

**ELEC 60C Course Outline as of Fall 2015****CATALOG INFORMATION**

Dept and Nbr: ELEC 60C      Title: MODERN ELEC CIRCUITS I  
 Full Title: Modern Electronic Circuits I  
 Last Reviewed: 2/23/2015

Units	Course Hours per Week		Nbr of Weeks		Course Hours Total	
Maximum	6.00	Lecture Scheduled	5.00	17.5	Lecture Scheduled	87.50
Minimum	6.00	Lab Scheduled	3.00	10	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	8.00		Contact Total	140.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 175.00

Total Student Learning Hours: 315.00

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**

Basic theory of operation of electronic power supplies, both linear and switching, electronic communications systems, and communications integrated circuits.

**Prerequisites/Corequisites:**

Course Completion of ELEC 60B with a grade of C or better; OR

Course completion of ELEC 71A and ELEC 71AL and ELEC 71B and ELEC 71BL

**Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

Description: Basic theory of operation of electronic power supplies, both linear and switching, electronic communications systems, and communications integrated circuits. (Grade Only)

Prerequisites/Corequisites: Course Completion of ELEC 60B with a grade of C or better; OR

Course completion of ELEC 71A and ELEC 71AL and ELEC 71B and ELEC 71BL

Recommended:

Limits on Enrollment:

Transfer Credit: CSU;

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>CSU Transfer:</b>	Transferable	Effective: Fall 2009	Inactive: Fall 2017
<b>UC Transfer:</b>		Effective:	Inactive:

### **CID:**

### **Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

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

1. Calculate and measure the gain of single-stage and multistage amplifying circuits.
2. Calculate and measure the cutoff frequencies of active and passive filters and amplifiers.
3. Identify different oscillator types by circuit configuration.
4. Identify modulation types and characteristics by oscilloscope and spectral analysis presentations.
5. Draw and explain the purpose of each stage in an AM and FM receiver and transmitter and software-defined receiver and transmitter.
6. Analyze the advantages and disadvantages of AM and FM.
7. Troubleshoot and repair basic switch mode power supplies.

### **Topics and Scope:**

- I. Power supplies
  - A. linear regulators
    1. series regulators
    2. shunt regulators
  - B. switching power supplies/regulators
    1. buck regulators
    2. boost regulators
    3. pulse width modulation (PWM)
  - C. Common problems
- II. Amplifiers
  - A. single-stage amplifiers
    1. gain
    2. bandwidth
    3. classes
  - B. multi-stage amplifiers

1. gain
  2. bandwidth
- C. Common problems
- III. Filters
- A. passive
    1. types
    2. bandwidth
    3. bandwidth characteristics
  - B. active
    1. types
    2. bandwidth
    3. bandwidth characteristics
  - C. Common problems
- IV. Oscillators
- A. resistor capacitor (RC)
  - B. inductor capacitor (LC)
  - C. mechanical
    1. crystal
    2. surface acoustic wave (SAW)
  - D. modular
- V. Frequency conversion - up and down converters
- VI. Modulation types
- A. amplitude modulation (AM)
  - B. frequency modulation (FM)
  - C. phase modulation (PM)
    1. quadrature amplitude modulation (QAM)
    2. quadrature phase shift keying (QPSK)
- VII. Receivers
- A. superheterodyne principle
    1. single conversion
    2. multiple conversions
    3. image rejection
  - B. intermediate frequency (IF) amplifiers
  - C. demodulating circuits
    1. diode
    2. phase lock loop (PLL)
    3. discriminators
  - D. software-defined receivers
  - E. local oscillators
    1. variable frequency oscillators (VFO)
    2. frequency synthesized oscillators
    3. automatic frequency control (AFC)
- VIII. Transmitters
- A. basic transmitters
  - B. frequency multipliers
  - C. power amplifiers
    1. linear
    2. non-linear
  - D. modulation
- IX. Application specific integrated circuits (ASIC)s

LABORATORY MATERIAL

- I. Power supply circuits
  - A. linear
  - B. switch mode
- II. Amplifier lab (discrete)
  - A. single stage
  - B. multi stage
- III. Filters
  - A. active
  - B. passive
- IV. Oscillators
  - A. inductor capacitor (LC)
  - B. resistor capacitor (RC)
- V. Modulation lab
  - A. amplitude modulation (AM)
  - B. frequency modulation (FM)
  - C. phase modulation (PM)
  - D. spread spectrum
- VI. Receiver lab
  - A. AM
  - B. FM
  - C. intermediate frequency (IF) amplifiers
  - D. frequency conversion
  - E. alignment
- VII. Transmitter Lab
  - A. AM - single side band (SSB)
  - B. FM - PM
  - C. alignment (tuning)
- VIII. Software defined receivers

**Assignment:**

1. 10-20 page weekly reading assignments
2. 8-12 written lab reports
3. 15-24 homework/lab assignments
4. 2-5 objective quizzes
5. 1 objective midterm exam and final exam

**Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Lab reports

Writing  
20 - 30%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems, lab assignments

Problem solving  
30 - 40%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None

Skill Demonstrations  
0 - 0%

**Exams:** All forms of formal testing, other than skill performance exams.

Quizzes; midterm and final exam: objective examinations include multiple choice, true/false, matching items, completion

Exams  
30 - 40%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

None

Other Category  
0 - 0%

**Representative Textbooks and Materials:**

Electronic Devices, 9th edition. Floyd, Thomas L. Prentice Hall publishers: 2012

Foundations of Electronics Circuits and Devices, 5th edition. Gates, Earl. Meade, DelMar/Cengage publishers: 2007

Instructor prepared materials