The University of Texas at Tyler
Department of Electrical Engineering

EENG 4309 – Electronic Circuit Analysis II (Required)

Syllabus

Catalog Description:
> CMOS digital circuits; structure of operational amplifiers; feedback concepts; oscillators; small-signal analysis; load-line analysis; introduction to nonlinear electronic circuits.

Prerequisites: | EENG 3306, EENG 3106, EENG 3305

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

Text(s): | Sedra, A. S., and Smith, K.C. *Microelectronic circuits, 7^{hth} Ed.* Oxford University Press, 2014. ISBN 978-0199339136.

Additional Material: | Engineering paper, scientific calculator; access to circuit-simulation software (Multisim), MATLAB, and Excel

Course Coordinator: | Yasser Mahgoub

Topics Covered: (paragraph of topics separated by semicolons)
> Single- and multi-stage amplifiers for IC implementation; differential amplifiers and operational amplifiers; feedback concepts; criteria for oscillation in feedback circuits; oscillator circuits; active and passive filters; introduction to nonlinear electronic circuits.

Evaluation Methods: (only items in dark print apply):
1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Objectives[2]: By the end of this course students will be able to:
1. Analyze single- and multi-stage amplifiers. [1]
2. Analyze the transfer characteristics of a differential amplifier. [1,2]
3. Analyze a simple operational amplifier. [1]
4. Analyze systems involving feedback and determine their closed-loop gain, input impedance, output impedance, and frequency response. [1,2]
5. Design simple active filters to meet frequency-response requirements. [1,5]
6. Determine the conditions under which circuits with feedback will oscillate. [1,2]
7. Design simple nonlinear oscillator circuits to meet specified requirements. [1,5]
8. Derive the transfer characteristics of a CMOS inverter by graphical or analytical methods. [1,2]
9. Determine V_{IL}, V_{IH}, V_{OL}, V_{OH}, and noise margins of a CMOS inverter from its voltage-transfer characteristic. [1,2]

10. Design simple logic gates using static CMOS, pseudo-NMOS, pass-transistor logic, and dynamic logic. [1]

2Numbers in brackets refer to method(s) used to evaluate the course objective.

Relationship to Student Outcomes (only items in dark print apply)[3]: This course supports the following Electrical Engineering Student Outcomes, which state that our students will possess:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics [1-4, 9];
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors [5, 6, 7,10];
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions [8];
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

3 Numbers in brackets refer to course objective(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:	0	hours
Engineering Sciences and Design:	3.0	hours
General Education Component:	0	hours

Prepared By:	David M. Beams	Date:	14 January 2018
	Revised by Yasser Mahgoub		13 January 2020
	Revised by Yasser Mahgoub		05 January 2021

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EENG 4309
Electronic Circuit Analysis II
Course Outline

Course Coordinator

Dr. Yasser Mahgoub
Office: HEC-A205
ymahgoub@uttyler.edu

Time: 10:10 – 11:05 AM, M/W/F
Place: HEC A216
Text: Sedra, A. S., and Smith, K. C., *Microelectronic circuits, 7th Ed.* Oxford University Press, 2014. ISBN-13 978-0199339136.   Also usable is the 6th Edtion, published 2010 (ISBN-13 978-0195323030)

Schedule: The schedule is shown below. The numbers in the two right-hand columns refer to the chapter numbers of the 6th and 7th Editions of the Sedra and Smith text.

Week	Topic	6th Ed	7th Ed
1	Introduction		
2	Frequency Response	9	10
3	Frequency Response	9	10
4	Negative Feedback / **Quiz 1**	10	11
5	Negative Feedback	10	11
6	Building Blocks of IC Amplifiers	7	8
7	Differential- and Multi-Stage Amplifiers	8	9
8	**Midterm Exam**		
9	Operational Amplifier Circuits	12	13
10	Active Filters	16	17
11	Active Filters	16	17
12	Oscillators / **Quiz 2**	17	18
13	Digital Integrated Circuits	13	14
14	Project presentations and Final Exam review		
15	**Final exam**		

Assessment:

Quizzes (2)	20%
Mid-Term Exam	20%
Homework (4)	10%
Project	15%
Class Participation	5%
Final Exam	30%

Grading Scale:

Grades will be assigned based on the total score as per the following scale out of a 100 total:

A:	90% – 100%
B:	80% – 89%
C:	70% – 79%
D:	60% – 69%
F:	< 60%

Any deviation from the above policy such as scaling or curving to calculate the individual item or final scores will be at the sole discretion of the instructor and performed by the instructor uniformly for all students in the class.

Attendance and Make-up Policy:

The progressive nature of the class means that perfect attendance is recommended if a good grade is desired. Makeup quizzes, exams or projects will only be provided for valid absences and at the sole discretion of the instructor.

Course communication:

Course communication will take place by e-mail and by announcements on UT-Tyler's Learning Management System (LMS). University policy requires that official e-mail communication be sent only to Patriot e-mail accounts.

Academic misconduct:

Academic misconduct that comes to light will be dealt through the formal discipline process. Examples of academic misconduct include (but are not limited to) submitting the work of others as one's own, copying from others during quizzes, and doing work intended to be submitted by another person.

General Policies of the University of Texas at Tyler

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.