LAGUARDIA COMMUNITY COLLEGE
CITY UNIVERSITY OF NEW YORK
MATHEMATICS, ENGINEERING, AND COMPUTER SCIENCE DEPARTMENT

MAC241 – Computer Electronics I

4 credits; 6 hours (4 lecture, 2 lab)
Prerequisites: ENG099, MAT200

Catalog Description:

The course introduces students to DC and AC electric circuit fundamentals and provides the basis for further studies in computer technology. Students can relate the basic electrical quantities and components with the interpretation of Ohm's and Kirchhoff's Laws, power, voltage divider, time constants and filters. The laboratory provides hands-on experience using multi-meters, oscilloscopes, function generators and circuit simulation software.

Instructional Objectives:

1. Introduce the basic electrical quantities, current voltage, resistors and power
2. Enable students to determine resistance by color code and multimeter measurement
3. Introduce Kirchhoff's laws and Ohm's law
4. Provide students with hands on experience using circuit simulation software
5. Familiarize students with methods of analyzing DC circuits with resistors in series, resistors in parallel and a mix of series and parallel resistors in a circuit
6. Provide students with hands on skills to measure voltage and current using a multimeter
7. Introduce alternating current
8. Familiarize students with the oscilloscope, power supply and signal generators and provide them with hands on skills to measure DC, AC voltages and AC frequencies
9. Introduce capacitors and RC circuits in series, parallel and mix configuration circuits
10. Familiarize students with impedance and phase shift in AC circuits
11. Introduce electromagnetism, transformers and inductance
12. Enable students to compute complex numbers and analyze RLC circuits
13. Familiarize students with resonance and its circuit applications
14. Enable the students to prepare technical reports on circuit analysis and design

Performance Objectives:

1. Define current, voltage, resistance and power
2. Compute resistance using color codes and measure resistance using a multimeter
3. Explain Ohm's law and Kirchhoff's laws
4. Compute basic electrical quantities using Ohm's law and verify results with circuit simulation software
5. Analyze DC circuits with resistors in series, resistors in parallel and a mix of series and parallel resistors in a circuit
6. Measure voltage and current using a multimeter
7. Explain alternating current
8. Use the oscilloscope to measure DC and AC voltages, and AC frequencies
9. Explain the operation of capacitors and their use in RC circuits; compute time constants in series, parallel and mix configuration
10. Compute impedance and phase shift in AC circuits
11. Explain electromagnetism, transformers and inductance
12. Analyze RLC circuits. Compute true, apparent and reactive powers using complex numbers
13. Explain and compute resonance circuits
14. Prepare technical reports on circuit design and analysis

Textbook:
Floyd, Thomas L. and Buchla, David M., Electronics Fundamentals, 8th Edition, Prentice Hall, ISBN: 978-0-13-507295-0.
Buchla, David M., Experiments in Electronics Fundamentals and Electric Circuits Fundamentals, 8th Edition, Prentice Hall, ISBN: 9780135063279.

Evaluation:
Lab projects (6 total) …….30%
Quizzes/homework ……..……..15%
Written tests……30%
Final exam…….……...25%

Academic Integrity:
This class will be conducted in compliance with LaGuardia Community College's academic integrity policy.

Attendance:
The maximum number of unexcused absences allowed is 15% of the total class meetings. Unexcused absences beyond this maximum will result in a grade of WU or F.

Comments:
The grading standards listed above and the contents listed in the course outline are both subject to modification by the instructor.

COURSE OUTLINE

Week	Topic
1	Introduction to basic electrical quantities. Fundamental concepts of charge, resistance voltage and current
2	Introduction to Ohm's law and power, computing resistance, current and voltage using Ohm's law
3	Series circuits, measure resistance, voltage and current in a complex series network
4	Parallel circuits, measure resistance, voltage and current in a complex parallel network
5	Serial-parallel circuits, Thevenin-Norton equivalencies, power measurement condition for max power transfer
6	Magnetism and electromagnetism. Introduction to basic magnetic quantities
7	Introduction to AC circuit frequency and various AC waves
8	Capacitors series and parallel. RC time constants, XC reactance, total impedance, phase shift and frequency response, industry applications in power supplies and timing circuitry
9	Inductors series and parallel, RL time constants, total impedance, phase shift and frequency response. Industry applications
10	Step-up and step-down transformers, winding ratios, various degrees of phase shifts and no phase shift method
11	RLC circuits, total impedance, resonance frequency, maximum voltage and power and DB calculations. Introduction to complex numbers
12	Review of capacitors, inductors and RLC circuits, report on RC, RL and RLC circuits
13	Final Exam