

2020SP-ECE-332-001: Electronics Principles II

Prerequisites: ECE 331 with a grade of C or above.

Course Credit: 4 (Lecture and Lab)

Instructor: Tom Chen (thomas.chen@colostate.edu)

Lab TA: Ming-Hao Cheng, MingHao.Cheng@colostate.edu
Jacob Alfieri, jalfieri@rams.colostate.edu

HW Grader: Kaitie Wood will be the HW grader. Her email address is kdwood@rams.colostate.edu

Office: Scott Building, Room 352

Textbook: Lecture notes (required, it is the combined notes with ECE331), supplemented by “Fundamentals of Microelectronics” by Behzad Razavi (strongly recommended to own)

Objectives: This course is the continuation of Electronics I. It builds on the knowledge of device characteristics, models and operation in linear and non-linear circuits. This course will focus on basic analog circuits based on the MOS technology. BJT type circuits will not be covered in general. Progression of design concepts from simple, single stage linear circuits, to multi-stage linear circuits, to reference circuit, and output stages covers the basic set of design principles and guidelines. The learning will be further enforced by actual design projects students perform in the corresponding lab sessions and the knowledge integration modules. The design projects focus on design principles and verification of the designs with SPICE simulation results with the goal of understanding design tradeoffs.

Assessments: Two assessments (tests) are planned during the semester. Students can use any reference books, notes, and calculators to solve problems during the test period. Each assessment lasts a class period. If you fail any assessment, you MUST contact the instructor to arrange for remedial actions. Failed to do so will result in your failing the class.

Final Exam: The final exam is open-book, open-notes. Use of calculators is allowed.

Homework: Homework assignments are posted online and they are due at 4pm on the day one week after the date of posting. All HWs must be placed inside the dropbox located inside the BC infill by 4pm of the due date. Homework solutions will also be posted online.

Laboratory: 5 laboratory sessions are planned. It may change depending on the overall learning progress over the semester. All lab assignments are turned in to the TA. The lab report must follow the required format. Fail to do so will have a negative impact on your lab grade.

Knowledge Integration: There are three knowledge integration (KI) modules. Each KI module deals with a set of anchoring concepts taught in ECE312, ECE332, and ECE342 and shows how these concepts are integrated in a practical design. A set of questions related to the concepts used in each KI will be distributed before each KI module begins. Students are required to complete the pre-work in the form of a report by working through the questions and to understand how individual concepts are integrated in the practical design. Online presentations by each student to demonstrate his/her understanding of the materials in the first two KIs are required.

Grading:

• Laboratory	25%
• Homework	10%
• KI pre-work reports	4%
• KI presentations	3%
• KI peer-peer assessment	3%
• Assessment I	15%
• Assessment II	15%
• Final exam	25%
• Math Foundation	2% (extra)

Missing or Late HWs and Lab Reports:

No credit will be given to any lab work/report/HWs submitted after the solutions have been posted and discussed in the class. Thus, each student must complete all pre-laboratory assignments, attend lab sessions and submit a lab report. Lab reports must be done individually. Points will be deducted proportionally for any late submissions.

Remedial Work:

Students who failed any assessment test must contact the instructor to arrange for potential remedial work. This is to ensure that the learning gaps do not carry over to the following topics.

Topics covered:

1. MOS single transistor circuits (review)
2. MOS current sources
3. MOS differential circuits
4. MOS output stage design
5. MOS OTA and Opamp
6. Frequency response of CMOS circuits
7. Principle of feedback structures
8. Stability analysis and compensation
9. Noise analysis

Office Hours:

Instructor office hours: T, Th, 11-noon, and Wed. 11:30am - 12:30pm, or by appointment.

Instructor office telephone: 491 6574.

Instructor email address: thomas.chen@colostate.edu

TA during any of the lab hours.

Any questions regarding grading of HWs should be addressed to Kaitie via email (kdwood@rams.colostate.edu).