

# Physics 623 Syllabus

**Fall 2018**

Lectures in Chamberlin 2120 on Tuesdays and Thursdays from 1:00 – 2:15 pm  
Labs in Chamberlin 4128 on Wed. 10:00 am – 1:00 pm and 3:00 pm – 6:00 pm

**Instructors:**

Victor Brar

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Dan McCammon

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Course homepage: <http://www.physics.wisc.edu/undergrads/courses/fall2017/623/>

**Text and References are on reserve in the Physics 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.

"Microwave Engineering", David Pozar (John Wiley and Sons)

**Evaluation:**

50% Laboratory (understanding, skills development, **notebook**)

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. Be considerate of your lab partner and make arrangements ahead of time if possible.

The homework is assigned two ways. Each week for the laboratory, there is a worksheet that you should complete and turn in before starting the lab. Some weeks, this is extensive enough that it constitutes the 'homework' for that week. Other weeks, homework problems will be assigned on Tuesday/Thursday in class and due the following Tuesday/Thursday in class.

## Physics 623 Lectures and Labs — Fall 2018

Week	Date (TR)	Lecture Topic	Lab (Wed)	Laboratory	Text reference
1			Sept. 5	Introduction	Ch. 1
	Sept. 6	Linear Circuit Theory			
2	Sept. 11	Transmission Lines & more LCT	Sept. 12	Transmission Lines	Handout
	Sept. 13	Semiconductor circuit elements			Ch. 1
3	Sept. 18	Transistor Amplifier	Sept. 19	Transistor Amplifier	Ch. 2
	Sept. 20	Difference Amplifier			Ch. 2
4	Sept. 25	Negative Feedback	Sept. 26	Difference Amplifier	Ch. 4
	Sept. 27	Op-amps			Ch. 4
5	Oct. 2	Op-amp circuits	Oct. 3	Operational Amps	Ch. 4
	Oct. 4	Fourier Transforms			handout
6	Oct. 9	Noise	Oct. 10	Operational Amps	Ch. 8
	<b>Oct. 11</b>	<b>Exam I</b>			
7	Oct. 16	Noise	Oct. 17	Johnson Noise	Ch. 8
	Oct. 18	Lock-in amplification			Ch. 8.14
8	Oct. 23	Lock-in applications	Oct. 24	Phase Detector	Ch. 8
	Oct. 25	Oscillators & positive feedback			Ch. 7
9	Oct. 30	Digital Logic	Oct. 31	Oscillators	Ch. 10
	Nov. 1	Digital Circuits			see also website:
10	Nov. 6	Integrated Circuits	Nov. 7	Digital Circuits	“digital circuits”
	Nov. 8	Phase Locked Loops			Ch. 13.13
11	Nov. 13	DACs and ADCs	Nov. 14	Phase Locked Loops	Ch. 13.13
	<b>Nov. 15</b>	<b>Exam II</b>			
12	Nov. 20	DACs and ADCs	Nov. 21	Circuit Simulation	Ch 13.1 – 13.(12)
	Nov. 22	Thanksgiving Break			
13	Nov. 27	Circuit simulation	Nov. 28	DAC & ADC	Ch 13.7-13.8
	Nov. 29	FPGA			Handouts-App. J
14	Dec. 4	FPGA	Dec. 5	FPGA I	Ch. 11
	Dec. 6	Digital receivers			Handout
15	Dec. 11	Digital computers	Dec. 12	FPGA II	Handout
	<b>Dec. 17</b>	<b>Final Exam: 2:45-4:45</b>			

Note Appendix “O” on oscilloscopes in Horowitz & Hill.