COURSE OUTLINE

ELEC 145 – TELECOMMUNICATIONS ELECTRICAL CIRCUITS

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ELEC 145 – TELECOMMUNICATIONS ELECTRICAL CIRCUITS

A. TITLE: TELECOMMUNICATIONS ELECTRICAL CIRCUITS

B. COURSE NUMBER: ELEC 145

C. CREDIT HOURS: 4

D. WRITING INTENSIVE COURSE: NO

E. COURSE LENGTH: 15 WEEKS

F. SEMESTER OFFERED: SPRING

G. HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY: 4- Hours Lecture

H. CATALOG DESCRIPTION:
   In this course students learn to analyze DC and AC passive circuits using Ohm’s Law, Kirchoff’s laws, and Superposition Theory. RC and RL circuits are analyzed for impedance and phase angles; troubleshooting, analysis by computer simulation using simulation software, and telecommunications applications are stressed throughout.

J. **GOALS (STUDENT LEARNING OUTCOMES):**

By the end of this course, the student will be able to:

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<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
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<tr>
<td>d. Describe Kirchhoff's law and how it is applied to electrical circuits</td>
<td>1. Communication 2. Crit. Thinking</td>
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<tr>
<td>e. Describe Superposition Theorem and how it is applied to electrical circuits</td>
<td>1. Communication 2. Crit. Thinking</td>
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<td>f. Discuss the functions of inductors and capacitors</td>
<td>1. Communication 2. Crit. Thinking</td>
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<td>g. Perform calculations in inductive and capacitive circuits</td>
<td>2. Crit. Thinking 3. Prof. Competence</td>
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<td>h. Interpret electrical circuits</td>
<td>2. Crit. Thinking 3. Prof. Competence</td>
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<td>i. Design electrical circuits and perform simulations using a computer</td>
<td>2. Crit. Thinking 3. Prof. Competence</td>
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<td>j. Examine sine wave and how it is applied to electrical circuits</td>
<td>2. Crit. Thinking 3. Prof. Competence</td>
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K. **TEXTS:**


L. **REFERENCES:**


M. **EQUIPMENT:** Angel and internet are to be used as integral part of the course deliver process, Laptop computer, Scientific Calculator, Circuit Simulation Software, Microsoft Office, and additional software as supplied by Next Step Program.

N. **GRADING METHOD:** (P/F, A-F, etc.) A-F
O. MEASUREMENT CRITERIA/METHODS
Final grade is based on the following: Quizzes, Tests, Midterm Exam, and Final Exam.

P. DETAIL TOPICAL OUTLINE:

I. VOLTAGE, CURRENT AND RESISTANCE
   a. Charge, Voltage, Current
   b. Resistance, Color code

II. OHM’S LAW, ENERGY AND POWER
   a. Ohm’s Law
   b. Solving problems using Ohm’s Law
   c. Energy and power
   d. Power ratings for resistors
   e. Voltage drop

III. SERIES CIRCUITS
   a. Total resistance
   b. Applying Ohm’s Law to series circuits
   c. Voltage sources in series
   d. Kirchhoff’s Voltage Law
   e. Voltage divider rule
   f. Potentiometers and rheostats
   g. Grounds
      h. Troubleshooting
   i. Signal-tracing
   j. Opens and shorts

IV. NETWORK ANALYSIS
   a. Nodes and branches
   b. Kirchhoff’s Current Law
   c. Total current
   d. Total resistance
   e. Conductance
      f. Applying Ohm’s Law in solving parallel circuits problems
   g. Signal tracing
   h. Current divider rule
      i. Power
V. SERIES-PARALLEL

a. Calculating currents, voltages and power
b. Voltage dividers with resistive loads
c. Bipolar voltage dividers
d. Voltmeter loading
e. Superposition theorem
f. Troubleshooting
g. Applications: Signal tracing a PC board, redrawing circuits

VI. THE SINE WAVE

a. Cycle, period, frequency
b. Radians, degrees
c. Peak, peak-peak, rms, effective, average\textsubscript{360}, average\textsubscript{180}, phase
d. Applying Ohm’s Law
e. Applying KCL and KVL

VII. CAPACITORS

a. Structure and characteristics
b. Energy storage
c. Voltage rating, temperature coefficient, leakage
d. Physical characteristics and capacitance
e. Types
f. Labeling
g. In series
h. In parallel
i. Time constant
j. Capacitor in dc circuits
k. Reactance and complex number representation
l. Phase shift

VIII. INDUCTORS

a. Structure and characteristics
b. Energy storage
c. Physical characteristics and inductance
d. Winding resistance and winding capacitance
e. Types
f. In series
g. In parallel
h. Induced voltage
i. Time constant
j. Inductor in dc circuits
k. Reactance and complex number representation
l. Phase shift
m. Power