EEN Required Course:	**ECE 31500 Fundamentals of Electrical Energy Engineering**
Credit and contact hours:	(3 cr.) Class 3
Proposed Campus Bulletin description: 2020-2021	ECE 31500 Fundamentals of Electrical Energy Engineering (3 cr.) Class 3. P: ECE 20400. Resistive circuit analysis with controlled sources. Sinusoidal frequency response, filters and Bode plots. Complex power in AC circuits, ideal transformers and three-phase power. Power electronic circuits including diodes, transistor switches, rectifiers and AC-DC converters. Magnetic circuits, magnetic materials and B-H curves. Transformer equivalent circuit models. No credit will be given for ECE majors.
Prerequisite or corequisite:	P: ECE 20400
Prerequisites by topic:	Elementary resistive and sinusoidal circuit solution techniques, introduction to diodes and transistors.
Textbook:	Rizzoni & Kearns, *Principals and Applications of Electrical Engineering*, 6th Edition ISBN: 978-0073529592
Coordinator:	Peter Schubert, Professor of Electrical and Computer Engineering
Goals:	To prepare students in the energy engineering curriculum for subsequent courses in electromechanical energy conversion, power electronics and power systems.
Outcomes:	Upon successful completion of the course, students should be able to 1. Apply the properties of linearity, superposition, source transformation, Thevenin and Norton equivalent circuits, and the maximum power transfer theorem to resistive circuits containing controlled sources. [1,2,6] 2. Analyze elementary high-pass, low-pass, and band-pass sinusoidal circuits. [1,2,6] 3. Determine the instantaneous power, average power, apparent power and the complex power for a circuit element in sinusoidal steady state. [1,2,6] 4. Solve simple circuits with ideal transformers. [1,2,6] 5. Calculate current and power in a balanced, three-phase circuit using per-phase analysis. [1,2,6] 6. Determine the state of diodes and transistors in a resistive circuit. [1,2,6] 7. Understand the role and function of diodes and transistors in AC-DC converters. [1,2,6] 8. Calculate flux density and stored energy in a simple magnetic circuit. [1,2,6]
Topics:	1. Resistive circuit analysis with controlled sources. (1.5 weeks) 2. Review of sinusoidal steady-state circuit analysis. (1.5 week) 3. Sinusoidal frequency response, filters and Bode plots. (2 weeks) 4. Complex power in AC circuits. (1.5 weeks) 5. Ideal transformers and three-phase power (1.5 weeks) 6. Diodes and transistor switches in resistive circuits. (1.5 weeks) 7. Rectifiers and AC-DC converters. (1.5 weeks) 8. Magnetic circuits, materials and B-H curves. (2 weeks) 9. Transformer equivalent circuit models. (1 week)

	10. Exams (2.0 classes and final exam period)
Computer usage:	None.
Laboratory projects:	None.
Evaluation methods:	Midterm exams, homework assignments, and final exam.
ABET category:	Engineering science 100%, engineering design 0%.
Prepared by:	Peter Schubert
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