Boston University
Department of Electrical and Computer Engineering
EC412
Analog Electronics
Spring 2018

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: Guang Yang, e-mail: gngyang@bu.edu, office: PHO517
Office Hours: Tuesday 2:00 pm – 3:00 pm in PHO318
Thursday 4:00 pm – 5:00 pm in PHO318

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

Prerequisite: ENG EC410


Lecture: Mon-Wed 2:30 pm - 4:15 pm in PHO 201
Discussion: Fri 12:20 pm - 1:10 pm in EPC 206
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 14, 2:30 p.m. - 4:15 p.m. in PHO 201
Exam #2 (two hours) - Wednesday, March 21, 2:30 p.m. - 4:15 p.m in PHO 201
Exam #3 (two hours) - Wednesday, April 19, 2:30 p.m. - 4:15 p.m in PHO 201
Final Exam (two hours) – May 8-12
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 - 15%; laboratory - 10%; lab project - 10%.

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 Friday, March 30, 2018.
# Course Syllabus

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
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| Jan. 22 | Introduction. Current-source biasing, active bypass  
Sections 8.3.6 - 8.3.8 |
| Jan. 29 | BJT differential amplifier, differential and common mode  
Sections 8.2, 8.3.1-8.3.3; |
| Feb. 5 | 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. 14 | EXAM #1 |
| Feb. 19 | Multistage amplifiers;  
Sections 11.1-11.5 |
| Feb. 26 | Output stages; inside the 741 op amp  
Sections 11.6, 11.7, 12.1, 12.2.1, 12.2.3, 12.2.4 |
| Mar. 5 | SPRING BREAK  
RELAX |
| Mar. 12 | 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. 22 | EXAM #2 |
| Mar. 26 | Active filters  
Sections 13.1, 13.2, 13.3-13.5 |
| Apr. 2 | Oscillators  
Section 13.7.1, 13.7.2, 13.7.5 |
| Apr. 9 | Feedback; amplifier stability  
Sections 10.1-10.7, 10.8.1-10.8.3 |
| Apr. 18 | EXAM #3 |
| Apr. 23 | Amplifier stability; frequency compensation;  
Sections 10.8.4, 10.8.5, 12.2.5, 8.4.1 |
<p>| Apr. 30 | Project presentations |</p>
<table>
<thead>
<tr>
<th>Date</th>
<th>Experiment</th>
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<tbody>
<tr>
<td>Jan. 26</td>
<td>NO LAB</td>
</tr>
<tr>
<td>Feb. 2</td>
<td>Expts. 17, 18: Current Mirror, Differential Amplifier</td>
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<tr>
<td>Feb. 9</td>
<td>Expt. 18: Differential Amplifier (continued)</td>
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<tr>
<td>Feb. 16</td>
<td>NO LAB</td>
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<tr>
<td>Feb. 23</td>
<td>Expt. 21: Multistage Amplifier</td>
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<tr>
<td>Mar. 2</td>
<td>Expt. 21: Multistage Amplifier (continued)</td>
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<tr>
<td>Mar. 9</td>
<td>NO LAB (Spring Break)</td>
</tr>
<tr>
<td>Mar. 16</td>
<td>Project</td>
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<tr>
<td>Mar. 23</td>
<td>Expt. 2: Nonlinear Op Amp Circuits</td>
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<tr>
<td>Mar. 30</td>
<td>Expt. 3: Nonideal Op Amp Circuits</td>
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<tr>
<td>Apr. 6</td>
<td>Expt. 24: 1st-Order Active Filters</td>
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<tr>
<td>Apr. 13</td>
<td>Expt. 25: 2nd-Order Active Filters</td>
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<tr>
<td>Apr. 20</td>
<td>Project</td>
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<td>Apr. 27</td>
<td>Project</td>
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<td>Apr. 30 - May 2</td>
<td>Project Presentations Days</td>
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