



NORTHERN ILLINOIS UNIVERSITY

PHYS 375 - Laboratory Electronics I

Description

Syllabus

Laboratories

Grading

Catalog Description:

Fundamentals of circuit analysis and the physics of electronic devices. Topics include DC and AC circuits, signal transmission, noise, feedback, semiconductors, operational amplifiers, and simple digital logic.

PRQ: PHYS 252 or PHYS 273

A second course in electronics is [PHYS 475 - Laboratory Electronics II](#)

This course consists of two weekly lecture/laboratory periods.

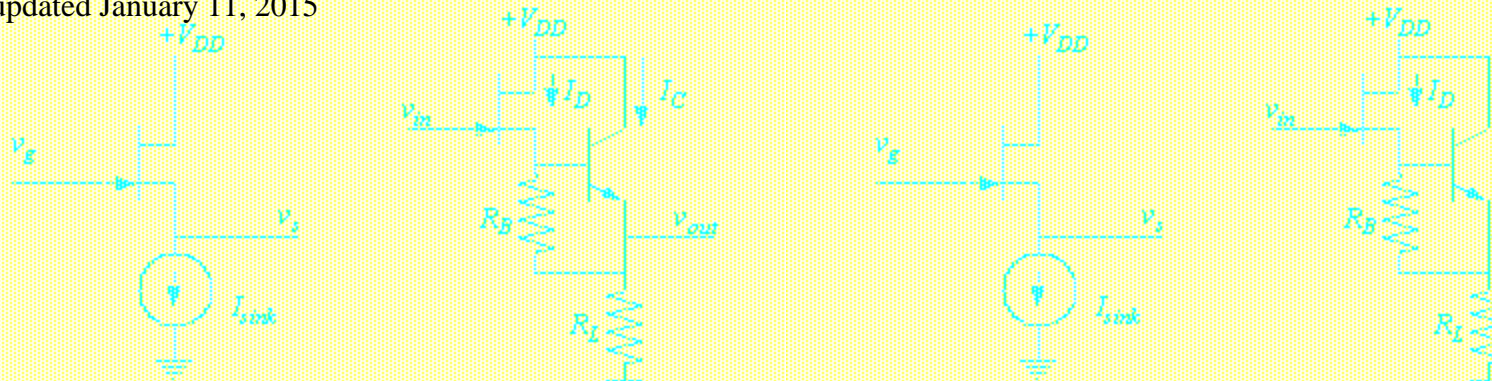
The lecture part will cover the basic theory of simple electronic circuits.

- DC and AC circuits
- Diodes and transistors
- Switches and digital logic
- Signal amplification in transistors and op-amps

The laboratory part will cover techniques of building and debugging circuits and follow the lectures

- Building circuits with breadboards and components
- Using power supplies and digital multimeters
- Using function generators and oscilloscopes
- Wiring simple integrated circuits
- Use of computers using LabView as part of circuit testing

last updated January 11, 2015





NORTHERN ILLINOIS UNIVERSITY

PHYS 375 - Laboratory Electronics I

Fall 2015 - Dr. Fortner

Lecture/Laboratory: TTh 10:00-12:00 (FW 233)

Texts:

Kaplan and White: Hands On Electronics (recommended)
 Essick - LabVIEW for Scientists and Engineers (3rd Ed - required)
 On reserve in the Faraday Library: (used by this course in past years)

- A. de Sa - Electronics for Scientists (1997)
- Horowitz and Hill - Art of Electronics (2nd Ed. 1989)
- Simpson - Introduction to Electronics for Scientists and Engineers (2nd Ed. 1987)

Weekly Lecture and LabVIEW Assignments

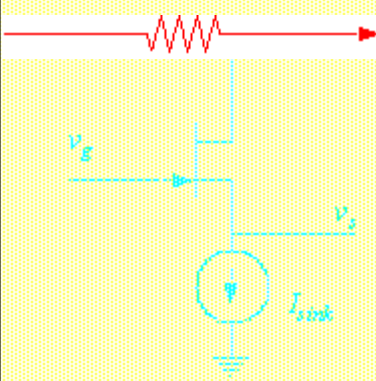
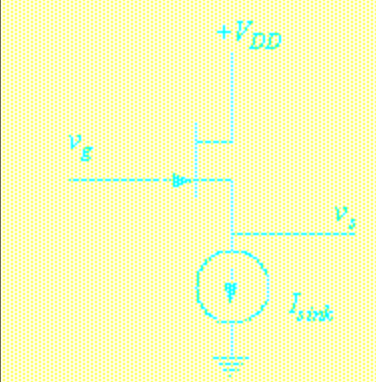
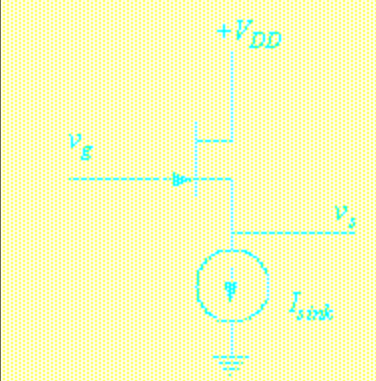
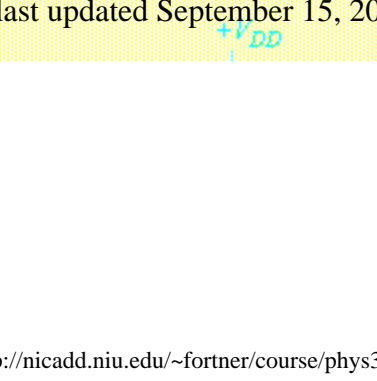
LabVIEW assignments should include screen shots of the block diagram and front panel.

Circuit problems will be assigned occasionally through BlackBoard, and should be prepared using Word and an equation editor or equivalent software, and saved in pdf format.

Week of	Lecture Slides (PDF)	Electronics Reading	LabVIEW Exercise (homework assignment)
8/24	Electricity; Kirchhoff's Laws	Kaplan - chapter 1	
8/31	Alternating Current; Filter	Kaplan - chapter 2	Essick - chapter 1 (1.3)

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<p><u>Laboratories</u></p> <p><u>Grading</u></p> 		<u>Circuits;</u>	
	9/7	<u>Transients; Signal Phase;</u>	Essick - chapter 2 (2.5)
	9/14	<u>Signal Transmission;</u>	Essick - chapter 3 (3.3)
	9/21		Essick - chapter 4 (4.7), chapter 5 (5.2)
	9/28	<u>Semiconductors; Diodes;</u>	Kaplan - chapter 3
	10/5	<u>Field Effect Transistors; Bipolar Junction Transistors;</u>	Kaplan - chapter 4, 5
	10/12	Midterm Exam	
	10/19	<u>Transistor Amplifiers; Amplifier Impedance;</u>	Essick - chapter 6
	10/26	<u>Operational Feedback; Op-Amp Circuits;</u>	Essick - chapter 10
	11/2	<u>Electronic Switches; Logic Gates;</u>	Kaplan - chapter 10
	11/9	<u>Flip Flops; Counters;</u>	Essick - chapter 7
	11/16		Engaged Learning Project
	11/23	Thanksgiving week	Engaged Learning Project
	11/30	Final Exam	Presentations

last updated September 15, 2015



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PHYS 375 - Laboratory Electronics I

Laboratory Schedule - Fall 2015

- Lecture/Laboratory: TTh 10:00-12:00 (FW 233)

Lab Reports

The purpose of the lab report is to communicate your lab results to your classmates. There is no standard format, but assume that your reader is at your level but hasn't done the lab yet. The procedure is in the lab handout and can be referenced with a link instead of writing it out. Be sure to note any changes from the handout as well as your results and observations. Clear data tables and graphs are important.

The format of the lab report is either HTML or PDF. These can be made with any number of editing programs, so do not use .doc or other word processor formats directly. Convert them into HTML or PDF instead. Graphs and circuit diagrams can be created and edited in a program like Excel or Paint and inserted as .gif or .jpeg types.

Students are required to post their lab reports on a web site. Students can use their server space provide by the university. All students should send an email message with the URL of the web site by the end of the third week of the semester. **Lab exercises in parentheses are for extra credit.**

[Send email.](#)

Visit the [student sites](#).

Lab Exams

The purpose of the lab exam is to assess your ability to build a circuit and use instruments to make measurements on a circuit. The instruments and techniques will be drawn from the labs, but the circuit may be entirely new. Each part of a lab exam is graded on the understanding of any appropriate theory and practice, and on the accuracy and clarity of the measurements.

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Weekly Lab Schedule

Week of	Laboratory (handouts in PDF format)	Report Due Date
8/24	DC Circuits	9/17
8/31	RLC Filters	9/24
9/7	Time Constants	10/1
9/14	Transmission Lines	10/8
9/21		
9/28	Diodes	10/15
10/5	Transistor Properties	10/22
10/12	LAB EXAM 1	
10/19	Transistor Amplifiers	
10/26	Operational Amplifiers , LabVIEW chapter 9	
11/2	Transistor Logic	
11/9	Multiplexers	
11/16	Engaged Learning Project (select a lab from Kaplan)	
11/23	Engaged Learning Project	
11/30	LAB EXAM 2	

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Grade components:

- Each laboratory will be given a grade from 0 to 5 points. A late lab will have a deduction of 2 points. Each missing lab will be given -5 points (about 40% of the grade).
- The engaged learning project is worth two laboratories.
- Each LabVIEW problem is worth a maximum of 4 points (about 20% of the grade).
- Each written and lab exam will consist of a number of parts (all four together worth about 40% of the grade).
 - Each part will be scored and a mean and standard deviation will be determined for that part.
 - The part will be worth $10 * (\text{score} - \text{mean}) / \text{deviation}$
- The total of all points (positive and negative) is used to compute the grade.

Grading scale:

- A: 100 or more
- B: 0 to 100
- C: -100 to 0
- D: -200 to -100
- F: less than -200

last updated January 28, 2014