

ECE 401 – ELECTROMECHANICAL ENERGY CONVERSION

Type (check one):	Required: <u> X </u> Elective: <u> </u>
2005-2006 Catalog Data:	ECE 401. Electromechanical Energy Conversion. (Formerly EE 401) Linear and nonlinear magnetic circuits of transformers. Basic principles of electromechanical energy conversion, electromechanical devices and feedback control systems. Derivation and analysis of mathematical models. Rotating a.c. and d.c. machinery and their use to control systems. Direct energy conversion systems. Prerequisite: ECE 222. Co-requisite: ECE 403. Offered in the Fall semester. <i>One semester; three credits.</i>
Prerequisites:	ECE 222 – Electric Circuit Analysis II
Co-Requisites:	ECE 403 – Energy Conversion Laboratory
Textbook:	Yamayee, Z. A. and Bala, J.L., Jr., <i>Electromechanical Energy Devices and Power Systems</i> , (1994) John Wiley: New York, NY. ISBN: 0-471-57217-9.
Other Required Materials:	None
Other References:	None
Instructor:	Dr. Fred H. Terry, Professor of Electrical Engineering
Course Objectives:	<ol style="list-style-type: none">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:	<ol style="list-style-type: none">1. Basic Circuit Analysis Techniques2. Physics of Magnetic Fields3. Differential and Integral Calculus4. Facility with Spreadsheets and Circuit Analysis Software
Topics:	<ol style="list-style-type: none">1. Energy Resources and Conversion2. Power Systems3. Basic AC Circuit Concepts4. Transformer Operation, Equivalent Circuits, Regulation5. Fundamental Electromechanical Energy Conversion, General Torque Equation6. Three-Phase Induction Machines, Models and Analysis7. Synchronous Machines, Models and Analysis8. DC Machines, Models and Analysis9. Transmission Lines
Class Schedule:	Three 50-minute sessions per week

Prepared by: Dr. Fred H. Terry, Professor of ECE **Date:** October 2005

Professional Component:
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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