EE 320 – ENGINEERING ELECTRONICS I

CATALOG DATA
Circuit design and analysis using diodes and transistors. Introduction to semiconductor physics. Circuit simulation with SPICE.

Credits 3
Offered every semester

PREREQUISITES AND/OR COREQUISITES
Prerequisites: CHEM 121, EE 221, MATH 431, PHYS 181, and PHYS 181L.

TEXTBOOK(s)
Sedra and Smith, "Microelectronic Circuits," Oxford University Press

TOPICS
1. Op-amps: inverting, non-inverting, and integrating topologies, non-ideal effects including slew-rate, offset, and finite bandwidth
2. Introduction to device physics: fundamentals of semiconductor physics, the pn junction, diode current-voltage characteristics, the transistor, operation including movement of holes and electrons under various operating conditions
3. Diode circuits: limiting, clipping, clamping, rectifying, use of the diode in a power supply
4. Single-stage amplifiers: biasing transistor amplifiers and selecting topology for input/output impedance, gain, and input/output signal swing, frequency response of amplifiers
5. Using SPICE to simulate the operation of electronic circuits

LEARNING OUTCOMES (Student outcomes) [UULO course outcomes]
After completing EE 320 students will be able to:
1. analyze and design basic op-amp circuits including inverting, non-inverting, and integrator topologies (1.6, 1.8, 1.9, 1.10) [1,2]
2. identify the currents, and how they change with applied potentials, flowing through a semiconductor, diode, and transistor (1.6, 1.7, 1.8, 1.9, 1.10) [1,2]
3. discuss the movement of electrons and holes in a semiconductor device under various operating conditions (1.1, 1.2, 1.3, 1.6, 1.8) [1,2]
4. analyze and design diode circuits including: clipping/clamping, rectification, and regulation circuits (1.3, 1.6, 1.8, 1.9, 1.10) [1,2]
5. analyze transistor amplifier circuits including: operating point, small-signal gain, and large-signal operating range (1.1, 1.2, 1.6, 1.8, 1.9, 1.10) [1,2]
6. design transistor amplifier circuits for a required gain, input/output impedance, and/or operating voltage (1.6, 1.7, 1.8, 1.9, 1.10) [1,2]
7. use SPICE to simulate the operation of diode and transistor circuits (1.10) [1,2]

COMPUTER USAGE
Students use SPICE to create, simulate, and analyze electronic circuits.

GRADING
Homework, quizzes, two midterm exams, and a final exam are used for grading assessment.

STUDENT OUTCOMES
1. The appropriate technical knowledge and skills
   1. An ability to apply mathematics through differential and integral calculus,
   2. An ability to apply advanced mathematics such as differential equations, linear algebra, complex variables, and discrete mathematics,
   3. An ability to apply knowledge of basic sciences,
   4. An ability to apply knowledge of engineering,
   5. An ability to design a system, component, or process to meet desired needs within realistic constraints,
   6. An ability to identify, formulate, and solve engineering problems,
   7. An ability to analyze and design complex electrical and electronic devices,
   8. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice,

UULO COURSE OUTCOMES
1. Intellectual Breadth and Lifelong Learning
2. Inquiry and Critical Thinking
3. Communication
4. Global/Multicultural Knowledge and Awareness
5. Citizenship and Ethics

COURSE PREPARER AND DATE OF PREPARATION
R. Jacob Baker, Monday, January 15, 2015

Academic Misconduct—Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV’s function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the Student Academic Misconduct Policy (approved December 9, 2005) located at: https://www.unlv.edu/studentconduct/student-conduct.

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Religious Holidays Policy—Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: http://catalog.unlv.edu/content.php?catoid=6&navoid=531.

Transparency in Learning and Teaching
The University encourages application of the transparency method of constructing assignments for student success. Please see these two links for further information: https://www.unlv.edu/provost/teachingandlearning or https://www.unlv.edu/provost/transparency

Library Resources
Students may consult with a librarian on research needs. For this class, the subject librarian is Sue Wainscott. (https://www.library.unlv.edu/contact/librarians_by_subject). UNLV Libraries provides resources to support students' access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at https://www.library.unlv.edu.

Incomplete Grades—The grade of I—Incomplete—can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student's control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving “I” grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

Tutoring and Coaching
The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit http://www.unlv.edu/asc or call 702-895-3177. The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of the SSC (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TEB second floor.
UNLV Writing Center
One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student’s Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: http://writingcenter.unlv.edu/.

Rebelmail—By policy, faculty and staff should e-mail students’ Rebelmail accounts only. Rebelmail is UNLV’s official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students’ e-mail prefixes are listed on class rosters. The suffix is always @unlv.nevada.edu. Emailing within WebCampus is acceptable.

Final Examinations—The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: http://www.unlv.edu/registrar/calendars.