Tompkins Cortland Community College

Master Course Syllabus

Course Discipline and Number: ELEC 233 **Year: 2025-2026**

Course Title: Linear Integrated Circuits **Credit Hours: 4**

Attendance Policy: *To maintain good grades, regular attendance in class is necessary. Absence from class is considered a serious matter and absence never excuses a student from class work. It is the responsibility of all instructors to distribute reasonable attendance policies in writing during the first week of class. Students are required to comply with the attendance policy set by each of their instructors. Students are not penalized if they are unable to attend classes or participate in exams on particular days because of religious beliefs, in accordance with Chapter 161, Section 224-a of the Education Law of the State of New York. Students who plan to be absent from classroom activity for religious reasons should discuss the absence in advance with their instructors. See college catalog for more information.*

Services for Students with Disabilities: *It is the College's policy to provide, on an individual basis, appropriate academic adjustments for students with disabilities, which may affect their ability to fully participate in program or course activities or to meet course requirements. Students with disabilities should contact the Coordinator of Access and Equity Services, to discuss their particular need for accommodations. All course materials are available in alternate formats upon request.*

Course Description

An introduction to comparator and operational amplifier IC applications used in modern electronic circuitry. Topics include inverting and noninverting amplifiers, signal generators, opamp specifications, frequency considerations, precision rectifiers, and active filters. Prerequisites: ELEC 130; MATH 120 or MATH 122; prior completion or concurrent enrollment in ENGL 101; RDNG 116 if required by placement testing. 4 Cr. (3 Lec., 3 Lab.) Occasionally.

Course Context/Audience

This course uses integrated circuits (ICs) to implement many of the circuits presented in the Electronic Devices and circuits (ELEC 130) course. Because of their high density, students are able to design and implement much more sophisticated circuits like amplifiers and filters.

Basic Skills/Entry Level Expectations

Writing: WC College level writing skills are required. See course co-requisites or pre-requisites.

Math: MC College level math skills – Course requires college level math skills. See course description for co-requisite and/or prerequisite requirement(s).

Reading: R4 Before taking this course, students must satisfactorily complete RDNG 116 or have assessment indicating that no reading course was required.

Course Goals

The student will be able to design complex electronic circuits using operational amplifiers and build, calibrate and test their operation.

Course Objectives/Topics

Objective/Topic	% Course
The student will be able to design op-amp comparator circuits used as level-detectors.	10%
The student will be able to calculate values and design inverting and non-inverting amplifier circuits.	10%

The student will be able to design and implement level detector circuits having hysteresis.	10%
The student will be able to demonstrate an understanding of the uses of op-amps for special applications like voltmeters and constant current sources.	10%
The student will be able to determine the waveform and timing parameters for multivibrator oscillators.	10%
The student will be able to describe and demonstrate the application of diodes as precision rectifiers.	10%
The student will be able to demonstrate an understanding of the use of differential and instrumentation amplifiers for differential and strain gage measurements.	10%
The student will be able to demonstrate an understanding of the limitations that bias, offset and drift place on op-amp circuits.	10%
The student will be able to compensate for the problems that high frequency, slew rate and noise place on op-amp circuits.	10%
The student will be able to use op-amps in the design of low-pass, high-pass, band-pass and notch frequency filters.	10%

General Education Goals - Critical Thinking & Social/Global Awareness

CRITICAL THINKING OUTCOMES	**HOW DOES THE COURSE ADDRESS THE OUTCOMES** (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
Students will be able to ➢ develop meaningful questions to address problems or issues. ➢ gather, interpret, and evaluate relevant sources of information. ➢ reach informed conclusions and solutions. ➢ consider analytically the viewpoints of self and others.	Because of the mathematical nature of the course, students need to develop meaningful questions to design algorithms that solve the problems based on data they gather from datasheets, textbooks and the internet. Assignments dealing with complex algorithms that are a slight variation on those presented in class. Assign labs that require research on the specifications of modern semiconductors used in industry today. Cooperation amongst students is imperative to succeed in this career path. This course encourages students to work in teams during lecture help sessions and labs. Encourage students to share solutions and strategies during homework preparation and lab circuit design and implementation.
SOCIAL/GLOBAL AWARENESS OUTCOMES	**HOW DOES THE COURSE ADDRESS THE OUTCOMES** (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
➢ Students will begin to understand how their lives are shaped by the complex world in which they live. ➢ Students will understand that their actions have social, economic and environmental consequences.	In order to compete in today's marketplace, industries have to create products at a minimal cost. This course always considers the simplest circuit designs and cost-saving industrial automation. Research activities regarding low-cost discrete and integrated circuit components. Cover cost-saving systems approach to circuit design and implementation.

Instructional Methods
The lecture portion should be primarily a presentation of the material covered in the textbook. This should be followed by solving multiple text examples and assigning homework based on those examples. A short time at the beginning of each class should be used to review the solutions to the homework problems. The laboratory portion of the course is used to provide experience building, measuring and troubleshooting the circuits discussed in lecture.

Methods of Assessment/Evaluation

Method	% Course Grade
Quizzes (weekly)	60%
Comprehensive final exam (2 hour)	20%
Laboratory reports (weekly)	10%
Laboratory performance exams (2)	10%

Text(s)

Electronic Devices, Floyd, Thomas L., 9th edition Edition, © 2011 Prentice-Hall.
Required:

Electronic Devices Lab Manual, Buchla, David M., 9th edition Edition, © 2011 Prentice-Hall.
Labs:

Bibliography

Electronic Devises, 9th edition, Boylestad, Robert L., Prentice-Hall: © 2006.

Introduction to Electronic Devices, 7th edition, Paynter, Robert T., Prentice-Hall: © 2006.

Electronic Principles, 7th edition, Malvino, Albert P., McGraw-Hill: © 2007.

Other Learning Resources

Audiovisual Angel website: Electrical Technology Student Resources
Electronic www.datasheetcatalog.com
Other MultiSim simulation software, www.ni.com