

Rutgers University, Department of Electrical and Computer Engineering
ABET COURSE SYLLABUS
COURSE: 14:332:463

- Course Catalog Description:** 14:332:463 Analog Electronics (3)
 Feedback amplifier analysis, Frequency response of BJT and FET amplifiers, and frequency response with feedback stability, power amplifiers.
- Pre-Requisite Courses:** 14:332:361
- Co-Requisite Courses:** 14:332:464 Analog Lab
- Pre-Requisite by Topic:**
1. Steady state analysis of electrical networks.
 2. Solid state device fundamentals.
 3. Single stage BJT and FET bias analysis.
- Textbook & Materials:** A.S. Sedra and K.C. Smith, *Microelectronic Circuits*, 5th Ed, Oxford University Press, 2004.
 G. Roberts and A.S. Sedra, *Spice*, 2nd Ed, Oxford University Press, 1996.
- References:** A.S. Sedra and K.C. Smith, *Microelectronic Circuits-Additional Problems* 4th Edition, Oxford University Press.
- Overall Educational Objective:** To develop analytical skills in obtaining the high frequency response of BJT and FET analog amplifiers.
- Course Learning Outcomes:** A student who successfully fulfills the course requirements will have demonstrated:
1. The ability to determine the biasing and high-frequency response of BJT and FET amplifiers with passive and active loads.
 2. The ability to analyze BJT and FET differential and multistage amplifiers with passive and active loads
 3. An understanding of the concept of negative feedback and an ability to identify and analyze the four configurations for amplifier stability and amplifier figures of merit.
 4. An ability to perform small-signal analysis of the 741 operational amplifier.

How Course Outcomes are Assessed:

HW Problems (10 %)
 Two Mid-Term Exams (50 %)
 Final Exam (40 %)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	HW Problems, Exams
(b) an ability to design and conduct experiments and interpret data	N	
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	N	
(d) an ability to function as part of a multi-disciplinary team	N	

(e) an ability to identify, formulate, and solve ECE problems	H	HW Problems, Exams
(f) an understanding of professional and ethical responsibility	N	
(g) an ability to communicate in written and oral form	S	HW Problems, Exams
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Homework
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for electrical and computer engineering practice	H	HW Problems, Exams
Basic disciplines in Electrical Engineering	H	HW Problems, Exams
Depth in Electrical Engineering	H	HW Problems, Exams
Basic disciplines in Computer Engineering	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	H	HW Problems, Mid-Term Exams
Variety of instruction formats	S	Lecture, office hour discussions

Topics Covered week by week:

Week 1: Single-stage BJT and FET amplifiers

Week 2: Multi-stage amplifiers

Week 3: Differential amplifiers

Week 4: Current sources and active loads

Week 5: High frequency single stage; Midterm Exam 1

Week 6: High frequency multi-stage

Week 7: Time constants and Bode plots

Week 8: Feedback amplifiers configuration

Week 9: Gain, input and output resistance of feedback amplifiers

Week 10: Feedback examples; Midterm Exam 2

Week 11: Stability of feedback amplifiers

Week 12: Bode plots; determining stability and compensation

Week 13: Analysis of 741 op-amp gain

Week 14: Stability example with 741 op amp

Week 15: Review

Computer Usage: Simulations using *P-Spice* in HW Problems

Laboratory Experiences: None

Design Experiences: Some what moderate

Independent Learning Experiences: 1. Home-Work

Contribution to the Professional Component:

(a) College-level mathematics and basic sciences: 0.25 credit hours

(b) Engineering Topics (Science and/or Design): 2.75 credit hours

(c) General Education: 0 credit hours

Total credits: 3

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Date: July 2007