University of Toledo
Electrical Engineering Technology
Master Syllabus

Course Title: Analog Systems Design **Course Code & Number: EET 4150**

Credit Hour Total: 4 Semester Hours

Lecture Contact Hours: 3 **Lab Contact Hours: 2**

Prerequisite: EET 2020, Electronic Device Applications

Texts: Electronic Design, From Concept To Reality, Roden and Carpenter, Discovery Press, 4th Edition.

Software: Multisim 7 (Electronic Workbench)

A. Course Description

This course emphasizes the design and analysis of transistor and integrated circuits using computer-aided engineering techniques. It also enhances the student's lab experience through constructing and troubleshooting designed circuits. The Electronics Workbench simulation software is used for circuit analysis and verification.

B. Related Program Outcomes (a, b, c, d, f, g):

- An understanding of the analytical and laboratory skills associated with electrical engineering technology, as evidenced by analyzing amplifiers and power supplies in homework and exams.
- An ability to apply current knowledge and adapt to emerging applications of mathematics, science and technology, as evidenced by the use of mathematical equations to analyze electronic circuits in homework and exams.
- An ability to conduct, analyze and interpret experiments concerning electrical engineering technology, as evidenced by data collection and analysis in lab reports.
- An ability to use creativity in the design of electrical systems, as evidenced by open-ended design projects in lab reports.
- An ability to identify, analyze and solve technical problems associated with Electrical Engineering Technology, as evidenced by solving and troubleshooting design problems in homework, exams and lab reports.
- An ability to communicate effectively, as evidenced by final project presentations and lab reports.

C. Course Objectives:

- To study small signal amplifiers, multistage amplifiers and their applications.
- To study amplifier frequency response.
- To study operational amplifiers circuits and systems.
- To practice the design process utilizing discrete components and integrated circuits.
- To design circuits from mathematical equations using OP AMPS.
- To integrate the knowledge of math and science in designing transistor amplifiers.
- To verify designs using PSPICE simulation software.
- To troubleshoot designed amplifiers.
- To design a major electronic project in a team environment.
- To use the library and other resource material to solve an open-ended design problem.
- To enhance communications through written reports and oral presentations on the design projects.
- To construct working proto-type of a design in the laboratory.
- To enhance creativity through innovative project designs.
- To integrate real life applications and latest technology into labs and projects.

D. Course Outline – Major Content Areas

- Amplifier Design Concepts
- Ideal Operational Amplifiers
- Diode Applications
- Bipolar Junction Transistors
- BJT Biasing Design
- BJT Amplifier Design
- Multistage Amplifier Design
- Field Effect Transistors
- FET Amplifier Design
- Transistor Stability
- Practical Operational Amplifiers
- BJT Frequency Analysis
- FET Frequency Analysis
- Active Filters
- Filters Design

E. Major Laboratory Topics

- Op-Amp Amplifier Design.
- Signal Synthesizing Design.
- Power Supplies Design.
- BJT Biasing analysis.
- BJT Biasing Design.
- Single Stage BJT Amplifier Design.
- Multi-Stage BJT Amplifier Design.
- Single Stage FET Amplifier Design.
- FET Biasing analysis.
- Single Stage FET Amplifier Design.
- Heat Sink Design
- Multi-Stage Amplifier Design

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