

Physics 314: Digital Electronics Fall 2016

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My Webpage: <http://userpages.wittenberg.edu/pvoytas/index.html>
Class Web site: http://userpages.wittenberg.edu/pvoytas/courses/p314_f016/p314_f16.html, where homework and reading assignments and other material for the course will be available.

Text: Introduction to Modern Electronics J.C. Sprott;
Supplemental material as needed

Course description: This course builds on what you've learned about analog electronics to introduce you to digital electronics. The emphasis will be on a hands-on, practical understanding. Labs are the central part of the course. We will first investigate the fundamentals of digital electronics, including Boolean logic, gates, flip-flops, clocks, counters, and memory. Then we will look at methods of digital-to-analog and analog-to-digital conversion. Finally, we will apply these concepts to a simple (but surprisingly powerful) programmable microcontroller. The course will be project-oriented; students will be able to choose specific applications based on their interests. If there is time and interest, we may also make use of circuit simulation software.

Specific Departmental Learning Goals of the course include:

- Have an understanding of some aspects of the relationship between science and technology.
- Design and conduct experiments at a reasonably sophisticated level.

Readings: There will generally be assigned readings before each class period. Doing the readings will 1) help with homework and 2) enable you to get more out of the lab.

Labs: Keep all your work in lab in a **permanently-bound quadrille-ruled** notebook **in ink**. The notebooks will be collected and graded after every experiment. Only things that don't fall out of the notebook when the notebook is inverted and shaken will be graded!

Homework: Problems and questions will generally be assigned for each class period and will be due at the beginning of class. Some will be over material covered the previous class period (review questions), and some will be over the material for the upcoming class period (preparation questions). Late homework will be accepted for half credit until the beginning of the next class after the assignment was due.

Exams: There will be a "mid-term" exam after the first half of the course and then a comprehensive final exam. Both exams will have written and practical parts.

Grading:	Homework:	15%
	Lab books:	20%
	Project:	15%
	Midterm:	25%
	Final:	25%

Letter grades will be assigned according to the percentage of possible points you have accumulated at the end of the semester. You are guaranteed that the divisions between grades will be no higher than the following: $90\% \leq A^-$, $A \leq 100\%$, $80\% \leq B^-$, $B \leq B^+ < 90\%$, $70\% \leq C^-$, $C \leq C^+ < 80\%$, $60\% \leq D^-$, $D \leq D^+ < 70\%$, $F < 60\%$. In borderline cases, attendance, class participation, and trend in exam scores will be used to decide whether to award the higher grade.

Accommodations:**Note to Students with Disabilities:** Wittenberg University is committed to providing reasonable accommodations for eligible students with disabilities. If you are eligible for course accommodations due to a disability, please provide me with your self-identification letter from the Office of Academic Services (206 Recitation Hall), so that we may discuss your learning needs. Early identification at the start of the term is required to ensure timely provision of services. If you need to contact the Office of Academic Services, please contact Roberta Perry at 937-327-7891 or rperry@wittenberg.edu.

Attendance: Unless something physically prevents you from doing so, contact me *before* class if you are going to be absent. Makeup labs and exams will be available only in cases of excused absences.

Tentative course schedule:

date	topics	Laboratory	readings (in general read these before class)
10/20/16	Why digital? Logic families Gates	Lab7	10-1:10-3
10/25/16	Binary, octal, hexadecimal representations	Lab7/d1	Handout
10/27/16	Gate combinations and Boolean logic	d1	11-1:11-4
11/01/16	Flip-flops	d1	11-5
11/03/16	Flip-flops; digital readouts	d2	Handout; other
11/08/16	Counters	d2	Handout; other
11/10/16	Registers, multiplexers, one-shots	d3	Handout: other
11/15/16	Exam 1		
11/17/16	Microcontrollers	d3	Microcontroller handout
11/22/16	Analog to digital conversion	d4	A/D handout
11/29/16	A/D and digital to analog	d4	D/A Handout
12/01/16	project Finish 5/project	d5	Handout
		d5	
12/06/16	Final exam		