EET 101 Electronic Fundamentals 1

Course Description: A course on DC and AC electrical systems for non-electrical engineering technology programs. Topics include: voltage, current, and power distribution for resistive, capacitive and inductive circuits; transformer properties, and three phase analysis.

Prerequisites(s): AFL 085 and AFM 095, or appropriate placement test score

Corequisite(s): No corequisite

Lecture Hours: 2	Lab Hours: 3	Credit Hours: 3
Lab Fee: 105	Supplemental Fee: 0	Purpose:
☐ Transfer Assurance Guide Course (TAG)	☐ Transfer Module Course (TM)	
Course Format: Lec/Lab	Grading: A/B/C/D/F/I	
Delivery Method: □ Web	□ Hybrid	x Classroom
Semesters Offered: x Fall	x Spring	x Summer

Course Primary Texts:

Title: Grob's Basic Electronics	Edition: 12th
Author(s): Schultz, M.E.	

Supplemental Materials:

Soldering Kit: http://www.electronickitsbychaneyelectronics.com/RACING-ROBOT-LEARN-TO-SOLDER-KIT/productinfo/C6927/

Course Outcomes:

1	Students should demonstrate the understanding of scientific and engineering notation, proper engineering prefixes, and the concept of order of magnitude in technical calculations.
2	Students should be able to explain the fundamental concepts of voltage and current, how these concepts relate to electron flow, and how material properties correlate to electrical resistance.
3	Students should illustrate the proper use of measurement equipment such as power supplies and multimeters and demonstrate the relationship between voltage, current, resistance, and power in the laboratory setting.
4	Students should be able to calculate key parameters, such as resistance, supply power, and total circuit current for series, parallel, and series-parallel circuits.
5	Students should understand the behavior of alternating current in resistive, capacitive and inductive networks, including resonant RLC circuits.

7	Students should differentiate the critical differences between capacitive and inductive circuits within DC circuits as compared to AC circuits.
8	Students should be able to explain the major types of transformer systems and understand the fundamentals of three-phase power systems.

Course Topics:

Topic 1	**Introduction to Powers of 10** Quantities and Units Units of Measurement Scientific Notation Engineering Notation Metric Prefixes, Metric Unit Conversions.	**3 Hours**
Topic 2	**Electricity** Atomic Structure Electrical Charge Current Voltage Resistance The Electric Circuit	**3 Hours**
Topic 3	**Resistors** Resistor types Color Coding Variable Resistors Power Ratings	**3 Hours**
Topic 4	**Ohm's Law** Ohm's Law The Relationship of Current, Voltage and Resistance Calculating Current, Voltage and Resistance Energy and Power Power in an Electric Circuit Energy Conversion Efficiency	**3 Hours**
Topic 5	**Series Circuits** Series Circuit Structure Total Current Total Resistance Total Voltage Total Equivalency Application of Ohm's Law Voltage Sources in Series Kirchhoff's Voltage Law Voltage Divider Theorem Power in Series Circuits Ground Effects of Open and Short Circuits	**5 Hours**
Topic 6	**Parallel Circuits** Parallel Circuits Structure Total Current	**5 Hours**

	Total Resistance Total Voltage Total Equivalency Application of Ohm's Law Voltage Sources in Parallel Kirchhoff's Current Law Current Sources Current Divider Theorem Power in Parallel Circuits Effects of Open and Short Circuits	
Topic 7	**Alternating Voltage and Current** Sine Wave Generation Voltage and Current Values for a Sine Wave Period and Frequency.	**3 Hours**
Topic 8	**Inductance and Capacitance** Energy Storage Calculations of inductance and capacitance Series/Parallel equivalent circuits Reactance	**3 Hours**
Topic 9	**Transformers** Step up/Step down calculations Impedance transformation Wye-Delta configurations	**4 Hours**
Topic 10	**Three Phase Power Systems** Basic voltage and current configurations Wye-Delta configurations Basic line/load calculations	**3 Hours**

Labs:

Lab Topic	Exp.#	Description	Hours
1	#1	**Introduction to the Electrical Laboratory:** Instrumentation used in the lab Safety principles and practices Reading analog VOM and digital DMM Bread-boarding. Resistor values	**3 Hours**
2	#2	**Ohm's law** Measuring voltage and current in series circuit. Determining unknown quantities using Ohm's Law.	**3 Hours**
3	#3	**Series Circuits** Construct series circuits from schematic diagrams Calculation and measurement of voltage and current values Calculation of power values Basic trouble shooting techniques Introduction to open and shorted elements Calculation and measurement of voltages and currents Verification of Ohm's Law	**3 Hours**

4	#4	**Parallel Circuits:** Construct parallel circuits from schematic diagrams Calculation and measurement of voltage and current values Calculation of power values Basic trouble shooting techniques	**3 Hours**
5	#5	**Series-Parallel Circuits** Measurement of voltage and current values across all branches and nodes. Calculation of power values	**3 Hours**
6	#6	**Electromagnetism and Motor Project** Demonstrate working simple electric motor. Build coil and electromagnet.	**3 Hours**
7	#7	**Introduction to the Digital Oscilloscope** 1. Learning the controls. 2. Calibration. 3. Basic D.C./A.C. voltage measurements. 4. Multisim Oscilloscope and Graphing Functions	**3 Hours**
8	#8	**Soldering Project** Build battery powered race car.	**6 hours**
9	#9	**RL and RC Circuits** Look at voltage and current relations in AC circuits Directly measure phase delay on the oscilloscope	**3 hours**
10	#10	**Transformers and 3 phase** Build simple transformers Introduction to 3-phase system laboratory	**3 hours**

Methods of Evaluation/Assessment

x Formative: □ Summative

List assessment activities (e.g. quizzes, discussions, essays, research papers, debates, oral presentations, exams):

Test 1	12% Total Semester Grade
Test 2	12% Total Semester Grade
Final Exam	18% Total Semester Grade
Quizzes	9% Total Semester Grade
Laboratory	40% Total Semester Grade

Quizzes: Quiz every Friday 15 – 20 min. in length.

Test 1: Week of _____. Will notify of exact day one week in advance.
Exam will cover first (5) weeks of course material. Test will be 1 hour in length. Closed book. Allowed one page of notes 8.5" x 11".

Test 2: Week of _____. Will notify of exact day one week in advance.
Exam will cover second (5) weeks of course material. Test will be 1 hour in length. Closed book. Allowed one page of notes 8.5" x 11".

Test 3:	Week of _____. Will notify of exact day one week in advance. Exam will cover third (5) weeks of course material. Test will be 1 hour in length. Closed book. Allowed one pages of notes 8.5" x 11".
Lab Reports:	Written lab reports will be due one week after initial lab session. All calculations for lab experiments must be completed before entering lab. Failure to complete lab calculations will result in expulsion from lab.
Make Up Policy:	No make up for missed quizzes, tests, exams and labs.
Turn-in Policy:	Assignments, lab reports, work sheets etc. will ***not*** be accepted late. All material must be dated or substantial points will be deducted.
Grading Policy:	Grading for all course material will be based completeness and accuracy of solution. Show all work in a relatively neat and orderly manner so partial credit can be awarded. If you give an incorrect solution with no work shown, you leave no choice but to deduct the total points for the problem at hand.

Don't let the calculator do the thinking for you.

Course Keeper: Ralph Whaley Date Completed: April 18, 2019