

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):

Microelectronic circuits, 7th Edition, by Sedra and Smith (Oxford University Press, ISBN 9780199339136, 2014).

Additional Material:

Access to Multisim, Excel, and MATLAB

Course Coordinator:

Prabha Sundaravadivel, Assistant 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:

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Ron J. Pieper
Prabha Sundaravadivel

Date:

Aug. 8, 2016
Aug. 20, 2018
Aug. 19, 2019

The University of Texas at Tyler
Department of Electrical Engineering

Course: EENG 3306 – Electronic Circuit Analysis I

COURSE OUTLINE

Course Coordinator:

Dr. Prabha Sundaravadivel
 Assistant Professor, Department of Electrical Engineering
Office: RBN 2015
Email: PSundaravadivel@uttyler.edu
Office Hours: Wednesday 2-5 PM
 Email and Canvas Discussion Boards.

Class Location/Time: Tu Th 8 AM- 9:20 AM, RBN 2012

Grading Policy:

Exam	40 %	No. of Exams - 2
Pop-up Quiz	10%	Total – 3-4
Final Exam	45%	
Class Attendance	5%	
Total	100%	

Semester Schedule:

Week	Start Date	Topics Covered	Lecture (Tues)	Lecture (Thurs)
1	27-Aug-19	<i>Introduction, Review of Basics</i>	Course Introduction	Review: DC and AC analysis
2	3-Sep-19	<i>Amplifiers</i>	Basic concepts: Introduction to Amplifiers	Career Success Day
3	10-Sep-19	<i>Amplifiers/ Op-Amps</i>	Amplifier circuit models; Frequency response Application: amplifier types,	loading effects, STC Frequency response, Fourier series, Two-port networks
4	17-Sep-19	<i>Op-Amps</i>	Ideal Op-Amp; inverting configuration; weighted summing amplifier	Noninverting configuration; difference amplifier
5	24-Sep-19	<i>Op-Amps</i>	Integrators and Differentiators	DC imperfections of Op-Amps
6	Oct-1-19	<i>Op-Amps</i>	AC limitations of Op-Amps (Bandwidth of	Exam-1

			noninverting and inverting amplifier)	
7	Oct-8-19	<i>Semiconductors</i>	Semiconductors; doping; current transport by drift and diffusion	P-N junction with applied bias
8	Oct-15-19	<i>Diodes</i>	Diode circuit models; zener voltage regulation	Rectifier circuits; peak rectifier
9	Oct-22-19	<i>Diodes</i>	Limiter, waveshaping, and clamp circuits	Exam- 2
10	Oct-29-19	<i>MOSFET</i>	MOSFET structure and physical operation	MOSFET IV Characteristics
11	Nov-5-19	<i>MOSFET</i>	MOSFET circuits at DC, small signal models	MOSFET small-signal models and operation
12	Nov-12-19	<i>BJT</i>	BJT structural operation	BJT IV characteristics
13	Nov-19-19	<i>BJT and Transistor Amplifiers</i>	BJT Circuits at DC	Transistor amplifiers; basic principles
14	Nov-25-19	Thanksgiving Holiday		
15	Dec-2-19	<i>Transistor Amplifiers</i>	Basic configurations, biasing	Discrete-circuit amplifiers
16	Dec-10-19	Final Exam		

Pop-Up Quiz:

There will be a total of 3-4 quizzes in the class in addition to the scheduled class. This is to keep the students on track with the course content.

Attendance Policy:

Students are expected to attend all scheduled lectures and lab meetings. By signing up for the class it is understood that the student has checked for ANY significant recurring conflicts with lecture and laboratory meeting times (including work, family, or any other commitments). No exceptions can be made for attendance requirements as this will be unfair to the other students. The progressive nature of the class means that perfect attendance is recommended if a good grade is desired. No more than three excused absences for valid reasons are allowed and documentation should be submitted for each absence. Class participation is graded based on attendance, faculty and graduate assistant observation and involvement in class activities

Exam:

There will be 2 exams in this course. The exams will be conducted in class. The exam will have 20% weightage each. These are not comprehensive exams.

Final Exam:

The Final exam will have a 45% weightage to the overall grad. This will be a comprehensive exam and will be conducted in the 16th week of the course. The exact time and venue is TBA.

Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.uttyler.edu/wellness/rightsresponsibilities.php>

Grade Replacement/Forgiveness and Census Date Policies :

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttyler.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions that students need to be aware of. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

State-Mandated Course Drop Policy

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date). Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

Disability Services

In accordance with federal law, a student requesting accommodation must provide documentation of his/her disability to the Disability Services counselor. If you have a disability, including a learning disability, for which you request an accommodation, please contact the Disability Services office in UC 3150, or call (903) 566-7079.

Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

Student Absence for University-Sponsored Events and Activities

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

Social Security and FERPA Statement:

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

Emergency Exits and Evacuation:

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

Happy Learning!