some <input type="checkbox"/> None
Realistic Constraints (check all that apply)	<input checked="" type="checkbox"/> Economic <input type="checkbox"/> Environmental <input type="checkbox"/> Sustainability <input type="checkbox"/> Manufacturability <input type="checkbox"/> Ethical <input checked="" type="checkbox"/> Health & Safety <input type="checkbox"/> Social <input type="checkbox"/> Political

Relationship to Program Outcomes:

Check all that apply:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice