50:750:307- Electronics

Instructor	Dr. Sean O'Malley	E-mail	omallese@camden.rutgers.edu
Phone	856-225-6159	Office Hours	TBA
Office	CNS 216F	Final Exam	TBA

Class time: Tues & Thurs. 2:00pm – 3:20pm

Text: There is no assigned textbook assigned for this course; however, if there was one it would be the following:

- Diefenderfer & Holton, "Principles of Electronic Instrumentation", ISBN 0-03-074709-0. (*good textbook but out of print, contains some mistakes*)

Other useful books:

- Boylestad & Nashelsky, "Electronic Devices and Circuit Theory", ISBN 978-0-13-502649-6. (*good text, but not great for this type of course*)

- Horowitz & Hill, "The Art of Electronics", ISBN 0-521-37095-7. (*The electronics reference book, every experimentalist should have a copy*)

- Hummel, "Electronic Properties of Materials", ISBN 0-387-95144-x. (*Good reference book for the physics behind electronic devices without getting into too much detail*)

- "Low Level Measurements" by Keithley Corporation. (*Lab reference for electrical measurements, every experientialist should have a copy*)

Software: We will be using a free circuit simulator program called QUCS throughout the semester. You can download a copy of the program here: http://qucs.sourceforge.net/

Description:

This course is meant to provide *you* the student with a working knowledge and understanding of electronic components, circuits, and devices as they pertain to a laboratory environment. The course includes both lecture and lab work.

Learning goals:

Upon completion of this course a student should have acquired the following knowledge and skills:

- Gain competency in the physically prototyping of electric circuits e.g., best practices in circuit layout out and in the soldering componentry to a board.
- Become adept at designing low, high, and bandpass filters with a given set of parameters.
- Understand the fundamental operation and construction of diodes.
- Become capable of constructing a regulated power supply.
- Comprehend the role played by transducers and their fundamental operation.
- Become competent in the design of basic op-amp circuits with desired gain and impedance characteristics.
- Gain familiarity with analog-to-digital and digital-to-analog converts.
- Develop an understanding of Boolean logic its associated devices.

Details:

1) Office hours are just a formality – You may stop by my office anytime, however I may or may not be available.
2) There will be **two semester exams** pertaining to the material covered during lecture. (100 pts ea.)
3) There will be several directed **labs** and **homework assignments**. (upto 20 pts ea.)
4) There will be an **end-of-semester project**, which you will have to present in front of the class. (150 pts)

Grading:

A	90-100%		C	67-75%
B+	87-89%		D	55-66%
B	80-86%		F	<55%
C+	76-79%			

Instructor's Statement:

Do not engage in any form of academic dishonesty. If you do not know what academic dishonesty is, please consult this statement:
http://www.camden.rutgers.edu/RUCAM/info/Academic-Integrity-Policy.html.
I will report any violations of this policy to the campus Judicial Officer.

Please note that it is necessary to explain all steps that you take on exams – make an effort to *clearly* show your work. Answers without justification will not be accepted! You may be asked to explain your reasoning.

Do not bring cell phones to class or disrupt class in any way. If you do so, you will be asked to leave and will not be welcomed back for the rest of the class period. The use of computers will be at my discretion – in general they will not be necessary or welcome.

Attendance is strongly suggested at all class meetings in accordance with the policies and guidelines set forth in the student manual.

Attending the lecture is not enough. Take notes in class and read-up on the relevant topics on the web or in relevant textbooks.

Class Resources:

https://canvas.rutgers.edu/

Class Outline:

1) Passive components (a review of resistors, capacitors, and inductors.)
2) Basic circuit construction techniques
3) Basics of semiconductor physics
4) Diodes
5) Regulators and power supplies
6) Transducers (e.g. temperature sensors, pressure sensors, light detectors, etc.)
7) Transistors and their various forms
8) Amplifiers
9) The 555 Timer
10) Digital electronics (e.g. logic circuits, analog-to-digital convertors (ADCs), and digital-to-analog convertors (DACs)
11) Signal noise