EENG 389: FUNDAMENTALS OF ELECTRIC MACHINARY & THE TESLA EFFECT

COURSE

**Background:**
- This EE Core junior course (3 cr. Lecture & 1 cr. Lab) provides physics based engineering science analysis of transformers, rotating 3-phase AC, and DC electrical machines.

**Purpose of the Redesign:**
- Organize and connect knowledge and link closely to learning outcomes.
- Improve learning environment by integrating a set of active and interactive learning tools.

**Intended Outcomes:**
- Explain principles of operation & circuit model
- Predict operational characteristics using circuit models and compare to Lab measured values.

**WHAT IS CHANGING**

**Analysis: (Direct Problem)**
Well posed, one unique stable solution that depends continuously on data.

**Design: (Requires Synthesis)**
Often ill posed as less is known about the problem.

**Application: The Transformer**
- Principle of operation
- Construction & equivalent circuit parameters estimation
- Performance calculation
- Compare computed parameters & external performance to student Lab measured values.

**COURSE OUTCOMES**

- Relates Analysis Tools used to Design Concepts
- Apply to systems likely encountered in industry.

**TESA, TESA, & TESA**
Not this kind of Tesla!

Nikola Tesla
- Invented the induction motor in 1888

Tesla Coil
For Wireless Electricity
- Tesla's Dream: Clean Renewable Energy!

“The Capacity to learn is a Gift; The Ability to learn is a Skill; The Willingness to learn is a Choice.”
Brian Herbert, An American Author

Copyright © The McGraw-Hill Companies, Inc.

Abd A. Arkadan, Electrical Engineering Department
Abd A. Arkadan received his Bachelor of Science from the University of Mississippi, Oxford, Mississippi (1980), his Masters of Science from Virginia Tech, Blacksburg, Virginia (1981) and his Ph.D. from Clarkson University, Potsdam, New York (1988), all in Electrical Engineering. He was a Professor at Marquette University, Milwaukee WI (1988-2016). A Fellow of IEEE “for contributions to computer aided characterization and design optimization of electric machines and drive systems.”