Boston University  
Department of Electrical and Computer Engineering  
EC412  
Analog Electronics  
Spring 2020

Class Organization

Professor: Sergienko  
Office: PHO 729, Tel. 3-6564; e-mail: AlexSerg@bu.edu  
Office Hours: Monday-Wednesday 4:30 pm – 5:30 pm

Teaching Assistant: Alexander Hammerman, e-mail: alh2020@bu.edu

Content: Differential amplifiers, multistage amplifier circuits, operational amplifiers,  
active filters, oscillators, feedback, MOS amplifiers.  
Laboratory design project.

Prerequisite: ENG EC410

Text (required): Microelectronic Circuits & Devices, M. Horenstein, Prentice Hall,  

Supplementary Text (not required): Tuinenga, SPICE: A Guide to Circuit Simulation &  

Laboratory Manual (required): Microelectronic Circuits & Devices, M. S. Wasserman,  

Lecture: Mon-Wed 2:30 pm - 4:15 pm in PHO 201  
Discussion: Time and place will be announced  
Laboratory: Fri 10:10 am - 11:55 pm in PHO 105  
You must be registered for a laboratory section.

Handouts: It is your responsibility to obtain all handouts, including homework, labs,  
and notes. If you miss a class, have a friend pick them up for you. Extra handouts  
will be available while they last outside room 729 in the Photonics Center building  
(7th floor, 8 Saint Mary’s St.).

Homework: Usually, homework will be handed out at the Monday lecture and will be  
due at the Monday lecture the following week. Late homework will not be accepted.  
Graded papers and solutions will be handed out in lecture.

Examinations:  
Exam #1 (two hours) – Wednesday, February 19, 2:30 p.m. - 4:15 p.m. in PHO 201  
Exam #2 (two hours) - Wednesday, March 25, 2:30 p.m. - 4:15 p.m in PHO 201  
Exam #2 (two hours) - Wednesday, April 15, 2:30 p.m. - 4:15 p.m in PHO 201

Final Exam (two hours) – May 5-9
Design Project:

A Laboratory design project will be assigned during the week of February. THE DEFENSE OF THE PROJECT WILL BE SCHEDULED ON APRIL 29, THE LAST WEEK OF THE SEMESTER. This project will require much time and effort, but the opportunity to do real design work should make the effort worthwhile.

Rules for SC412 Laboratory:

All students are to purchase a bound 8 1/2 x 11 lab notebook, and put all relevant data in it. There is no place for loose data sheets in the laboratory! Never use any. If you purchased a similar notebook for SC410, and have enough room, you may use the same one. You may also be required to write laboratory reports. You may work on your regular experiments in pairs and in groups up to four students on the design project.

Makeup: We do not give makeup exams. If you miss an exam without a valid excuse, you will get a zero. If you have a valid medical excuse, you must get a note from your doctor or the BU infirmary specifically excusing you from the exam.

Snow: If a snowstorm occurs on the day of an exam, it will be held unless the University officially closes for the day.

Grading: final exam - 35%; midterm exams - 10% each; homework - 10%; laboratory - 10%; lab project - 15%.

ATTENTION: WE DO NOT GIVE GRADES OF INCOMPLETE FOR THIS COURSE! If you do not think you can finish the semester, you should withdraw by the final drop date, which is Wednesday, April 15, 2019.
Week | Date | Topic | Sections
---|---|---|---
Jan. 22 | Course Introduction | | |
Jan. 27 | Introduction. Current-source biasing, active bypass | Sections 8.3.6-8.3.8 | |
Feb. 3 | BJT differential amplifier, differential and common mode | Sections 8.2, 8.3.1-8.3.3; | |
Feb. 10 | Large-signal performance; Sections 8.3.3-8.3.5, 8.5.1, 8.5.4, Frequency response, active pullups; cascode stage; high-gain stages; Sections 9.4.1, 6.3.2, 12.2.2 | |
Feb. 17 | (Tuesday on Monday schedule); Exam #1 (Feb. 19) | | |
Feb. 24 | Multistage amplifiers; Sections 11.1-11.5 | | |
Mar. 2 | Output stages; inside the 741 op amp Sections 11.6, 11.7, 12.1, 12.2.1, 12.2.3, 12. | | |
Mar. 9 | ======= SPRING BREAK ======= RELAX ======= | | |
Mar. 18 | Linear op amp circuits, Sections 2.1-2.3 Nonlinear op amp circuits, Non-ideal op amp circuits Sections 2.4-2.6, 12.2.7, 12.2.8 | | |
Mar. 23 | Exam #2 (March 25) | | |
Mar. 30 | Active filters Sections 13.1, 13.2, 13.3-13.5 | | |
Apr. 6 | Oscillators Section 13.7.1, 13.7.2, 13.7.5 | | |
Apr. 8 | Feedback; amplifier stability Sections 10.1-10.7, 10.8.1-10.8.3 | | |
Apr. 13 | EXAM #3 (April 15) | | |
Apr. 20 | Amplifier stability; frequency compensation; Sections 10.8.4, 10.8.5, 12.2.5, 8.4.1 | | |
Apr. 27 | Project presentations | | |
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<thead>
<tr>
<th>Date</th>
<th>Experiment</th>
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<tbody>
<tr>
<td>Jan. 31</td>
<td>NO LAB</td>
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<tr>
<td>Feb. 7</td>
<td>Expts. 17, 18: Current Mirror, Differential Amplifier</td>
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<td>Feb. 14</td>
<td>Expt. 18: Differential Amplifier (continued)</td>
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<td>Feb. 21</td>
<td>Expt. 21: Multistage Amplifier</td>
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<td>Feb. 28</td>
<td>Expt. 21: Multistage Amplifier (continued)</td>
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<td>Mar. 6</td>
<td>NO LAB</td>
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<td>Mar. 13</td>
<td>NO LAB (Spring Break)</td>
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<td>Mar. 20</td>
<td>Project</td>
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<td>Mar. 27</td>
<td>Expt. 2: Nonlinear Op Amp Circuits</td>
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<td>Apr. 3</td>
<td>Expt. 3: Nonideal Op Amp Circuits</td>
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<td>Apr. 10</td>
<td>Expt. 24: 1st-Order Active Filters</td>
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<td>Apr. 17</td>
<td>Expt. 25: 2nd-Order Active Filters</td>
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<td>Apr. 24</td>
<td>Project</td>
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<tr>
<td>Apr. 27 - 29</td>
<td>Project Presentations Days</td>
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