ACADEMIC YEAR: 2020-2021

HUDSON VALLEY COMMUNITY COLLEGE
TROY, NEW YORK

COURSE OUTLINE

COURSE TITLE: Electronics I

COURSE SUBJECT AND NUMBER: ELET 105

DEPARTMENT: Applied Technologies

CREDIT HOURS: 4

CONTACT HOURS LECTURE: 3, LAB: 3

SEMESTER COURSE IS OFFERED:

OFFERED DISTANCE LEARNING: Yes

PRE-REQUISITE: None

CO-REQUISITE : None

PREREQUISITE(S) OR COREQUISITE(S): ELET 100 -Electricity I

TEXT (S) Electronic Devices 7th Edition Floyd
Prentice Hall, 2006

LAB FEES:

FINAL EXAM/FINAL PROJECT: Yes If yes, please specify: Final Exam

ORIGINAL SUBMISSION DATE: 2002

CURRICULUM COMMITTEE APPROVED REVISION DATE:

PREPARED BY: Abraham Michelen

COURSE DESCRIPTION: This is a first course, preceding ELET 215, Operational Amplifiers, in analog electronics. The topics covered include: semiconductor materials, the PN junction, rectifiers, BJT and FET transistors, DC bias and DC bias stability of transistors, re bjt

transistor model, small-signal amplifiers using both BJT and FET transistors, and cascaded amplifiers.

ACTIVITIES AND ASSIGNMENTS: lectures, laboratory activities (to include reports), tests, final exam.

GRADE COMPUTATION: (In general terms as defined by college policy. Specifics, including Z grade, will be defined on the instructor's syllabus).

Tests – 50%
Lab Reports- 25%
Final Exam – 25%

ADA COMPLIANCE: In compliance with the Americans with Disabilities Act of 1990 and with Section 504 of the Rehabilitation Act, Hudson Valley Community College is committed to ensuring educational access and accommodations for all its registered students, in order to fully participate in programs and course activities or to meet course requirements. Hudson Valley Community College's students with documented disabilities and medical conditions are encouraged to access these services by registering with the Center for Access and Assistive Technology to discuss their particular needs for accommodations. For information or an appointment contact the Center for Access and Assistive Technology, located in room 130 of the Siek Campus Center or call 518-629-7154/ TDD:518-629-7596.

STUDENT BEHAVIORAL OBJECTIVES:
Students will be able to:

1. Recognize various electronic device characteristics.
2. Apply circuit laws with respect to the properties of electronic devices to measure, calculate, and evaluate quantities of diode and transistor biasing, amplification circuits, under normal and abnormal operations.
3. Apply proper grammatical rules and structure in order to produce high-quality technical documents.
4. Troubleshoot electronic devices and discuss the validity of the laws applied to electronic systems.

TOPICAL OUTLINES

1. **Introduction to the Semiconductor Diode (2 weeks)**
    a. Semiconductor materials
        i. Intrinsic Semiconductor Material
        ii. N-type Material
        iii. P-type Material
    b. Ideal Diode
    c. Diode equivalent circuits
    d. Zener Diode
    e. LED
    f. Diode Applications

i. Load Line analysis
ii. Half-wave rectifiers
iii. Full-wave rectifiers

2. Bipolar Junction Transistors (BJTs) (3 weeks)

a. Transistor Construction
b. Transistor Operations
c. D.C. Biasing
d. Operating Point
e. Common-Base (CB) Bias Circuit
f. Common-Emitter (CE) Circuit Connection
g. Common-Collector (CC) Circuit
h. Calculation of bias point for fixed-bias circuit
i. Need for bias stabilization
j. DC Bias circuit with emitter resistor
k. DC Bias circuit independent of Beta
1. DC Bias calculations for voltage feedback circuits
m. Common-collector (Emitter Follower) DC Bias circuit
n. Graphical DC - Bias Analysis
o. Design of D.C. bias Circuits
p. Switching Circuits
q. Miscellaneous bias circuits.

3. FIELD EFFECT TRANSISTORS (FETs) (3 weeks)

a. General
b. Comparison of FET and conventional transistor characteristics
c. Construction of FETs
d. Voltage and current conventions
e. Voltage and current conventions
f. Various FET structures
g. Biasing the FET
h. Self-Biasing operation

4. SMALL-SIGNAL ANALYSIS : BJT's (3 weeks)

a. Introduction
b. Transistor piecewise linear equivalent circuit
c. Transistor hybrid equivalent circuit
d. Graphic determination of the h-parameters
e. Variations of transistor parameters
f. Small-signal analysis of the basic transistor amplifier
g. Approximate Base, Collector, and Emitter equivalent circuit.

5. SMALL-SIGNAL ANALYSIS: FET's (2 weeks)

a. Low frequency AC equivalent circuit: common source configuration
b. High frequency AC equivalent circuit: common source configuration
c. Common drain (source follow) amplifier
d. Common source amplifier
e. Common gate amplifier

f. Design MOSFET amplifier circuits

6. MULTISTAGE SYSTEMS, DECIBELS (dB), AND FREQUENCY CONSIDERATION (2 weeks)
   - **a.** Introduction
   - b. General cascaded systems
   - c. RC - coupled amplifiers
   - d. Transformer-coupled transistor amplifiers
   - e. Direct coupled transistor amplifiers
   - f. Cascade amplifier
   - g. Darlington compound configuration
   - h. Decibels
   - i. General frequency considerations
   - j. Low frequency response-RC-coupled transistor amplifier
   - k. High-frequency response-RC-coupled transistor amplifier
   - 1. Multistage frequency effects
   - m. Frequency response of cascaded FET amplifiers