The University of Texas at Tyler
Department of Electrical Engineering

Course: EENG 3306 – Electronic Circuit Analysis I (Required)

Syllabus

Catalog Description:

Generalized amplifier models; two-port networks applications of operational amplifiers; non-ideal characteristics of operational amplifiers; electrical characteristics, small-signal models and applications of diodes; bipolar junction transistors, and FETS; amplifier analysis and design; limitations of small-signal models.

Prerequisites: EENG 3304 (Linear Circuits Analysis I); EENG 3104 (Linear Circuits Analysis I Laboratory), CHEM 1311 (General Chemistry I) and CHEM 1111 (General Chemistry I Laboratory)

Credits: (3 hours lecture, 0 hours laboratory per week)

Text(s): Microelectronics, Circuit Analysis and Design 4th edition, ISBN 978-0-07-338064-3

Additional Material: Access to Multisim, Excel, and MATLAB

Course Coordinator: David M. Beams, Associate Professor of Electrical Engineering

Topics Covered: (paragraph of topics separated by semicolons)

Generalized amplifier models; applications of operational amplifiers; non-ideal characteristics of operational amplifiers; electrical characteristics, small-signal models and applications of diodes; small-signal models and applications of bipolar junction transistors; small-signal models and applications of FETS; amplifier analysis and design; *h*-parameter representations of amplifiers; distortion and limitation of small-signal models.

Evaluation Methods: (only items in dark print apply):

1. Examinations / Quizzes
2. Homework
3. Report/paper
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Learning Outcomes : By the end of this course students will be able to:

1. Analyze dc electronic circuits (including resistance, independent sources, and dependent sources) using basic circuit-analysis techniques (Kirchhoff's Laws, Ohm's Law, Thevenin- and Norton-equivalent circuits).
2. Analyze ac electronic circuits (including resistance, capacitance, self- and mutual inductance, independent sources, and dependent sources) using basic circuit-analysis techniques. (Kirchhoff's Laws, Ohm's Law, Thevenin- and Norton-equivalent circuits, phasor transform).
3. Compute the time-domain response of a linear network to a periodic, non-sinusoidal signal using superposition and the Fourier series.
4. Analyze linear electronic circuits using the four basic amplifier models (voltage, current, transconductance, and transimpedance).
5. Analyze electrical circuits represented by two-port parameters.
6. Analyze circuits using operational amplifiers including the limitations imposed by non-ideal electrical characteristics.
7. Design diode-application circuits—e.g., rectifiers, clipping circuits, and Zener-diode voltage

regulators.

8. Use the operational principles and electrical characteristics of bipolar junction transistors (BJTs) to determine the quiescent operating point of a BJT.
9. Use the operational principles and electrical characteristics of bipolar junction transistors to derive appropriate small-signal models.
10. Use the operational principles and electrical characteristics of MOSFETs to determine the quiescent operating point of an enhancement-mode MOSFET.
11. Use the operational principles and electrical characteristics of MOSFETs to derive the appropriate small-signal model.
12. Analyze transistor amplifiers using midband small-signal models.
13. Calculate the limits of small-signal operation of diodes, bipolar transistors, and MOSFETs from their V-I characteristics.

Relationship to Program Outcomes (only items in dark print apply)[1]: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply mathematics, science, and engineering principles in the practice of electrical engineering;
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering [13];
3. have the ability to analyze electrical circuits, devices, and systems [1,2,4,5,6,9,12];
4. have the ability to design electrical circuits, devices, and systems to meet application requirements [7];
5. have the ability to design and conduct experiments, and analyze and draw conclusions from experimental results;
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods [3,9,11];
7. have effective written, visual, and oral communication skills
8. possess an educational background to understand the broader context in which engineering is practiced, including:
   a. knowledge of contemporary issues related to science and engineering;
   b. the impact of engineering on society;
   c. the role of ethics in the practice of engineering;
9. have the ability to contribute effectively to multi-disciplinary engineering teams;
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers [8,10].

[1] Numbers in brackets [ ] indicate the appropriate Course Learning Outcome(s) supporting the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:	0	Hours
Engineering Sciences and Design:	3	Hours
General Education Component:	0	Hours

Prepared By: David M. Beams
Ron J. Pleper

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