University of Massachusetts Amherst
Department of Electrical and Computer Engineering
Fall 2017

E&C-Eng 575 Introduction to Analog Integrated Circuits
E&C-Eng 675 Analog Integrated Circuit Design
(3credits)

ECE 575 Abstract:	This course covers the basics of analog integrated circuit design. Topics include standard circuit building blocks such as current mirrors, voltage references, single stage amplifier topologies, differential pairs. Device models, bias choices, temperature effects, the body effect, and mismatch. Op-amp and OTA design as well as frequency response, stability, and compensation. Noise analysis is applied to various circuit configurations. More complex topics if time permits.
ECE 675 Abstract:	This course is a graduate version of ECE575 but, will include more advanced design projects and exams.
Objectives	Students will develop the basic skills necessary for the design of the building blocks used in more complicated analog integrated systems.
Prerequisites:	E&C-ENG324 or an equivalent undergraduate course in analog electronics
Instructor:	Professor Robert W. Jackson, 215G Marcus Hall
	Phone: (413) 545-1386
	email: **jackson@ecs.umass.edu**
Office Hours:	See Class Website
Lecture Schedule:	Tuesday/Thursday 10:00-11:15, 211Marston
Grading Policy:	Homework 20%, Midterm: 35%, Final Exam: 45%
Text:	*Analog Integrated Circuit Design* by T. C. Carusone, D. A. Johns and K. Martin, J. Wiley, 2nd edition
Additional References:	*Analysis and Design of Analog Integrated Circuits* by Gray and Meyer, J. Wiley publisher
	Design of Analog CMOS Integrated Circuits Behzad Razavi, McGraw-Hill , 2001.
	CMOS Analog Circuit Design, by Allen, & Holberg, Oxford, 2$^{\text{ND}}$ Edition

Topics/Schedule

Sections	Topics	# Lectures (tentative)
1.1-1.5	MOS Devices DC, DC analysis, small signal modeling	3
1.6,2.1,2.2, 2.4	IC structure, processing, passives	1
Ch3	Basic amplifier types	3
Ch4	Frequency response	3
Ch5	Feedback, Stability, Settling time	2
6.1, 6.2	Op-amp design & compensation	4
6.3	Advance current mirrors	1
6.4, 6.5	Cascode opamp configurations	1
6.7, 6.8	Differential amplifier	1
Ch7	Voltage/Current references	1
9.1-9.4	Noise	3
Ch 10	Comparators	1
Ch 12	Filters (if time permits)	2
Total lectures		26

Professional Component: Credits of engineering science: **3;** Credits of design: **1**
Prepared by: R. W. Jackson

PROGRAM OUTCOMES	COURSE OBJECTIVE
1. Well grounded in the fundamental concepts of math, physics, chemistry, computer science, and engineering science	Y
2. Able to identify, formulate and solve problems in ECE	Y
3. Able to design and conduct experiments, and to analyze and interpret measured data	N
4. Capable of designing analog and digital systems, components, and processes to meet desired needs	Y
5. Proficient in using modern engineering techniques and computing tools for effective engineering practice	Y
6. Experienced in engineering teamwork and in solving technically diverse problems	N
7. Able to communicate effectively orally and in writing, and through symbolic and graphical expression	N
8. Aware of professional and ethical responsibilities as engineers	N
9. Aware of the impact of ECE technology and decisions on society	N
10. Motivated about the importance of lifelong learning and professional development	N

Accommodation Policy Statement

Include this or a similar accommodatio n policy:
The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), Learning Disabilities Support Services (LDSS), or Psychological Disabilities Services (PDS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements.

Graduate School Interim Statement on Academic Honesty

It is expected that all graduate students will abide by the Graduate Student Honor Code and the Academic Honesty Policy (available at the Graduate Dean's Office, the Academic Honesty Office (Ombud's Office) or online at http://www.umass.edu/gradschool/handbook/univ_policies_regulations_a.htm). Sanctions for acts of dishonesty range from receiving a grade of F on the paper/exam/assignment or in the course, loss of funding, being placed on probation or suspension for a period of time, or being dismissed from the University. All students have the right of appeal through the Academic Honesty Board.