

ESE 314: Electronic Laboratory B

Fall 2016

3 credits

Course Description: Laboratory course on design and operation of basic building blocks in electronics. The course is coordinated with, and illustrates and expands upon, concepts presented in ESE 372. Emphasis is given to design solutions more relevant to integrated rather than to discrete element electronics. Field effect transistors are given special attention due to their importance in contemporary analog and digital IC. Frequency responses of the basic amplifiers and active filters are analyzed. Internal structure and fundamental performance limitations of digital inverter and other gates are studied. Weekly lectures cover minimum theoretical background for the laboratory experiments.

Course Goal: To understand operation of standard building blocks of modern analog and digital circuits.

Course Learning Outcomes:

Ability to design and characterize: differential and single stage amplifiers, active RC and switched capacitor filters, and digital gates. Ability to optimize design for improved bandwidth and reduced power dissipation.

Class/Laboratory Schedule: Lecture: 53min/ week. Lab: 3 hr/ week

Changes between laboratory sections will be permitted during the first two weeks of the course. To change sections students must talk to Mrs. Huggins, Room 267, Light Engineering.

Laboratory assignments can be downloaded from blackboard one week in advance. The experiment can be started only after the prelab questions are answered and answers are approved by TA. The data obtained during laboratory experiments must be approved by TA once the work is completed. The laboratory report must be submitted to TA at the next laboratory session. Late submission without adequate reason will result in point subtraction. Missed laboratory work can be performed only during dedicated makeup times. Any questions regarding the grading must be resolved within one week after the work was graded. Lectures can include 5 min quiz.

Prerequisites: ESE 211, ESE 372

Suggested Text Books: A.S. Sedra, K.C. Smith, "Microelectronic circuits", 7th edition, Oxford, ISBN 978-0-19-933913-6.

Instructor: Leon Shterengas (631-632-9376, leon.shterengas@stonybrook.edu);
Office hours: TU,TH 2pm – 4pm, Light Engineering Bldg. 143

Grading: Lab works - 50%, Quizzes - 10%, Midterm - 20%, Final - 20%

Tentative Laboratory Experiments:

1. MOSFET current mirrors.
2. Common Source amplifiers. Active load.
3. Frequency response of the Common Source amplifiers.
4. Frequency response of Common Gate and Common Drain amplifiers.
5. MOSFET differential stage.
6. Design of two-stage CMOS OpAmp.
7. Active RC filters.
8. Switched capacitor circuits.
9. CMOS inverter.
10. Propagation delay and power dissipation in CMOS gates.

Student Outcomes	% contribution*
<input type="checkbox"/> (a) an ability to apply knowledge of mathematics, science and engineering	20
<input type="checkbox"/> (b1) an ability to design and conduct experiments	20
<input type="checkbox"/> (b2) an ability to analyze and interpret data	20
<input type="checkbox"/> (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	10
<input type="checkbox"/> (d) an ability to function on multi-disciplinary teams	
<input type="checkbox"/> (e) an ability to identify, formulate, and solve engineering problems	10
<input type="checkbox"/> (f) an understanding of professional and ethical responsibility	
<input type="checkbox"/> (g) an ability to communicate effectively	10
<input type="checkbox"/> (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
<input type="checkbox"/> (i) a recognition of the need for, and an ability to engage in life-long learning	
<input type="checkbox"/> (j) a knowledge of contemporary issues	
<input type="checkbox"/> (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	10
<input type="checkbox"/> Any other outcomes and assessments?	

Disability Support Services (DSS) Statement:

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: <http://www.stonybrook.edu/ehs/fire/disabilities>]

Academic Integrity Statement:

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management Statement:

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.