1. **ECE 20100 – Linear Circuit Analysis I**

2. **Credits and contact hours:**
   3 credit(s)
   Lecture that meets 3 time(s) per week for 50 minutes per meeting for 15 weeks.

3. **Instructor's or course coordinator's name:** Prof. M. Capano

4. **Textbook(s):** *Linear Circuit Analysis:* Time Domain, Phasor, and Laplace Transform Approaches, 3rd Edition, R. DeCarlo and P. M. Lin, Kendall Hunt, ISBN No. 9780757564994, 2009.
   a. **Other supplemental materials:** *MatLab: Student Version*, Current Edition, The MathWorks, Inc. (recommend only)

5. **Specific course information**
   a. **Catalog description:** Volt-ampere characteristics for circuit elements; independent and dependent sources; Kirchhoff's laws and circuit equations. Source transformation; Thevenin's and Norton's theorems; superposition. Step response of 1st order (RC, RL) and 2nd order (RLC) circuits. Phasor analysis, impedance calculations, and computation of sinusoidal steady state responses. Instantaneous and average power, complex power, power factor correction, and maximum power transfer. Instantaneous and average power.
   b. **Prerequisites:** ENGR 13100 and (PHYS 17200 or PHYS 15200) and (MA 16600 Minimum Grade of C- or MA 16200 Minimum Grade of C-) and (MA 26100 [may be taken concurrently] or MA 17400 [may be taken concurrently] or MA 18200 [may be taken concurrently] or MA 27100 [may be taken concurrently])
   c. **Course status:**

6. **Specific goals for the course**
   a. Student learning objectives
      On completing this course the student shall have:
      i. An ability to analyze linear resistive circuits [1]
      ii. An ability to analyze 1st order linear circuits with sources and/or passive elements [1]
      iii. An ability to analyze 2nd order linear circuits with sources and/or passive elements [1]

   b. The relationship of the course's student learning outcomes to the Student Outcomes in Criterion 3 is denoted in the parenthetical following each learning objective.

7. **Outline**

Lectures	Topics
3	General circuit element, charge, current; voltage, sources, power; resistance, Ohm's Law, power reprise, non-ideal sources
3	Kirchhoff's Laws, single loop/node circuits; R combinations, V & I division; dependent sources (reprise).

3	Nodal analysis; mesh analysis
3	Op-amp basics; superposition and linearity; source transformations
3	Thevenin's and Norton's Theorems; maximum power transfer, D/A converter (optional).
3	Inductance; capacitance; L and C combinations, duality.
3	Intro 1st order circuits; source free/zero-input response; step response.
3	Linearity (reprise)/response classification; further examples: instabilities/waveform generation; RC Op-amp circuits
3	Intro 2nd order circuits: LC undamped case; source free case: real characteristic roots; source free case: complex roots
3	2nd order circuits with constant inputs; further examples/applications (instr. Option); sinusoidal forcing function
3	Complex forcing function; Phasors, Ohm's Phasor law for R. L, & C, KVL & KCL: Impedance/admittance of 2-terminal devices.
3	Sinusoidal steady-state (SSS) analysis; Phasor diagrams; frequency response.
3	Instantaneous and average power; effective value; complex power, conservation of power.
3	Power factor improvement; maximum power transfer; polyphase circuits.
3	Three exams for 1 week of testing over the semester

ECE 20700 – Electronic Measurement Techniques

2. **Credits and contact hours:**
   1 credit(s)
   Lab that meets 1 time(s) per week for 170 minutes per meeting for 15 weeks.

3. **Instructor's or course coordinator's name:** Dr. A. Balmos

4. **Textbook(s):** A lab manual will be provided for students.
   a. **Other supplemental materials:** None

5. **Specific course information**
   a. **Catalog description:** Experimental exercises in use of laboratory instruments. Voltage, current, impedance, frequency and waveform measurements. Frequency and transient response. Elements of circuit modeling and design.
   b. **Prerequisites:** ECE 20100 [may be taken concurrently]
   c. **Course status:**

6. **Specific goals for the course**
   a. Student learning objectives
      On completing this course the student shall have:
      i. An ability to competently operate basic laboratory equipment. [1]
      ii. An ability to make voltage, current, impedance, transient, and frequency response measurements. [1]
      iii. An ability to layout, wire and troubleshoot electronic circuits. [1]
      iv. An ability to design operational amplifier circuits from a set of specifications. [1, 2, 6]
      iv. An ability to keep a laboratory notebook and prepare a formal laboratory report. [3]

   b. The relationship of the course's student learning outcomes to the Student Outcomes in Criterion 3 is denoted in the parenthetical following each learning objective.

7. **Outline**

Weeks	Topics
1	Course overview; Intro to Oscilloscope, Ohmmeter, Voltmeter
2	Simple Op-Amp Circuit; Oscilloscope I
3	Op-Amp Equations; Current Measurement
4	Follower Circuit
5	Summing Amplifier
6	Integrator
7	Linear Scale Ohmmeter
8	Scope II: triggering, x-y mode
9	Lab practical exam
10	Lab practical exam - Formal Technical Report due
11	Step response and time constant measurement

12 AC bridge circuit
13 Frequency response measurements
14 Filter design
15 Lab practical exam