COURSE OUTLINE

Course Number	Course Title	Credits
EET 219	**Electronic Networks**	**4**
Hours: Lecture/Lab/Other	**Pre-requisite**	**Implementation Semester & Year**
3 Lecture/3 Lab	**EET139**	**Spring 2022**

Catalog description:
Analysis and design considerations for electronic circuits, including power supplies using semiconductor diodes and zener diodes, and Class A amplifiers using bipolar and FET transistors.

General Education Category:
Not GenEd

Course coordinator:
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Required texts & Other materials:
Electronic Principles, by Malvino, 9th edition, Glencoe/McGraw Hill, ISBN: 978-1259852695

Course Student Learning Outcomes (SLO):

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

1. Describe the nature of semiconductor materials and how they can be used to create semiconductor devices. [ILG # 1, 3; PLO #1]
2. Analyze simple power supplies and low frequency transistor amplifiers. [ILG # 2, 3, 4, 10, 11; PLO # 2, 3, 7]
3. Build and test simple power supplies. [ILG # 2, 3, 4, 10, 11; PLO #2, 3, 7, 8]
4. Build and test low frequency transistor amplifiers. [ILG # 2, 3, 4, 10, 11; PLO #2, 3, 7, 8]
5. Effectively communicate findings with fellow students and others using field appropriate terminology. [ILG # 1, 4, 10, 11; PLO #1]

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 **Introduction to Semiconductors and Diodes** [Supports Course SLO #1, 2, 3, 5]

Learning Objectives
The student will be able to:

1. Name the most commonly used semiconductor materials.
2. List the two types of charge carriers.
3. Differentiate between p-type, n-type semiconductors and the type of impurity which produces them.
4. Identify forward and reverse bias PN junctions.
5. Identify the barrier potential for silicon at a given temperature.
6. Distinguish between minority and majority carriers.
7. Draw the diode symbols and label the terminals.
8. Evaluate circuit response using the ideal, 2nd and 3rd approximations of the diode.
9. Draw a load line given sufficient information.
10. Test a diode using an ohmmeter.
11. Build and test half-wave, full-wave and bridge rectifier circuits.
12. Calculate the capacitance required for power supply filtering.
13. Analyze and build a zener regulated supply.
14. Derate the power handling capabilities of a rectifier or zener diode using the device datasheet.
15. List at least 4 optoelectronic devices and their basic usage.

Unit II **Introduction to the Transistor and Amplifiers** [Supports Course SLOs #1, 2, 4, 5]

Learning Objectives
The student will be able to:

1. State and apply the relationship between base, collector and emitter currents.
2. Draw the symbols for the two types of bipolar junction transistors (BJTs).
3. State and apply the relationship between beta, collector current and base current.
4. Calculate the maximum power for a transistor amplifier.
5. Calculate beta from data sheet curves.
6. Draw the load line for a transistor circuit.
7. Identify cutoff, saturation and the Q point of a transistor circuit.
8. Calculate the Q point for a base or emitter bias transistor circuit.
9. Draw diagram of a VDB (voltage divider bias) circuit.
10. Explain the advantage of a VDB bias circuit.

Unit III **Transistor Amplifiers (continued)** [Supports Course SLOs #2, 4, 5]

Learning Objectives
The student will be able to:

1. Draw the AC and DC equivalent circuit for a common-emitter (CE) amplifier.
2. Calculate appropriate coupling capacitor and bypass capacitor values needed for an amplifier.
3. Calculate the impedance at the base of a CE amplifier.
4. Calculate the voltage gain of a CE amplifier.
5. Draw the AC equivalent circuit of an amplifier using the "Pi" or "T" model.
6. Calculate the input impedance to CE amplifier stage.
7. Show DC and AC load lines for a CE or common-collector (CC) amplifiers.
8. Calculate the maximum power point (MPP) for a CE amplifier.
9. Identify a class B/AB push-pull amplifier.
10. Build, test and analyze basic low frequency transistor amplifier circuits.
11. Determine the power gain and efficiency of a power amplifier
12. Identify a common-collector (CC) and common-base (CB) amplifier and calculate the voltage gain of each.
13. Identify a Darlington connected transistors and determine their overall beta.

Unit IV **Field Effect Transistors** [Supports Course SLOs #1, 2, 4, 5]

Learning Objectives
The student will be able to:

1. Recognize the junction field-effect transistor (JFET) symbol for both N channel and P channel devices.
2. Identify the terminals of a JFET.
3. Recognize the drain curves of a JFET.
4. Identify I_{DSS} and V_p.
5. Calculate R_{DS}.
6. Distinguish between depletion mode and enhancement mode from the symbol as well as the characteristic curves.
7. Distinguish between P channel and N channel metal-oxide field effect transistors (MOSFETs) from the symbol as well as the characteristic curves.

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.
- Lab grade based on individual reports on experimental results.
- In class participation and attendance.

Evaluation Tools	Percentage Of Grade
3 Unit Tests	60%
Lab Grade	30%
Participation	10%
Total	100%