San Bernardino Valley College
Curriculum Approved: FA01

I. CATALOG DESCRIPTION:

A. Division: Technical and Workforce Development
Department: Electricity/Electronics
Course ID: ELECTR 116
Course Title: Alternating Current Circuit Laboratory
Laboratory: 3 hours
Units: 1
Prerequisites: ELECTR 110 and ELECTR 111
Corequisite: ELECTR 115

Course Description:
The laboratory complement to ELECTR 115 including skill training in oscilloscopes, QT boards, function generators, and other test equipment.

Schedule Description: The laboratory complement to ELECTR 115 including skill training in oscilloscopes, QT boards, function generators, and other test equipment.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

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

A. Describe the oscilloscopes operation and controls and be able to use it to measure voltage and time.
B. Use both analog and digital function generators to simulate AC signals.
C. Explain the layout of a QT board and be able to construct circuits on it.
D. Use a multimeter to measure voltage, check for continuity, and verify polarity.
E. Explain electrical safety procedures.

IV. CONTENT:

A. Practical Labs to Reinforce the Theory Described in ELECTR 115, LABS 1-12
1. Measuring voltage and time
2. Measuring and calculating phase angles in series RC circuits
3. Measuring and calculating phase angles in series RL circuits
4. Define unit variations in a series RC circuit, changing frequency, resistance, capacitance, and applied voltage
5. Determining the frequency cutoff in a series RC circuit
6. Determining the frequency cutoff in a series RL circuit
7. Determining the impedance characteristics of series resonance circuits
8. Determining the current characteristics of series resonance circuits
9. Build and compare, parallel bandpass and bandstop circuits
10. Analyze the voltage characteristics in a complex RC circuit as frequency changes.
11. Linear power supply rectifier configurations
12. Linear power supply filter configurations

B. Lab Guidelines
All labs are to be written up in a professional manner. This means that all text must be done with a typewriter or computer (very little handwriting).

C. Assemble Each Lab in the Following Order:
1. The description and purpose of the lab (lab cover sheet)
2. The schematic or drawing of the circuit, drawn with templates and rulers
3. Any charts or graphs that support the lab conclusion

4. A conclusion of the lab describing what you saw change (volts, ohms, etc.), why you think it changed, what you learned, and your opinions.
5. Next, you put your worksheet with the names of your lab partners and the instructors' initials.
6. Extra credit if applicable

D. The individual labs are to be assembled in order, in a binder, which will be collected and graded after the 5th and 12th labs.

V. METHODS OF INSTRUCTION:

Methods of instruction will vary from instructor to instructor but may include:

A. Discussion between the instructor and the student concerning the operation of the different test equipment.
B. Graphs and diagrams to show dynamic circuit relationships.
C. Assign practical laboratory projects with specific objectives; i.e., circuit descriptions, time and voltage measurements, frequency determination, troubleshooting and analysis.

VI. TYPICAL ASSIGNMENTS:

Typical assignments will vary from instructor to instructor but may include:

A. Determine the frequency cutoff point of a series RL circuit, verify the 3 dB point characteristics.
B. Measure V_{PP} from the oscilloscope, calculate V_P, V_{RMS}, V_{AVG}.
C. Measure the width of a sine wave off an oscilloscope, calculate the period and frequency.

VII. EVALUATION:

A. Methods of evaluation will vary from instructor to instructor but may include:
   1. Mid-term exam
   2. Final exam
      Typical Questions:
      a. The value of C is $.1^{-6}$ farads and L is 10^{-3} henrys. What is the resonant frequency?
      b. What must occur for induction to take place?
   3. Practical evaluations with written conclusions (graded on content, neatness, and spelling)

B. Frequency of evaluation will vary from instructor to instructor but shall include a topic journal and may additionally include:
   1. One (1) mid-term exam
   2. One (1) comprehensive final exam
   3. Completion of weekly lab experiments with conclusions

VIII. TYPICAL TEXT(S):

Meade, R. L., Foundations of Electronics, 3rd Edition, ITP Delmar, New York, 1998
Gates, E. D., Introduction to Electronics, 4th Edition, ITP Delmar, New York, 2001
Harsany, S. C., Introduction to Electronics, Prentice Hall, New Jersey, 2000

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

Scientific calculator