

Course Syllabus

PHYS 3610/6610

Electronics I: Electronics for Scientific Instrumentation

Lecture: TH 7:15-8:45 PM, FASB 250

Labs:

(002) TH 9:40-11:45 AM, PHYS 302

(003) TH 12:55-2:50 PM, PHYS 302

(004) TH 5:15-7:15 PM, PHYS 302

(005) MW 3:05-5:00 PM, PHYS 302

Course Description

This is a course in analog and digital electronics. It assumes no prior knowledge of Physics, but will make extensive use of Algebra, Calculus and Complex Analysis.

The course will consist of two class sessions and two lab sessions per week for each student. The laboratory exercises are the focus of the course and compromise half of the course grade. There will be several homework assignments, two midterm exams and one final exam. Students are also expected to have a TurningPoint clicker (or a smartphone app) for use during class discussions.

Instructor

Douglas Bergman

230 INSCC (Bldg 19), 801-585-5973, bergman@physics.utah.edu (<mailto:bergman@physics.utah.edu>)

Office hours: W 2-3, H 11-12

TA

Mandefro Terferi

209-19 JFB, 80-581-7355, mandefero2002@yahoo.com (<mailto:mandefero2002@yahoo.com>)
(<mailto:mandefero2002@yahoo.com>)

Office hours: during lab sections.

Textbook

Fundamentals of Electrical Engineering, Leonard S. Bobrow, UMass, Amherst

Oxford University Press, ISBN-10: 0195105095, ISBN-13: 978-0195105094

All homework assignments will be taken from Bobrow.

Lab Policy

This is a lab oriented course, hence the heavy weight of lab work in the grade.

The TA runs the lab. They decide whether to give credit or not. The TA will decide whether what you have to show is good enough on the basis of YOUR LAB NOTES. So make you notes complete, clear and readable by others.

You can enter the lab at your convenience. However the TA will only be there at designated times to help and sign off your work.

Each student will be assigned an electronics "tester" box and be given a set of electronics components and a storage container. You will be responsible for the tester and any damage it sustains while in your care. It should be returned at the end of the class in the same shape it was given to you, specifically it should be cleaned out and have no components, wire or tools stored in it. The components are yours to keep at the end of the class, however the storage box must be returned, empty of all components. You will be docked the equivalent of one lab grade for not returning the tester and storage box in the clean state you received them.

You are responsible for cleaning up your working space an the end of each lab session.

Exams

There will be two midterms, to be administered during the regular class time and in the class room. See the schedule for dates. There will be no makeup midterms. The midterms will be closed-book tests. You be allowed one 8.5x11 sheet of notes (one side) and a calculator.

"Flipped Course" and In-Class Grades

The course will be run using the "flipped course" methodology. The instructor will prepare video lectures for each class session, which the students are responsible for watching *before* the session. The class session itself will consist of group exercises and working through examples. To participate students use a TurningPoint clicker (or a smartphone app). The In-Class grade is based on the use of the TurningPoint clickers, with one

point given for each session in which a student is seen to participate.

Feedback

There is a standing survey in the "Quizzes" section where students can anonymously voice concerns to the instructor.

ADA Statement

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.

Rights & Responsibilities

All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, and I will do so, beginning with verbal warnings and progressing to dismissal from and class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee.

Weekly Schedule

Week 1 (8/25-27): Ohm's Law, Kirchhoff's Laws, Node Method, Mesh Method

Week 2 (9/1-3): Thévenin Equivalent, Superposition, OpAmps

Week 3 (9/8-10): OpAmps, Schmitt Trigger

Week 4 (9/15-17): Digital Electronics, Boolean Algebra, Karnaugh Maps

Week 5 (9/22-24): Sequential Logic

Week 6 (9/29-10/1): Midterm 1; Diodes, Diode Circuits

Week 7 (10/6-8): Voltage Regulators, Capacitors & Inductors, 1st & 2nd Order Circuits

Week 8 (10/20-22): Complex Representation, Impedance

Week 9 (10/27-29): Power, Frequency Domain, Bode Plots, Laplace Transform

Week 10 (11/3-5): Active Filters

Week 11 (11/10-12): **Midterm 2; Bipolar Junction Transistors**

Week 12 (11/17-19): Transistor Amplifiers, BJT Circuits

Week 13 (11/24): Field Effect Transistors

Week 14 (12/1-3): FET Amplifiers, CMOS, OTA, Sample & Hold

Week 15 (12/8-10): AM, FM

Course Summary:

Date	Details	
Tue Aug 25, 2015	 Class 1 (https://utah.instructure.com/calendar?event_id=775281&include_contexts=course_346726)	7:15pm to 8:45pm
	 Class 2 (https://utah.instructure.com/calendar?event_id=775279&include_contexts=course_346726)	7:15pm to 8:45pm
Thu Aug 27, 2015	 Class 1 Quiz (https://utah.instructure.com/courses/346726/assignments/2320305)	due by 7:15pm
	 Class 2 Quiz (https://utah.instructure.com/courses/346726/assignments/2324378)	due by 7:15pm
	 Class 3 (https://utah.instructure.com/calendar?event_id=775280&include_contexts=course_346726)	7:15pm to 8:45pm
Tue Sep 1, 2015	 Class 3 Quiz (https://utah.instructure.com/courses/346726/assignments/2325219)	due by 7:15pm
	 Lab 1 (https://utah.instructure.com/courses/346726/assignments/2324449)	due by 11:59pm
	 Class 4 (https://utah.instructure.com/calendar?event_id=775298&include_contexts=course_346726)	7:15pm to 8:45pm
Thu Sep 3, 2015	 Homework 1 (https://utah.instructure.com/courses/346726/assignments/2324472)	due by 7:15pm

	 Lab 2 (https://utah.instructure.com/courses/346726/assignments/2324450)	due by 11:59pm
Tue Sep 8, 2015	 Class 5 (https://utah.instructure.com/calendar?event_id=775297&include_contexts=course_346726)	7:15pm to 8:45pm
	 Class 5 Quiz (https://utah.instructure.com/courses/346726/assignments/2326993)	due by 7:15pm
Thu Sep 10, 2015	 Class 6 (https://utah.instructure.com/calendar?event_id=775296&include_contexts=course_346726)	7:15pm to 8:45pm
	 Class 6 Quiz (https://utah.instructure.com/courses/346726/assignments/2327321)	due by 7:15pm
	 Homework 2 (https://utah.instructure.com/courses/346726/assignments/2324473)	due by 7:15pm
	 Lab 3 (https://utah.instructure.com/courses/346726/assignments/2324451)	due by 11:59pm
Tue Sep 15, 2015	 Class 7 (https://utah.instructure.com/calendar?event_id=775295&include_contexts=course_346726)	7:15pm to 8:45pm
	 Class 7 Quiz (https://utah.instructure.com/courses/346726/assignments/2335006)	due by 7:15pm
	 Lab 4 (https://utah.instructure.com/courses/346726/assignments/2324452)	due by 11:59pm
Thu Sep 17, 2015	 Class 8 (https://utah.instructure.com/calendar?event_id=775294&include_contexts=course_346726)	7:15pm to 8:45pm
	 Class 8 Quiz (https://utah.instructure.com/courses/346726/assignments/2335742)	due by 7:15pm
	 Homework 3 (https://utah.instructure.com/courses/346726/assignments/2324474)	due by 7:15pm
	 Lab 5 (https://utah.instructure.com/courses/346726/assignments/2324453)	due by 11:59pm
Tue Sep 22, 2015	 Class 9 (https://utah.instructure.com/calendar?event_id=775293&include_contexts=course_346726)	7:15pm to 8:45pm
	 Class 9 Quiz (https://utah.instructure.com/courses/346726/assignments/2335999)	due by 7:15pm
	 Lab 6	due by 11:59pm

[\(https://utah.instructure.com/courses/346726/assignments/2324454\)](https://utah.instructure.com/courses/346726/assignments/2324454)



Midterm Review (https://utah.instructure.com/calendar?event_id=775323&include_contexts=course_346726)

7:15pm to 8:45pm

Thu Sep 24, 2015



Homework 4
(<https://utah.instructure.com/courses/346726/assignments/2324475>)

due by 7:15pm



Lab 7
(<https://utah.instructure.com/courses/346726/assignments/2324455>)

due by 11:59pm



Midterm 1
(<https://utah.instructure.com/courses/346726/assignments/2345024>)

due by 8:45pm

Tue Sep 29, 2015



Lab 8
(<https://utah.instructure.com/courses/346726/assignments/2324456>)

due by 11:59pm



Class 10 (https://utah.instructure.com/calendar?event_id=775292&include_contexts=course_346726)

7:15pm to 8:45pm

Thu Oct 1, 2015



Class 10 Quiz
(<https://utah.instructure.com/courses/346726/assignments/2344950>)

due by 7:15pm



Lab 9
(<https://utah.instructure.com/courses/346726/assignments/2324457>)

due by 11:59pm



Class 11 (https://utah.instructure.com/calendar?event_id=775291&include_contexts=course_346726)

7:15pm to 8:45pm

Tue Oct 6, 2015



Class 11 Quiz
(<https://utah.instructure.com/courses/346726/assignments/2344970>)

due by 7:15pm



Lab 10
(<https://utah.instructure.com/courses/346726/assignments/2324458>)

due by 11:59pm



Class 12 (https://utah.instructure.com/calendar?event_id=775290&include_contexts=course_346726)

7:15pm to 8:45pm

Thu Oct 8, 2015



Class 12 Quiz
(<https://utah.instructure.com/courses/346726/assignments/2345523>)

due by 7:15pm



Homework 5
(<https://utah.instructure.com/courses/346726/assignments/2324476>)

due by 7:15pm



Lab 11
(<https://utah.instructure.com/courses/346726/assignments/2324459>)

due by 11:59pm



Class 13 (https://utah.instructure.com/calendar?event_id=775289&include_contexts=course_346726)

7:15pm to 8:45pm

Tue Oct 20, 2015	 Class 13 Quiz https://utah.instructure.com/courses/346726/assignments/2345576	due by 7:15pm
	 Lab 12 https://utah.instructure.com/courses/346726/assignments/2324460	due by 11:59pm
	 Class 14 (https://utah.instructure.com/calendar?event_id=775288&include_contexts=course_346726)	7:15pm
Thu Oct 22, 2015	 Homework 6 https://utah.instructure.com/courses/346726/assignments/2324477	due by 7:15pm
	 Lab 13 https://utah.instructure.com/courses/346726/assignments/2324461	due by 11:59pm
Tue Oct 27, 2015	 Class 15 Quiz https://utah.instructure.com/courses/346726/assignments/2346866	due by 7:15pm
	 Class 15 (https://utah.instructure.com/calendar?event_id=775287&include_contexts=course_346726)	7:45pm to 8:15pm
	 Class 16 (https://utah.instructure.com/calendar?event_id=775286&include_contexts=course_346726)	7:15pm to 8:45pm
Thu Oct 29, 2015	 Class 16 Quiz https://utah.instructure.com/courses/346726/assignments/2346995	due by 7:15pm
	 Homework 7 https://utah.instructure.com/courses/346726/assignments/2324478	due by 7:15pm
	 Lab 14 https://utah.instructure.com/courses/346726/assignments/2324462	due by 11:59pm
Tue Nov 3, 2015	 Class 17 (https://utah.instructure.com/calendar?event_id=775285&include_contexts=course_346726)	7:15pm to 8:45pm
	 Class 17 Quiz https://utah.instructure.com/courses/346726/assignments/2347121	due by 7:15pm
	 Lab 15 https://utah.instructure.com/courses/346726/assignments/2324463	due by 11:59pm
Thu Nov 5, 2015	 Midterm Review (https://utah.instructure.com/calendar?event_id=775440&include_contexts=course_346726)	7:15pm to 8:45pm
	 Homework 8 https://utah.instructure.com/courses/346726/assignments/2324479	due by 7:15pm
	Lab 16	

 (<https://utah.instructure.com/courses/346726/assignments/2324464>) due by 11:59pm

Tue Nov 10, 2015

 **Midterm 2**
(<https://utah.instructure.com/courses/346726/assignments/2347130>) due by 8:45pm

 **Lab 17**
(<https://utah.instructure.com/courses/346726/assignments/2324465>) due by 11:59pm

Thu Nov 12, 2015

 **Class 18** (https://utah.instructure.com/calendar?event_id=775284&include_contexts=course_346726) 7:15pm to 8:45pm

 **Class 18 Quiz**
(<https://utah.instructure.com/courses/346726/assignments/2361951>) due by 7:15pm

 **Lab 18**
(<https://utah.instructure.com/courses/346726/assignments/2324466>) due by 11:59pm

Tue Nov 17, 2015

 **Class 19** (https://utah.instructure.com/calendar?event_id=775283&include_contexts=course_346726) 7:15pm to 8:45pm

 **Class 19 Quiz**
(<https://utah.instructure.com/courses/346726/assignments/2361991>) due by 7:15pm

Thu Nov 19, 2015

 **Class 20** (https://utah.instructure.com/calendar?event_id=775282&include_contexts=course_346726) 7:15pm to 8:45pm

 **Class 20 Quiz**
(<https://utah.instructure.com/courses/346726/assignments/2363929>) due by 7:15pm

 **Homework 9**
(<https://utah.instructure.com/courses/346726/assignments/2324480>) due by 7:15pm

 **Lab 19**
(<https://utah.instructure.com/courses/346726/assignments/2324467>) due by 11:59pm

Tue Nov 24, 2015

 **Class 21** (https://utah.instructure.com/calendar?event_id=775299&include_contexts=course_346726) 7:15pm to 8:45pm

 **Class 21 Quiz**
(<https://utah.instructure.com/courses/346726/assignments/2364213>) due by 7:15pm

 **Lab 20**
(<https://utah.instructure.com/courses/346726/assignments/2324468>) due by 11:59pm

Tue Dec 1, 2015

 **Class 22** (https://utah.instructure.com/calendar?event_id=775300&include_contexts=course_346726) 7:15pm to 8:45pm

 **Class 22 Quiz**
(<https://utah.instructure.com/courses/346726/assignments/2364467>) due by 7:15pm

	 Class 23 (https://utah.instructure.com/calendar?event_id=775301&include_contexts=course_346726)	7:15pm to 8:45pm
Thu Dec 3, 2015	 Class 23 Quiz (https://utah.instructure.com/courses/346726/assignments/2364855)	due by 7:15pm
	 Homework 10 (https://utah.instructure.com/courses/346726/assignments/2324481)	due by 7:15pm
	 Lab 21 (https://utah.instructure.com/courses/346726/assignments/2324469)	due by 11:59pm
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Tue Dec 8, 2015	 Class 24 (https://utah.instructure.com/calendar?event_id=775302&include_contexts=course_346726)	7:15pm to 8:45pm
	 Lab 22 (https://utah.instructure.com/courses/346726/assignments/2324470)	due by 11:59pm
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Thu Dec 10, 2015	 Course Review (https://utah.instructure.com/calendar?event_id=778515&include_contexts=course_346726)	7:15pm to 8:45pm
	 Homework 11 (https://utah.instructure.com/courses/346726/assignments/2327256)	due by 7:15pm
	 Lab 23 (https://utah.instructure.com/courses/346726/assignments/2324471)	due by 11:59pm
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Tue Dec 15, 2015	 Final Exam (https://utah.instructure.com/courses/346726/assignments/2411683)	due by 10:30pm
	 In Class (https://utah.instructure.com/courses/346726/assignments/2605666)	
