VE 311 Electronic Circuits

Summer 2023

Instructor: Xuyang Lu	**Email:** Xuyang.Lu@sjtu.edu.cn
Teaching Assistant: Yucheng Huang	**Email:** hyc391@sjtu.edu.cn
Teaching Assistant: Zeyu Zhang	**Email:** zzy912912@sjtu.edu.cn
Teaching Assistant: Jiaying Li	**Email:** lijiaying200@sjtu.edu.cn

Canvas Pages: https://jicanvas.com/courses/338

Feishu Group:

VE 311 SU2023
上海交通大学
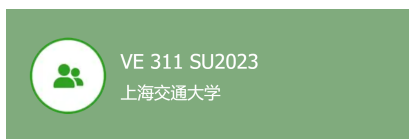
仅限企业内部成员加入

该二维码 1 年内 (2024/4/30前)有效

Office Hours: Will be announced later and post on Canvas.

Course Description:

- **Lecturing**: working principles of nonlinear semiconductor devices, including diode, BJT and MOSFET (with emphasis), and analog circuits based on those devices, such as voltage regulators, rectifiers, single stage amplifiers, differential pair amplifiers and current mirrors (if time allows).

- **Homework**: circuit analysis by hand-calculation with proper approximations. Comparison of hand-calculation results with Pspice simulation results.

- **Lab**: learning how to build and analyze circuits on simulation tool (Proteus) and breadboard by using power supply, function generator, oscilloscope and multimeter.

Course Outcomes:

- Build voltage regulators and rectifiers based on diodes and apply the constant voltage drop model to analyze them.

- Build single stage amplifiers based on BJTs and MOSFETs. Find out the dc biasing conditions of the amplifiers. Estimate the dc voltage gains and input/output impedances of the amplifiers by small-signal analysis.

- On the integrated circuit level, perform spice simulation to validate the hand-calculation results which are obtained by applying proper approximations.

- On the PCB level, design and analyze analog circuits by using PCB simulation tools (e.g. Proteus). Based on the simulation results, build the actual circuits on breadboard and use oscilloscope, function generator and multimeter to analyze the circuits.

Tentative Course Outline:

- Diode

- Diode Circuit

- BJT

- BJT Circuit

- MOSFET

- MOSFET Single Stage Amplifier

- MOSFET Differential Amplifier

- MOSFET Current Mirror (if time allows)

Main References: This is a restricted list of various interesting and useful textbooks that you can refer to during the course.

- Richard C. Jaeger and Travis N. Blalock, *Microelectronic Circuit Design.*

- Behzad Razavi, *Design of Analog CMOS Integrated Circuits.*

- Adel S. Sedra, Kenneth C. Smith, *Microelectronic Circuits.*

Course Schedule:

- Yellow: Lectures

- Blue: Midterm and final exams

- Red: Lab report due dates

- *: Assignment due dates

Grading Policy:

- Assignments × 9 (18%)

- Labs × 5 (15%)

- Midterm Exam (33%)

- Final Exam (34%)

	Apr	May					Jun				Jul				Aug					Sep
Monday	24	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	4
Tuesday	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	5
Wednesday	26	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30	6
Thursday	27	4	11	18	25*	1*	8*	15*	22	29*	6*	13*	20*	27*	3	10	17	24	31	7
Friday	28	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25	1	8
Saturday	29	6	13	20	27	3	10	17	24	1	8	15	22	29	5	12	19	26	2	9
Sunday	30	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	3	10
JI Week			1	2	3	4	5	6	7	8	9	10	11	12	13					
JI Semester	Spr. Brk.		Summer Term												Summer Break					
SJTU Week	11	12	13	14	15	16	17	18	1	2	3	4								
SJTU Semester	Spring Term						Summer Term				Summer Break									

Lab Session:

Lab manuals will be posted on Canvas in **Week 5, 7, 8, 11, 12**. Please complete the Proteus simulation and other related tasks according to the instructions on Lab Manuals and submit your result in a well-typed report format. Details about the labs will be announced further.

Homework Assignments:

There are 9 homework assignments in total. Assignment will be posted on Canvas on Thursday and due the next Thursday 12:00 pm, right after the usual Thursday lecture time.

Both hand-written work and typed work is welcomed, but please make sure that the your work is convenient for instructor and teaching assistants to read (which means the pictures or answers of each question should be cleared labeled). All homework assignments should be submitted in **PDF format**.

Course Policy:

- **Honor code**: All students in the class are bound by the Honor Code of the Joint Institute (http://umji.sjtu.edu.cn/academics/academic-integrity/honor-code/). You may not seek to gain an unfair advantage over your fellow students; you may not consult, look at, or possess the unpublished work of another without their permission; and you must appropriately acknowledge your use of another one's work.

- **Late policy**: Every homework and lab reports are encouraged to be submitted before the due date through Canvas. However, we accept the late submission within 24 hours with 25% deduction on the grade of your work. Any late submission that exceeds 24 hours of the due time will not be accepted and the grade for this work will be given an zero. If you have any difficulty in submitting your work, please contact the professor and TAs directly.

- **Homework and Lab**: Students are encouraged to discuss course topics, homework assignments and lab experiments with each other. However, all submissions must represent your own work. Duplicated submission is not allowed and will trigger an honor code violation investigation.

- **Exam**: The rule will be announced prior to each exam. Anyone violating the rule will be given an 'F' as the score.