TO: The Faculty of the College of Engineering

FROM: School of Electrical and Computer Engineering of the College of Engineering

RE: ECE 62500 Changes in Title, Terms Offered, Prerequisite, Description, Text and Content

The faculty of the School of Electrical and Computer Engineering has approved the following changes in ECE 62500. This action is now submitted to the Engineering Faculty with a recommendation for approval.

From: **ECE 62500 – Analysis of Electromechanical Systems II**
Sem. 2. Class 3, cr. 3.
Prerequisite: ECE 62500. Authorized equivalent courses or consent of instructor may be used in satisfying course pre- and co-requisites.

Extension of ECE 52500. Electric propulsion systems including presentation of cycloconverter and rectifier-inverter drive systems. Dynamic and steady-state analysis of machine performance with series controlled rectifiers in the stator or rotor phases. MMF space harmonic analysis.

To: **ECE 62500 – Advanced Analysis of Electromechancial Systems**
Sem. 2 of odd years. Class 3, cr. 3.
Prerequisite: ECE 61000
Prerequisites by Topic: Principles of electromechanical energy conversion. Electromechanical dynamics of synchronous, induction, and brushless dc machines. Reference frame theory.

Application of advanced numerical methods for the characterization of the steady-state and dynamic characteristics of electromechanical energy conversion devices including solenoids, synchronous, induction, and permanent-magnet machines.

Reason: The course description and content have been changed to reflect the updated content of the course.

ECE 62500 – Advanced Analysis of Electromechanical Systems

Required Text: Sheppard J. Salon, "Finite Element Analysis of Electrical Machines," Springer, 2002, 978-0792395942.

Recommended References: Assorted Papers

Lectures	Principle Topics
1	Introduction to finite element analysis
6	Laplace's equation, variational and Gallerkin formulation of finite element equations, specification of boundary conditions
3	Poisson's Equation, variational formulation of finite element equations
3	Nonlinear Poisson equation, fixed point and Newton-Raphson iterators
3	Permanent-magnet materials
6	Calculation of forces/torques: global coenergy, virtual coenergy, Maxwell stress tensor approaches
3	Application to linear solenoid
3	Application to permanent-magnet machines, steady-state performance and parameter extraction
3	Eddy currents
5	Application to induction machines, steady-state performance and parameter extraction
3	Application to induction machines, steady-state performance and parameter extraction
4	State-space and time domain modeling

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