# NEW YORK CITY COLLEGE OF TECHNOLOGY

Electromechanical Engineering Technology | Course Outline

**Course**: EMT 1240P – Introduction to Computer Engineering Technology
**Course Coordinator:** Prof. Yu Wang, PhD. **Revised on:** Spring 2018
**Credits:** 4 **This course is:** ☒Required ☐Elective ☐ Selective Elective
**Contact Hours:** 6 **Class Hours:** 3 **Lab Hours:** 3 **Ind. Study Hours:** 0 **Internship Hours:** 0

**Catalogue Description:**
Introduction to basic electrical theory, semiconductor devices, digital electronics, and applications. Topics cover key fundamentals of electrical quantities, digital logic, and digital computer basics. Hands-on laboratory experience reinforces the students learning and provides opportunity to transfer theory learned in lecture to practical applications.

**Pre-Requisites:** CST 1100
**Co-Requisites:** N/A

**Required Texts [Title. Authors. Publisher. Year.]**
1. Introduction to Basic Electricity and Electronics, Gates, Earl D, Cengage Learning @2014, ISBN-10: 1133948510, ISBN-13: 9781133948513
2. EMT1240: Intoduction to computer engineering technology laboratory manual, Computer Engineering Technology of NYCCT

**Other Suggested Reference or Supplemented Material**
1. Electronics Fundamentals: Circuits, Devices & Applications, 8/E, Thomas L. Floyd, David M. Buchla, Prentice Hall @2010, ISBN-10: 0135072956, ISBN-13: 9780135072950
2. Digital Fundamentals, 11/E Thomas L. Floyd, Prentice Hall @2015, ISBN-10: 0132737965, ISBN-13: 9780132737968

**Upon successful completion of this course, the students will be able to:**

1. Demonstrate basic knowledge how electrical circuits, semiconductor devices, and digital electronic systems fit into the context of professional careers, ethics, societal needs, and environmental concerns.
2. Demonstrate basic knowledge relating to direct current circuits (DC), semiconductor devices and digital electronics.
3. Demonstrate knowledge of the Ohm's Laws, Kirchhoff's Laws, and techniques to apply in series circuit and parallel circuit.
4. Demonstrate basic knowledge of diode biasing.
5. Understand combinational logic circuits and sequential logic circuits.
6. Apply knowledge of logic gates, Boolean Algebra, K-Map, and DeMorgan's Theorems in digital circuits.
7. Utilize the knowledge of mathematics and science to gain an understanding of the operation of electrical and electronics systems.
8. Reinforce theory and techniques taught in the classroom through experiments in the laboratory.

**General Education Outcomes**

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| SKILLS/Inquiry/Analysis: Acquire and use tools needed for communication, inquiry, and analysis. |
| SKILLS/Inquiry/Analysis: Develop discipline-specific knowledge and skills to solve problems. |

**Student Outcomes listed in the ETAC/ABET Criterion 3 Addressed in this Course**

| Student Outcomes | Level |
|---|---|
| a. An ability to apply the knowledge, techniques, skills, and modern tools of the discipline to narrowly defined engineering technology activities; | I |
| b. An ability to apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require limited application of principles but extensive practical knowledge; | I |
| c. An ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments; | I |
| d. An ability to function effectively as a member of a technical team; | I |
| e. An ability to identify, analyze, and solve narrowly defined engineering technology problems; | I |
| f. An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature; | I |
| g. An understanding of the need for and an ability to engage in self-directed continuing professional development; | I |
| h. An understanding of and a commitment to address professional and ethical responsibilities, including a respect for diversity; | I |
| i. A commitment to quality, timeliness, and continuous improvement; | I |

***Legend**: I (Introduce), R (Reinforce) and E (Emphasize).Unmarked means not addressed.*

**Brief list of topics to be covered**

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| **Week 1** | Course outline, classroom conduct, academic integrity, attendance, and grading policy.<br>A brief history of electricity, digital, and analog devices. Safety. Electrical quantities and units and measurements.<br>Chapter 7, 10 & 11 (Text book)<br>**Lab**: Tools and equipment for electrical circuit and electronics. Safety.<br>Resistance. |
| **Week 2** | Voltage, current, and resistance. Resistor color codes and standard resistor values. The electrical circuit and switches. Ohm's law for calculating current, voltage, and resistance in DC circuit. Power in an electric circuit.<br>Chapters 12,13-1~13.5, 14-1 ~14-4, 16-1 (Text book )<br>**Lab**: Ohm's law experiment. Build a circuit on Breadboard. |
| **Week 3** | Connecting resistors in series. Current in a series circuit. Voltage sources in series. Kirchhoff's voltage law. Application of Ohm's law in series DC circuit.<br>Chapters 13-6, 14-5, 17-1 (Text book )<br>**Lab**: Introduction to Multisim |
| **Week 4** | Connecting resistors in parallel. Voltage in a Parallel Circuit. Kirchhoff's Current Law. Application of Ohm's Law in parallel DC circuit.<br>Chapters 13-7, 17-2 (Text book )<br>**Lab**: Measurements in series circuits |
| **Week 5** | Exam 1<br>**Lab**: Measurements in parallel circuits |
| **Week 6** | Introduction to semiconductors.<br>Chapters 29 (Text book)<br>**Lab**: V-I characteristic curves of diodes |
| **Week 7** | Digital concept. Binary Digits, Logic Level, and Digital Waveform. Basic Logic Functions and Integrated Circuits. Number systems and codes. Conversion between number systems.<br>Chapter 41 (Text book)<br>**Lab**: Logic Probe, and Oscilloscope.<br>Basic logic gates (I) |

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| **Week 8** | Logic gates and circuit: AND, OR, NAND, NOR. XOR, XNOR<br>Chapter 42 (Text book)<br>**Lab**: Basic logic gates (II). |
| **Week 9** | Midterm<br>**Lab**: NAND and NOR gates. |
| **Week 10** | Boolean algebra, DeMorgan's theorem, and reduction techniques (Karnaugh Maps).<br>Chapter 43 (Text book )<br>**Lab**: Combinational Logic Circuits. |
| **Week 11** | Functions of Combinational Logic, Adder and Decoder.<br>Chapter 45 (Text book )<br>**Lab**: Universal capability of NAND and NOR gate |
| **Week 12** | Exam 2<br>**Lab**: Binary adder |
| **Week 13** | Latches, Flip-Flops, Registers and applications<br>Chapter 44<br>**Lab**: Flip-Flops |
| **Week 14** | Counters and application<br>Chapter 45<br>**Lab**: Counters |
| **Week 15** | Final Exam |