

Course Title: COEN 3312: Circuits II
Also listed as EEEN 3312: Circuits II

Semester Credit Hours: 3 (2,2)

I. Course Overview

This course is a continuation of COEN 2311: Circuits I. Topics include a review of DC and AC circuit analysis techniques; complex numbers and phasors; use of phasors in the analysis of AC circuits; AC power concepts; polyphase circuits; magnetically coupled circuits; applications of Laplace and Fourier transforms in circuit analysis; s-domain circuit analysis; Bode plots; and filters.

II. PMU Competencies and Learning Outcomes

Skills in understanding of DC and AC circuit theory are major components of professional competence for electrical and computer engineers. Throughout the semester, students are encouraged to apply critical thinking and problem solving skills in the class discussions and assignments. Professional communication skills (written and oral) are encouraged through discussions and assignments. Effective use of the most modern technology is integral to the development of the knowledge and skills acquired in this class.

III. Detailed Course Description

Topics include a review of DC and AC circuit analysis techniques (covered in COEN 2311: Circuits I); complex numbers and phasors; use of phasors in the analysis of AC circuits; AC power concepts; polyphase circuits; magnetically coupled circuits; applications of Laplace and Fourier transforms in circuit analysis; s-domain circuit analysis; Bode plots; and filters.

IV. Requirements Fulfilled

This is a required course for majors in computer engineering

V. Required Prerequisites

Successful completion of:

- MATH 2332: Differential Equations
- COEN 2311: Circuits I
- COEN 2111: Circuits I Lab

VI. Learning Outcomes

At the end of this course, students will:

- Be able to accurately define impedance and admittance; instantaneous, average, and reactive power; the power factor for a given load; mutual and self inductance; poles and zeros in circuit transfer functions; and resonance frequency.
- Be able to analyze AC circuits using phasors, Laplace transforms, and Fourier Transforms.
- Be able to calculate the rms value of a time-varying waveform
- Be able to calculate instantaneous power, average power, reactive power, and the power factor of a load in normal and polyphase circuits
- Be able to analyze circuits containing ideal transformers
- Be able to calculate the frequency response of AC circuits

VII. Assessment Strategy

The assessment strategy measures the student's understanding of circuit theory and apply the knowledge acquired in the analysis and design. This is achieved in the following ways:

- Class participation is used to help indicate to the instructor and the student his or her level of involvement and understanding.
- Homework assignments are used to provide feedback to students and to indicate individual progress in meeting course goals
- Design problems using PSPICE are used to provide students with advanced design and analysis problems, done either individually or in groups, that focus on advanced critical thinking and problem solving skills
- Mid-term examinations are used to indicate students' developing level of mastery of the topics of the course
- An end-of-semester final examination is used to measure the student's mastery in understanding and application of the knowledge integral to the course.

Assessment in this course is designed to assist students to further their understanding of the university's learning objectives. In cooperation with the instructor, each student selects two design assignments to become a part of the student's portfolio.

VIII. Course Format

The course consists of lectures, class discussions, homework assignments to be completed outside of class, and examinations. Students prepare for class by reading the text and additional materials and by completion of assignments so that they may be discussed in class are expected as indicators of students' commitment to professional growth.

Classroom Hours:

Class lecture: 2 hours per week

Recitation Session: 2 hours per week

IX. Topics to be Covered

- A. Sinusoidal steady-state analysis
- B. Power calculations in AC circuits
- C. Polyphase circuits
- D. Magnetically coupled circuits
- E. Complex frequency and the Laplace Transform
- F. S-domain circuit analysis
- G. Frequency response of AC circuits
- H. Two-port networks
- I. Fourier circuit analysis

X. Laboratory Exercises

There are no laboratory exercises associated with this course.

XI. Technology Component

Students in this class are expected to have a computer account with the appropriate server to enable class communications. Media assisted instruction is a tool in this class. Use of appropriate technology for analysis of data and completion of problems is required, for example, use of a scientific calculator, and use of student owned laptop. Students utilize the application software packages (MATLAB and PSPICE) in homework problems.

XII. Special Projects/Activities

A student project is not required for this class.

XIII. Textbooks and Teaching Aids

A. Required Textbook

William Hayat, Jack Kemmerly, and Steven Durbin, *Engineering Circuit Analysis*, Sixth Edition, McGraw-Hill, 2002

B. Alternative Textbooks

None

C. Supplemental Textbooks

Mahmood Nahvi and Joseph A. Edminister, *Schaum's Outline of Electric Circuits*, Fourth Edition, McGraw-Hill, 2002

D. Supplemental Online Materials

1. Scientific calculator
2. Laptop computer
3. MATLAB and PSPICE access either on laptop or in a general purpose computer lab
4. Engineering paper
5. CRC Standard Mathematical Tables and Formulae, Daniel Zwillinger