Physics 623 Syllabus
Spring 2023

Lecture in 2120 Chamberlin, TR 1:00 – 2:15 pm
Labs in 3119A Chamberlin, Wed. 2:25-5:25 pm and 7:00-10:00 pm

Instructors:

Dan McCammon
Office hours: 5-6pm Tuesdays in 6207 Chamberlin + phone or email
6207 Chamberlin Hall
Phone: (608) 262-5916
Email: mccammon@physics.wisc.edu

Alessandro Cunsolo
Office hours: 5:30-6:30 Wednesdays in lab room (3119A Chamberlin) + any time by appointment
1336 Chamberlin Hall
Email: cunsolo@wisc.edu

Course homepage: http://www.physics.wisc.edu/courses/home/spring2023/623/

Text and References are on reserve in the Physics/Astronomy Library

Text: "The Art of Electronics" by Horowitz and Hill, Cambridge 3rd Ed.

Useful General References:
 "Introduction to Modern Electronics", C. Sprott (Wiley) [**Physics 321 Textbook**]
  "All About Circuits" on-line open source text: http://www.allaboutcircuits.com/textbook
  "Electronics with Discrete Components", E. J. Galvez (Wiley, 2013)
 "Introductory Electronics for Scientists and Engineers", R.E.Simpson, (Allyn and Bacon) 2nd Ed.
 "Electronics for the Physicist", C.F.G. Delaney (Ellis Horwood)
 "Principles of Electronics", L.R. Fortney (Harcourt Brace Jovanovich)
 "Basic Electronics for Scientists", James J. Brophy, (McGraw-Hill) 5th Ed.

Evaluation:
>   50% Laboratory (understanding, skills development, **notebook**, prelabs)
>   50% Lecture: Exams (70%), homework (30%)

Please don't skip any labs. Makeups are freely given — if you miss a lab due to research activities or illness, please see the instructor as soon as possible

The homework is assigned two ways. Each week for the laboratory, there is a worksheet that you must complete and turn in before starting the lab. Some weeks, this is extensive enough that it constitutes the homework for that week (and will count on your homework grade as well). Other weeks, homework problems will be assigned on Thursday in class and due the following Thursday in class.

Physics 623 Lectures and Labs — Spring 2023

Week	Date (TR)	Lecture Topic	Lab (W)	Laboratory	Text reference
1	Jan. 24	Linear Circuit Theory	Jan. 25	Introduction-Scope*	Ch. 1
	Jan. 26	Transmission Lines & more LCT			Handout
2	Jan. 31	Semiconductor circuit elements	Feb. 1	Transmission Lines*	Ch. 1
	Feb. 2	Transistor Amplifiers			Ch. 2
3	Feb. 7	Difference Amplifier	Feb. 8	Transistor Amplifier	Ch. 2
	Feb. 9	Negative Feedback			Ch. 4
4	Feb. 14	Op-amps I	Feb. 15	Difference Amplifier	Ch. 4
	Feb. 16	Op-amps II			Ch. 4
5	Feb. 21	**MIDTERM EXAM I**	Feb. 22	Operational Amps	
	Feb. 23	Fourier Transforms			Handout
6	Feb. 28	Noise I	Mar. 1	Operational Amps	Ch. 8
	Mar. 2	Noise II			Ch. 8
7	Mar. 7	Lock-in amplifiers	Mar. 8	Johnson Noise	Ch. 8.14
	Mar. 9	Lock-in applications			Ch. 8.14
March 11-19		**Spring Break**			
8	Mar. 21	Oscillators and positive feedback	Mar. 22	Phase Detector	Ch. 7
	Mar. 23	Digital Logic			Ch. 10
9	Mar. 28	Digital Circuits I	Mar. 29	Oscillators	Handout
	Mar. 30	Integrated Circuits			
10	Apr. 4	**MIDTERM EXAM II**	Apr. 5	Digital Circuits	
	Apr. 6	Phase Locked Loops			Ch. 13.13
11	Apr. 11	Circuit simulation	Apr. 12	Phase Locked Loops	
	Apr. 13	DACs and ADCs			Ch 13.1-13.12
12	Apr. 18	DACs and ADCs	Apr. 19	DAC & ADC	Ch 13.7-13.8
	Apr. 20	FPGA I			Appendix J - Handouts
13	Apr. 25	FPGA II	Apr. 26	Circuit Simulation	Ch. 11
	Apr. 27	Modulation and communication			Handout
14	May 2	Digital computers	May 3	FPGA I	Handout
	May 4	Review			
Tuesday, May 9		**FINAL EXAM: 12:25 – 2:25**			

*Read Appendix "O" on oscilloscopes in Horowitz & Hill. Also scope tutorials and manuals on course website.