

University of Arkansas - Fort Smith
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General Syllabus

ELTE 13503 Electrical Circuits and Components

Credit Hours: 3

Lecture Hours: 2

Lab Hours: 2

Prerequisite: ELTE 12303 Fundamentals of Electricity

Effective Catalog: 2018-2019

I. Course Information

A. Catalog Description

Details how individual components react to AC and DC. Includes the study of inductors, transformers, capacitors, R-C circuits, R-L circuits, R-L-C circuits, time constants, series-parallel resonant circuits, and filters.

B. Additional Information

The course will take the theory from fundamentals of electricity and apply it to a whole range of new components and concepts. These will include batteries, capacitors, inductors, transformers, magnetism, time constants, capacitive and inductive reactance, as well as filters, resonance and wave shaping.

Students will receive a more intense treatment of alternating current and how it reacts with these additional components.

As new topics are introduced in lecture, they will be investigated in laboratory experiments to intensify the learning experience. Good laboratory practice, as well as proper use and care of equipment will be stressed.

To this point, all the components the students have been working with have been passive, but a good understanding of this material will provide a smooth transition into advanced circuits and solid state devices.

II. Student Learning Outcomes

A. Subject Matter

Upon successful completion of this course, the student will be able to:

1. Stimulate and measure, within $\pm 3\%$, the response of tuned circuits using a signal generator, frequency counter and oscilloscope.
2. Solve R-C, R-L and R-L-C circuits for correct voltage, current, phase angle, real power, reactive power and power factor with at least 74% accuracy.
3. Solve for R-C and R-L circuit time constants and draw waveforms for voltage/current versus time, from text or worksheet assignments with no less than 74% accuracy.
4. Compute resonant frequency, Q factor and bandwidth for series and parallel R-L-C circuits.
5. Build and successfully operate various electronic circuits using discrete resistors, capacitors and coils.
6. Understand the operation of filters, tuning circuits, transformer designs and wave shaping networks.
7. Identify problems in the R-C, R-L and R-L-C circuits in series, parallel and combination.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking - Students will analyze and troubleshoot problems in R-C, R-L, and R-L-C circuits in series, parallel and series/parallel combination circuits. Students will apply the proper analytical troubleshooting techniques to be determine faults in circuits in the laboratory.

Quantitative Reasoning -Students must be able to utilize mathematics to solve various electrical problems.

III. Major Course Topics

- A. Batteries
- B. Magnetism, Induction
- C. Inductance
- D. Inductive Reactance
- E. R-L Circuits
- F. Capacitance
- G. Capacitance Reactance
- H. R-C Circuits
- I. RC and L/R Time Constants
- J. AC Circuits
- K. Resonance
- L. Filters