EE 3310 · Electronic Devices and Circuits · Spring 2023

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Class Time: 1:25 - 2:20 pm MWF Russ 150
Office Hours: 10:10 - 1:15 WF or by appt., Russ 246

Text (recommended): *Electronic Devices: A Design Approach*. Ali Aminian and Marian Kazimierczuk, 2003.

Course Description: Electronic devices, models, circuits, and analog IC applications.

Student Learning Objectives: With regard to engineering applications, students will investigate solid-state electronic devices such as diodes and bipolar and field-effect transistors; analyze and design circuits such as linear power supplies and transistor amplifiers; and design I.C. op-amp applications such as active filters.

Evaluation Policy: Final grades are based on five exam scores, equally-weighted. Letter grades follow the standard University grading scale (90-100% = *A*, etc.). There is no cumulative final and thus no examination during exam week.

Classroom Policy: Class attendance is highly encouraged. This course utilizes a *flipped classroom* approach, in which a lecture video and accompanying notes document is made available ahead of time for each class topic indicated on the next page of this syllabus. It is essential that you watch these videos and review notes before class so that classroom time may be utilized effectively for answering questions, working on practice problems, and participating in group exercises.

Examination Policy: ***Exams must be taken in-person on the days indicated on the next page of this document, at the scheduled class time. Make-up exams are not given. Missing an exam for any reason will result in a zero for the exam grade and an X for the final course grade. Exceptions may be made at the sole discretion of the instructor.*** Thoroughly examine the class schedule on the next page of this document. If you must miss an exam due to a pre-existing obligation, please notify the instructor the first week of the semester for further instructions. ***Absolutely no materials except course notes and a calculator may be used during exam sessions, including but not limited to online educational resources such as chegg.com. Use of any such materials or resources will result in prosecution through the Office of Community Standards and Student Conduct and, if found responsible, result in an F for the entire course grade.***

Academic Integrity Policy: All submitted work is to be solely that of the individual student. University academic integrity policies and procedures will be followed.

Please note that all class policies, procedures, and schedules may be adjusted by the instructor at any time.

WEEK	DATE	TOPIC
1	M 1/9	Introduction to semiconductors and the p-n junction
	W 1/11	Diodes; forward and reverse biasing; LED and Schottky diodes
	F 1/13	Ideal transformers; rectification and power supplies
2	M 1/16	**DR. MARTIN LUTHER KING JR. HOLIDAY – UNIVERSITY CLOSED**
	W 1/18	Capacitor-input filter; ripple
	F 1/20	Diode PIV rating, capacitor ratings
3	M 1/23	Zener diodes, shunt voltage regulator circuit
	W 1/25	Bipolar power supply, IC-based voltage regulators
	F 1/27	**EXAM I**
4	M 1/30	Introduction to bipolar junction transistors (BJTs)
	W 2/1	BJT active-region circuits; the Darlington configuration
	F 2/3	Two-stage direct-coupled DC circuits, intro to small-signal operation
5	M 2/6	Common-emitter voltage amplifier; DC circuit, operating point, mid-frequency circuit
	W 2/8	CE voltage amplifier: mid-frequency small-signal model, gain, input and output impedances
	F 2/10	CE low- and high-frequency small-signal models, overall response
6	M 2/13	Common-base voltage amplifier; MF small-signal model, input impedance, LF and HF response
	W 2/15	The BJT cascode
	F 2/17	**EXAM II**
7	M 2/20	Intro. to field-effect transistors; JFETs and MOS; Shockley Equation; Ohmic and Active Regions
	W 2/22	DC Bias of JFETs, depletion- and enhancement-type MOSFETs
	F 2/24	Common-source voltage amplifier; MF small-signal model, gain, input and output resistances
8	M 2/27	SPRING BREAK – UNIVERSITY CLOSED
	W 3/1	
	F 3/3	
9	M 3/6	CS low- and high-frequency small-signal models, overall response
	W 3/8	Constant-current sources and sinks; BJT and MOSFET current mirrors
	F 3/10	The CMOS differential amplifier
10	M 3/13	CMOS differential pair with active load
	W 3/15	**EXAM III**
	F 3/17	Introduction to negative feedback; feedback equation, beta networks, local feedback
11	M 3/20	Voltage followers
	W 3/22	Shunt/shunt voltage amplifier
	F 3/24	The three-transistor operational amplifier
12	M 3/27	Small-signal amplifier design: system specifications, choice of device and configuration
	W 3/29	Small-signal amplifier design: load-line analysis, design of operating point, MF analysis
	F 3/31	Small-signal amplifier design: feedback design, LF design, final checks, **EXAM IV assigned**
13	M 4/3	Intro to IC op-amp applications
	W 4/5	**EXAM IV due;** fundamental op-amp configurations; non-inverting, inverting, summing
	F 4/7	Balanced differential amplifier; common-mode rejection; instrumentation amplifier
14	M 4/10	Output voltage and current, gain-bandwidth product
	W 4/12	Slew rate, offset compensation
	F 4/14	Review of RLC filters; Sallen-Key active low-pass filter
15	M 4/17	S-K active high-pass, higher-order active filters
	W 4/19	S-K band-pass filters, misc.
	F 4/21	**EXAM V**