COURSE OUTLINE

Course Number	Course Title	Credits
EET 230	**Introduction to Electronics I**	**4**
Hours: Lecture/Lab/Other	**Pre-requisite**	**Implementation Semester & Year**
3 Lecture/3 Lab	**EET 219**	**Spring 2022**

Catalog description:
Covers the basic building blocks of linear systems, such as inverting and non-inverting amplifiers, comparators, and filters.

General Education Category:
Not GenEd

Course coordinator:
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Required texts & Other materials:
Operational Amplifiers and Linear Integrated Circuits by R. Coughlin & F. Driscoll, Prentice Hall
ISBN: 0130149918

Course Student Learning Outcomes (SLO):

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

1. Describe uses for linear integrated circuits. [ILG # 1, 3; PLO # 1, 7]
2. Analyze comparator circuits and inverting, non-inverting and differential amplifiers. [ILG # 1, 2, 3, 4, 10, 11; PLO # 1, 2, 4, 7, 8]
3. Build and test comparator circuits, inverting amplifiers and non-inverting amplifiers. [ILG # 2, 3, 4, 10, 11; PLO # 2, 4, 7, 8]
4. Recognize and make use of the DC & AC limitations of operational amplifiers. [ILG # 3, 4, 10, 11; PLO # 2, 4, 7, 8]
5. Design simple amplifiers and comparators using operational amplifiers. [ILG # 2, 3, 4, 10, 11; PLO # 2, 4, 7]

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 1. Written and Oral Communication in English. Students will communicate effectively in both speech and writing.
Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Institutional Learning Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
Institutional Learning Goal 10. Information Literacy: Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Program Learning Outcomes for Electronics Engineering Technology (PLO)

1. Communicate effectively in English, both orally and in written form.
2. Demonstrate an understanding of the fundamentals of AC and DC electricity.
4. Demonstrate mastery of college algebra and trigonometry.
7. Demonstrate an understanding of analog circuits, including linear integrated circuits.
8. Set up and operate modern electronic equipment such as DMM, oscilloscope, and signal generators.

Units of study in detail – Unit Student Learning Outcomes:

Unit I **Comparators and Amplifiers** [Supports Course SLO # 1, 2, 3, 5]

Learning Objectives
The student will be able to:

1. Show the transfer characteristic for an inverting and non-inverting comparator.
2. Design and build a comparator given a transfer characteristic or a description of the comparator's behavioral characteristic.
3. Draw the output waveform of a circuit given the transfer characteristics, the circuit diagram or the behavioral characteristics of a comparator and the input signal waveform shown graphically.
4. Design and build an inverting or a non-inverting amplifier given the closed loop gain.
5. Analyze an amplifier given the circuit diagram.
6. Distinguish between an inverter and a buffer.

Unit II **Comparators with Feedback** [Supports Course SLOs #2, 3, 5]

Learning Objectives
The student will be able to:

1. Show the transfer characteristic of an inverting or non-inverting comparator with feedback given the circuit diagram.
2. Calculate the upper and lower trip points, center voltage and the hysteresis voltage for a comparator.
3. Design and build a circuit for a comparator with hysteresis given the transfer characteristic or the operating parameters.
4. Determine the duty factor at the output of a comparator circuit using either provided data or data obtained through measurements by the student.

Unit III **Differential Amplifiers and Op-Amp Limitations** [Supports Course SLOs #2, 4]

Learning Objectives
The student will be able to:

1. Determine the gain for a simple differential amplifier.
2. Determine the gain for a buffered differential amplifier.
3. Demonstrate capability to use offset null pins on an op-amp to balance out the effects of the Op-Amp's internal differences.
4. Calculate the bandwidth of a given circuit using the op-amp data sheet information.
5. Interpret the slew rate of an op-amp.

Evaluation of student learning: [Evaluates SLOs # 1 - 5]

Students' achievement of the course objectives will be evaluated through the use of the following:

- Three unit tests assessing students' comprehension of terminology, calculations and practices related to the unit objectives.
- Homework.
- Temperature Controller project report. The project incorporates nearly all the different types of op-amp circuits studied in the course. Students learn how each of the circuit "blocks" combine together to achieve temperature control of a heater. The report verifies students understanding of the concepts presented over the course of the semester.

Evaluation Tools	Percentage Of Grade
3 Unit Tests	60%
Homework	20%
Report	20%
Total	100%