

CIRCUIT ANALYSIS - ELEC. 202
2016 SPRING

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| Class Meeting Location | SOS B10 |
| Class Meeting Times | TU,TH (11:30 – 12:45) |
| Instructor | Şükrü Ekin Kocabaş |
| Office Hours | After class or by appointment |
| Office Location | ENG Z11 |
| Office Phone | 1776 |
| Email | ekocabas@ku.edu.tr |
| Web Address | http://courses.ku.edu.tr/elec202/ |
| Number of Credits | 4 |
| ETCS Credit | 4 |
| Prerequisites | ELEC. 201 |
| Language | English |

Assistants

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Lab Coordinator

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Course Description

Introduction to circuit theory and analysis. Analog and digital circuits. First and second order circuits. Laplace transform; Steady state and transient responses; Filter Design. Laboratory practice and instruments.

Course Objectives

At the end of the course, the students will be able to analyze and design RLC and op-amp circuits. The material learned will form the basis for designing and analyzing more complicated circuits using transistors.

Learning Outcomes

The students will be able to look at a given circuit topology composed of RLC & op-amp elements, and perform AC or DC analysis. They will be able to do measurements by using an oscilloscope on the circuits they build.

Teaching Methods

Lectures will be made using slides. The whiteboard will be utilized to solve problems during the lectures. The website will have copies of the materials used during teaching.

Course Contents

There will be 28 lectures. We will cover Chps 1-14 in the textbook, with the addition of selected sections from Chp 16 (Applications of the Laplace Transform).

Tentative Schedule

| Dates | Day | Week | Class No | Lecture | Notes | Lab / PS |
|------------------|------------|-----------|----------|----------------|-------------|--|
| 2-Feb-16 | Tue | 1 | 1 | Chp 1 | | |
| 4-Feb-16 | Thu | 1 | 2 | Chp 1 | | |
| 9-Feb-16 | Tue | 2 | 3 | Chp 2 | | |
| 11-Feb-16 | Thu | 2 | 4 | Chp 2 | | Lab 1: Introduction to Circuit Laboratory and Resistive Circuits |
| 16-Feb-16 | Tue | 3 | 5 | Chp 3 | | |
| 18-Feb-16 | Thu | 3 | 6 | Chp 3 | | PS 1 |
| 23-Feb-16 | Tue | 4 | 7 | Chp 4 | | |
| 25-Feb-16 | Thu | 4 | 8 | Chp 4 | | Lab 2: Thevenin and Norton Equivalent Circuits |
| 1-Mar-16 | Tue | 5 | 9 | Chp 5 | | |
| 3-Mar-16 | Thu | 5 | 10 | Chp 5 | | PS 2 |
| 8-Mar-16 | Tue | 6 | 11 | Chp 6 | MT 1 | |
| 10-Mar-16 | Thu | 6 | 12 | Chp 6 | | Lab 3: Basic Applications of Op- Amps |
| 15-Mar-16 | Tue | 7 | 13 | Chp 7 | | |
| 17-Mar-16 | Thu | 7 | 14 | Chp 7 | | PS 3 |
| 22-Mar-16 | Tue | 8 | 15 | Chp 8 | | |
| 24-Mar-16 | Thu | 8 | 16 | Chp 8 / 16 | | Lab 4: First Order Circuits |
| 29-Mar-16 | Tue | 9 | 17 | Chp 9 | | |
| 31-Mar-16 | Thu | 9 | 18 | Chp 9 | | PS 4 |
| 5-Apr-16 | Tue | 10 | 19 | Chp 10 | | |
| 7-Apr-16 | Thu | 10 | 20 | Chp 10 | | Lab 5: Second Order Circuits |
| 12-Apr-16 | Tue | 11 | | Holiday | | |
| 14-Apr-16 | Thu | 11 | | Holiday | | |
| 19-Apr-16 | Tue | 12 | 21 | Chp 14 | MT 2 | |
| 21-Apr-16 | Thu | 12 | 22 | Chp 14 | | |
| 26-Apr-16 | Tue | 13 | 23 | Chp 11 | | |
| 28-Apr-16 | Thu | 13 | 24 | Chp 11 | | Lab 6: Frequency Response |
| 3-May-16 | Tue | 14 | 25 | Chp 12 | | |
| 5-May-16 | Thu | 14 | 26 | Chp 13 | | Lab 7: Project work |
| 10-May-16 | Tue | 15 | 27 | Chp 13 | | |
| 12-May-16 | Thu | 15 | 28 | Review | | Project demo |
| 16-May-16 | Mon | | | | | Lab final |
| 17-May-16 | Tue | | | | | Lab makeup |
| TBA | | | | | Final Exam | |
| TBA | | | | | Makeup Exam | |

Assessment Methods

| Type | Description | Final Grade % |
|--------------|--|---------------|
| Quiz / HW | | 10 |
| Midterm Test | Chp 1-5 | 20 |
| Midterm Test | Chp 6-9 | 20 |
| Final Exam | Chp 1-14 | 25 |
| Lab | 6 lab sessions, 3 hours each | 15 |
| Project | Design project | 5 |
| Final Exam | Lab final, 75min exam taken individually | 5 |
| Total | | 100 |

Required TextBooks

Alexander, Charles K., and Matthew N. O. Sadiku. 2009. Fundamentals of electric circuits (4th ed). Boston: McGraw-Hill. ISBN: 9780071272384

The 5th edition of the book came out, it is very similar to the 4th edition.

Academic Dishonesty

Academic dishonesty, including cheating on exams, quizzes and homework is a serious offense and will not be tolerated. University policies regarding this matter will be strictly enforced. Please read the section on academic dishonesty in the university catalog.

<http://vpaa.ku.edu.tr/tr/rules-and-regulations/student-discipline-regulations>

<http://dos.ku.edu.tr/tr/regulations-undergrad>

<http://vpaa.ku.edu.tr/tr/academic/student-code-of-conduct>

<http://vpaa.ku.edu.tr/sites/vpaa.ku.edu.tr/files/Misc Documents/Statement on Academic Honesty.pdf>

Policy on Makeups

If you miss any lab, quiz or exam with a valid excuse, you can take the relevant make-up for that part. There will be a single makeup exam at the end of the semester, covering all topics. All students who miss any of the exams with a valid excuse will take the all-inclusive make-up exam. Quizzes do not have makeups, instead, if you have a valid excuse, you will be graded on the quizzes you take with each quiz weighing a greater amount. For health related issues you need to get your excuse approved by the health center. For other emergencies, you should get in touch with the instructor as early as possible. Regardless of your excuse, fill out the following form to get your excuse processed.

<http://goo.gl/forms/N5Ck8eEXcH>

Lab Rules

- There will be *6 laboratory sessions* throughout the semester. Each laboratory session needs to be completed in 2:45 hours.
- *If you miss two lab sessions* without an approved excuse (e.g. medical report or instructor's consent), you will automatically get an *F* from the course. There will be a single make-up session for all the labs during the finals week for all those with an approved excuse.
- No one is allowed to *change lab sessions* without prior approval from TAs and the instructor.
- Each student will have *one partner* during the experiments to be selected during the first lab session. The students are not allowed to change partner or the lab bench throughout the semester without TAs consent.
- Every student is required to prepare and submit a *preliminary report* before the experiment. Preliminary report questions will be posted on the course web site prior to the experiments. The purpose of the preliminary report is to get the student acquainted with the procedure that will be followed during the experiment. You will not be allowed in the lab without a preliminary report.
- Before each experiment, there will be a *quiz* that is similar to the preliminary report questions. The quizzes will start at the very beginning of the lab session and all students have to return the quiz papers at the same time. Those who come in late will have to miss the quiz.
- If you are *late for more than 30 minutes*, you will not be allowed to join the lab. Please make sure you are on time.
- In order to receive full credit, you have to show the TA that each setup in the experiment is completed and *receive a check mark* before you proceed with the experiment.
- After each laboratory session each group is required to *keep the bench clean and organized*, i.e. each component used should be returned to relevant box, the devices should be turned off etc. Leaving the bench with a mess after the laboratory session will result in a 20% decrease in the overall lab grade.
- You will need to prepare a *lab report* for each lab. The structure of the report is outlined in the following section. Lab reports will be due within one week of the lab session, unless noted otherwise.
- There will be a *lab final* at the end of the semester. Lab final will have a written part and a hands-on experimental part, which will be performed without a partner. Some of the written questions will be about the equipment used during the experiments. The experimental part will be similar to one of the previous experiments.
- There will be a *project assignment* near the end of the semester. The project will be similar to the labs, but one in which there will be a design process as well. More information will be provided as the semester progresses.
- If you took this class before, you may be *exempt from the lab section* based on your lab performance the last time you took the class.

Lab Report Guidelines

Two partners should *turn in a joint report*, which should be prepared collectively by both partners.

Below are the parts of the lab report.

Title Page

Full Names of both students
Student Numbers
Lab Section
Experiment Number

Question 1, 2, 3...

Answer the questions under the section called "Post-lab Report" in the order given in the lab manual. This section should include PSpice results, data taken during the experiments, associated figures as required, and relevant discussion sections.

Conclusion

Add your comments about the experiment and the difficulties you encountered in your conclusions section.

Appendix

You need to add the PSpice schematic print outs (or netlists) that you have analyzed in your preliminary work to your lab report.

Notes

- Specify the name of the axes and units in all your plots
- For your PSpice and oscilloscope screen outputs, clearly specify voltage levels, time divisions, etc (Do not forget to include the units of your measurements.)
- Instead of a single figure, you can easily fit 2-4 figures on a single page to save paper.
- If there is a change in the value of any components during experiment with respect to the manual sheet, please point out that change in your report.
- If you take material from an external source, you need to properly cite the source. Use footnotes for citations and make sure you read the following material on academic writing.
 - http://vpaa.ku.edu.tr/sites/vpaa.ku.edu.tr/files/Misc_Documents/Statement_on_Academic_Honesty.pdf