ELEC 60D Course Outline as of Fall 2017

CATALOG INFORMATION

Dept and Nbr: ELEC 60D Title: MODERN ELEC CIRCUITS II
Full Title: Modern Electronic Circuits II
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 various linear and digital Application Specific Integrated Circuits (ASIC).

Prerequisites/Corequisites:
Course Completion of ELEC 60C with a grade of C or better; OR
Course Completion of ELEC 62 with a grade of C or better

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Basic theory of operation of various linear and digital application specific integrated circuits. (Grade Only)
Prerequisites/Corequisites: Course Completion of ELEC 60C with a grade of C or better; OR Course Completion of ELEC 62 with a grade of C or better
Recommended:
Limits on Enrollment:

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

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Effective:	Inactive:
UC Transfer:	Effective:	Inactive:

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

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

1. Identify operation amplifier (op amp) circuits.
2. Measure and analyze op-amp parameters.
3. Identify and explain operation of contemporary application specific integrated circuits (ASIC).
4. Troubleshoot and properly adjust phase lock loop (PLL) circuits as used in frequency synthesizers and demodulators.
5. Program and analyze performance of embedded controllers.
6. Program direct digital synthesizers (DDS) and analyze operation for frequency, frequency jitter and spectral purity.
7. Diagnose and troubleshoot problems with solid state industrial power devices and thyristors.

Topics and Scope:

I. Operational amplifier (op amp) fundamentals as applied to systems
  A. theory of operation
    1. basic parameters
      a. open and closed loop gain
      b. cut off frequency
      c. slew rate
      d. gain bandwidth product (GBP)
      e. common mode rejection ratio (CMRR)
    2. Norton amps
      a. open and closed loop gain
      b. cut off frequency
      c. slew rate
      d. gain bandwidth product (GBP)
      e. common mode rejection ratio (CMRR)
  B. Op amp and/or Norton amp applications

1. active filters
2. audio frequency (AF) amplifiers
3. power amps
4. instrumentation amplifiers
5. comparators

II. Phase lock loops (PLLs) & applications
A. Basic parts
1. voltage controlled oscillator (VCO)
2. frequency divider
3. phase detector
4. summing junction
B. Applications
1. frequency synthesizers
2. demodulators

III. Embedded controllers
A. analog to digital (A/D) and digital to analog (D/A) circuits
B. programmable integrated circuit (PIC)s
C. stamps

IV. Direct digital synthesis (DDS)
A. D/A conversion
B. clock reference
C. low pass filters
D. spectral purity

V. Digital potentiometers

VI. Industrial power devices
A. thyristors
1. silicon control rectifier (SCR)s
2. triode for alternating current (TRIAC)s
3. diode for alternating current (DIAC)s
B. insulated gate bipolar transistor (IGBT)
C. enhancement mode metal oxide semiconductor field effect transistors(E-MOSFETs)

LABORATORY MATERIAL
I. Operational amplifiers (op amp) lab
A. parameters
B. Norton amp
C. applications
II. Embedded controllers (basic)
A. programming
B. downloading
C. troubleshooting
III. Phase lock loop (PLL) lab
A. frequency synthesis
B. demodulation
IV. Direct digital synthesis (DDS)
A. analog to digital (a to d) conversion

B. digital to analog (d to a) conversion
C. spectral purity
V. Digital potentiometers
VI. Industrial power devices
VII. Application specific integrated circuits (ASIC)s

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 and 1 objective 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 (classic)

Instructor prepared materials