STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

MASTER SYLLABUS

ELEC 231 – ELECTRONIC CIRCUITS

Prepared By: Stephen Frempong

SCHOOL OF ENGINEERING TECHNOLOGY
ELECTRICAL ENGINEERING TECHNOLOGY & ENGINEERING
SCIENCE DEPARTMENT
SPRING 2018

A. **TITLE** : ELECRONIC CIRCUITS

B. **COURSE NUMBER**: ELEC 231

C. **CREDIT HOURS:** (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)
Credit Hours: 4
Lecture Hours: 3 per week
Lab Hours: 3 per week
Other: per week

Course Length: 15 Weeks

D. WRITING INTENSIVE COURSE: NO

E. GER CATEGORY: NONE

F. SEMESTER OFFERED: FALL/SPRING

G. COURSE DESCRIPTION: Basic theory and circuit applications of silicon, germanium, zener, light emitting (LED) and Schottky diodes, bipolar and field effect transistors (FET) are presented. Students are introduce to half wave and full wave DC power supplies and associated ripple filters. Zener and Active Voltage Regulator circuits are studied. The basic operation of Metal Oxide; Semiconductor Field Effect Transistors (MOSFET) is also presented. Basic types of bi-polar transistor AC amplifiers (CE, CB, CC) and their FET counterparts are discussed.

H. PRE-REQUISITES: Electric Circuits 1 and Laboratory. (ELEC 101/109), Electric Circuits 2 and Laboratory (ELEC 102/129), Calculus 1 (MATH 161), or permission of instructor.

CO-REQUISITE: NONE

I. STUDENT LEARNING OUTCOMES

Institutional Student Learning Outcomes (ISLO's)

(1) Communication Skills (2) Critical Thinking (3) Foundational Skills
(4) Social Responsibility (5) Industry, Professional, Discipline-Specific Knowledge and Skills

ABET- STUDENT OUTCOMES (a-k)

Course Objectives	Institutional ISLO's	ABET Student Outcomes (a-k)

Design, build and test AC/DC Rectification Power Supply Circuits.	2. Critical Thinking 5. Industry, Professional, Discipline-Specific Knowledge and Skills	(d) An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives. (c) An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.
Understand Transistors (BJT and FET) and perform amplifier circuit calculations.	2. Critical Thinking 5. Industry, Professional, Discipline-Specific Knowledge and Skills	(b) An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.
Build, test and perform calculations for various transistor amplifiers.	2. Critical Thinking 5. Industry, Professional, Discipline-Specific Knowledge and Skills	(c) An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.

J. <u>APPLIED LEARNING COMPONENT:</u> CLASSROOM/LAB

K. TEXTS

Thomas L. Floyd, *Electronic Devices,* *
10th Edition. Upper Saddle River, New Jersey: Prentice-Hall, 2017. OR,
as determine by instructor.

LABORATORY MANUAL:

Robert T. Paynter, B. J. Toby Boydell, and Harry Smith, *Introductory* *
Electronic Devices and Circuits, 7th Edition.
Upper Saddle River, New Jersey: Prentice-Hall, 2006.

L. REFERENCES: NONE

M. EQUIPMENT: Students need to purchase laboratory components kit from the bookstore.

N. GRADING METHOD: A, B, C, D, F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS: Final grade is based on the following: Quizzes, Tests, Midterm Exam, Lab Projects/Reports, Homework, and Final Exam.

P. **DETAILED COURSE OUTLINE:**

I. Diodes
   a. Complete Diode Model
   b. Practical Diode
   c. Ideal Diode
   d. Diode Specification Sheet
   e. Zener Diodes
   f. Diode Testing
   g. Light Emitting Diodes (LED)

II. Common Diodes Applications: Basic Power Supply Circuits
   a. Transformers
   b. Half-Wave Rectifiers
   c. Full-Wave Rectifiers
   d. Filters
   e. Zener Voltage Regulators

III. Common Diodes Applications: Clippers, Clampers, Voltage Multipliers, and Displays
   a. Clippers
   b. Clipper Applications
   c. Clampers
   d. Voltage Multipliers

e. Diode Circuit Troubleshooting

IV. Special Applications Diodes
   a. Tunnel Diodes

V. Bipolar Junction Transistors
   a. Transistor Construction and Operation
   b. Transistor Current and Voltage Rating
   c. Transistor Characteristic Curves
   d. Transistor Testing

VI. DC Biasing Circuits
   a. Introduction to DC Biasing: The DC Load Line
   b. Base Bias
   c. Voltage-Divider Bias

VII. Introduction to Amplifiers
   a. Amplifier Properties
   b. BJT Amplifier Configurations
   c. Amplifier Classifications
   d. Decibels

VIII. Common-Emitter Amplifiers
   a. AC Concepts
   b. The Roles of Capacitors in Amplifiers
   c. The Common-Emitter AC Equivalent Circuit
   d. Amplifier Gain
   e. Gain and Impedance Calculations

IX. Other BJT Amplifiers
   a. The Emitter Follower
   b. The Common-Base Amplifier
   c. Emitter –Follower AC Analysis

X. Power Amplifiers
   a. The AC Load Line
   b. RC-Coupled Class A Amplifiers
   c. Transformer-Coupled Class A Amplifier
   d. Class B Amplifiers
   e. Class AB Amplifiers (Diode Bias)

XI. Field-Effect Transistors
   a. Introduction to JFETs
   b. JFET Biasing Circuits
   c. The Common Source Amplifier
   d. Common-Drain and Common-Gate Amplifiers
   e. Specification Sheets and Applications

XII. MOSFETs
   a. MOSFET Construction and Handling
   b. D-MOSFETs
   c. E-MOSFETs
   d. Dual-Gate MOSFETs
   e. Power MOSFETs

Q. LABORATORY OUTLINE:

1. Diode Characteristics
2. Zener Diodes
3. Diode Rectifier Circuits
4. A Basic Power Supply
5. Bipolar Junction Transistors
6. Voltage-Divider Bias
7. Emitter Bias
8. The Common Emitter Amplifier
9. Class B and Class AB Amplifier
10. A Two-Stage Audio Amplifier
11. JFET Operation
12. The Common-Source Amplifier
13. E-MOSFET's
14. Wien-Bridge and Colpitts Oscillator Circuits