PHY335 – Electronics and Instrumentation Lab – Spring 2020

**Organization**

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| **Classes:** | Mon/Wed & Tue/Thurs, 1-3:50 pm  Room A-127 + TBD |
| **Professor:** | Jan C. Bernauer C-105. Office hours: Tues: 4:00-5:00 in C-105 or by appointment. Email: jan.bernauer (at) stonybrook.edu or phone 28813 |
| **Teaching Assistants:** | Anthony Catanese Email: anthony.catanase (at) stonybrook.edu Jay Rutledge Email: jay.rutledge (at) stonybrook.edu TBD |

**Description**

All material is divided into units, covering related topics. Each unit may occupy from 2 to 5 lab periods. In groups of 2, you will perform lab assignments. The instructions are linked below. For preparation, read the material covering the upcoming lab in the textbooks, design circuits required for the lab assignments and perform calculations. The time in the lab is limited, and extensions will only be granted under exceptional circumstances.

**Most lab periods will be start with a short lecture. Please be on time.**

You must have **two** lab books. These books will contain your notes and data taken in the lab. After finishing a unit you will submit your lab book to TA for grading, and use the second book for the next unit.

All students should make the best effort to participate equally in the experimental part. You will write separate lab reports after completion of each unit and submit them for grading along with your lab book. Although you may work in the lab with a partner, you will **write your reports individually**. Except for the raw data, the reports are expected to be different and reflect individual work. Copying of any part of the report is unacceptable and will automatically lead to zero grade, as a first warning.

Please keep the lab clean and bring back components to the part racks and sort them in correctly. If a workbench is found untidy after class, points *might* be deducted. If you throw away working parts to clean up faster, points **will** be deducted.

There will be *Midterm practical exam* during the semester, and a *final exam*. Exams include doing experimental tasks in the Lab, explaining the relevant theory (for example, derivation of essential formulas), and data analysis. Take notes at mini-lectures to prepare for this. Each exam will resemble the lab period and the writing of the report, all combined in the interval of 1/2 a lab period. The exams are given in two shifts, so that each student will have to work on the exam problems on his or her own. Active and equal participation in experimental work and study of the material covered in mini-lectures during the course will prepare you for the exams. Sign-up sheets for each shift of the midterm (12:30-2:30 pm and 3:00-5:00 pm) will be posted in the lab 2-3 weeks in advance.

**Lab reports**

Lab reports can be handwritten if the handwriting is good. Preferably, they are however prepared on a computer, e.g. with latex, or word. They should include:

* Introduction
  + 1 to 2 pages
  + Include all relevant theory and equations
  + i.e. generally those found in bold at the top of the lab instructions
* Data
  + Data in the lab notebook should be also in the lab report.
  + Draw circuit diagrams!
  + Include error bars on plots, and data tables
* Analysis
  + Must explain if the experiment was successful
  + Does experiment agree with theory prediction?
  + Include a discussion of statistical and systematical errors
* Short conclusion / summary

The introduction has to be written **before** the unit. The TAs or the Professor will sign below the text on the first day of the unit (make sure that it is signed before you leave!), and it will be graded along with the report by the TAs. Lectures for a unit will be given during the last day(s) of the unit before, so make sure to plan your experiment time accordingly. For Unit 1, the deadline for the intro will be the first day of the second week.

**Grading**

At least six units, the midterm and the final must be completed to pass this course. The grading is weighted as **60% Units + 20% midterm + 20% final**

**Academic Integrity**

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person’s work as your own is always wrong. Faculties are required to report any suspected instance of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <https://www.stonybrook.edu/commcms/academic_integrity/index.html>.

**Text books**

There will be no specific reading assignments from the textbooks. However, you should look in the section with a topic similar to each lab, read it, and understand it.  
I highly recommend  
**Horowitz and Hill, The Art of Electronics (Cambridge University Press)** Either the 2nd or 3rd edition.

Other books include:

* Curtis A. Meyer, Basic Electronics: An Introduction to Electronics for Science Students
* Hayes and Horowitz, Student manual for the Art of Electronics (Cambridge University Press, 1989)
* Rizzoni, Principles and Application of Electrical Engineering
* Alexander and Sadiku, Fundamentals of Electric Circuits
* J. R. Cogdell, Foundations of Electrical Engineering

**Syllabus**

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| **UNIT** | **SUBJECT** | **LAB DATES** | **REPORT**  **DUE ON** | **ADDITIONAL MATERIAL** |
|  | Introduction | Jan. 27+28 |  |  |
| 1 | Lab instruments, signals,  resistors | Jan. 29+30, Feb. 3+4, 5+6 | Feb. 12+13 | AoE Chapter 1.1 to 1.3 |
| 2 | Capacitors, Inductors, RC  filters | Feb. 10+11, 12+13, 17+18 | Feb. 24+25 | AoE: Chapter 1.4 to 1.5,1.7 (6) |
| 3 | Diodes and DC power | Feb. 19+20, 24+25 | March 4+5 | AoE Chapter 1.6 |
| 4 | Operational amplifiers | Feb. 27+28, March 2+3,  4+5, 9+10 | March 23+24 | AoE Chapter 4 |
| 5 | Simulation and PCB design | March 11+12, 23+24 | March 30+31 |  |
| Midterms | (Units 1-4) | March 25+26 |  |  |
| 6 | Transistors and Transistor  circuits | March 30+31, April 1+2,  6+7, 8+9, 13+14 | April 22+23 | AoE Chapter 2,3 |
| 7 | Digital electronics, TBD | April 15+16, 20+21, 22+23,  27+28, 29+30 | May 6+7 | AoE Chapter 10,(11),12.1-12.3,  13.1-13.5 (13.5-13.14), |
| Finals | (Units 1-7, focus on 5-7)) | May 6+7 |  |  |

**DISABILITY SUPPORT SERVICES (DSS) STATEMENT**

If you have a physical, psychological, medical, or learning disability that may impact our course work, please contact Disability Support Services at (631) 632-6748 or http://studentaffairs.stonybrook.edu/dss/. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.  
Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website: <http://www.sunysb.edu/ehs/fire/disabilities.shtml>

**Critical Incidents**

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, and/or inhibits students’ ability to learn.