CHM 6158C: Electronics and Instrumentation

Spring Semester 2015 (3 credits)

Instructor:	Nick Polfer, 311C Chemistry Lab Building (CLB), polfer@chem.ufl.edu, 392-0492
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Office hours:	TBA
Course description:	CHM 6158C is a combined lecture and laboratory class, providing students with an understanding of the principles and applications of electronic devices and techniques employed in modern computerized scientific measurements in analytical/physical chemistry.
Objectives:	It is expected that by the end of the course students will be familiar with basics of electronics circuits, including logic circuits, op-amp circuits, and AC measurements. The students will also have acquired sufficient coding experience, and should be able to design a LabView project to automate and control laboratory measurements.
Textbooks:	The lecture notes will be based on the following textbooks (**no** need to purchase, all lecture material will be provided): 1. The Art of Electronics, Paul Horowitz, Winfried Hill, 2nd Edition, Cambridge University Press, ISBN 978-0-521-37095-0. 2. Teach Yourself Electricity and Electronics, Stan Gibilisco, 3rd Edition, McGraw-Hill, ISBN 0-07-137730-1.
Venue:	FLI 109 (Flint). Lectures and lab periods will take place in this classroom.
Lectures:	T, R 4th period (10:40 am – 11:30 am) The lectures will be made available on an E-learning web environment.
Exams:	Two exams, one midterm and one final exam, will review the lecture material.
Course policies:	Attendance at all class/discussion sessions and **at least 6 hours of lab per week** is expected. Any absences are subject to UF regulations

https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

As a courtesy, it is expected that students arrive on time and that they mute their cell phones during class.

Requirements for class **attendance** and **make-up exams**, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

Students should also familiarize themselves with the UF Student **Honor Code** posted at www.chem.ufl.edu/~itl/honor.html.

Students with disabilities must first register with the Dean of Students Office; the Dean of the Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting **accommodation**.

The assignment of grade points follows the UF **grading policies**, see undergraduate catalog https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These **evaluations** are conducted online at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu

Lab experiments:

- There are a total of 7 lab units that will be covered as a part of the laboratory part of the course. The sequence of experiments deal with measurement instrumentation, digital logic, data acquisition using LabVIEW, power supplies, op amps, etc.
- A lab "period" consists of a 3-hour lab session. The following times are reserved for lab periods:

Every day periods 6-8 (12:50 – 3:50 pm)

- Instructions for the lab exercises will be posted on the E-learning website.
- Students are required to hand in lab reports within **1 week of completing the lab**. Note that performance in these lab units largely determines the grade (see below).

- While discussion of the lab material with colleagues is encouraged, the lab report must be completed independently by each student. **Plagiarism will not be tolerated and will be reported**.
- The final project involves the design of an apparatus or software program that can control or automate measurements in the laboratory. Ideally, this project aids the student's research endeavors.

EXPERIMENTS: Laboratory experiments will cover the following areas:

Unit X: Arduino Lab

Unit 1: Breadboarding, DC Voltage Measurements, Analog Signals

Unit 2: Digital Signals, Logic Gates, Flip-Flops, and Counters

Unit 3: LabVIEW and Virtual Instruments

Unit 4: Operational Amplifiers and Power Supplies

Unit 5: AC Measurements

Unit 6: Final Project

Lab #	Topic	# Lab sessions	Max. # Points	Due Date
1	Breadboarding, V measurements	2	15	TBA
2	Digital Logic, Counters	3	25	TBA
3	LabVIEW	5	40	TBA
4	Op Amps and Power Supplies	4	30	TBA
5	AC Measurements	4	30	TBA
X	Arduino	1	10	TBA
6	Final Projects	5	50	TBA
Lab Total		24	200	
Midterm Exam Final Exam			50 50	
Course Total			300	

Suggested grading scale:

Graduate students	Letter Grade	GPA
280 - 300	A	4.0
260 - 279	A-	3.67
240 - 259	B+	3.33
220 - 239	B	3.0
210 - 219	B-	2.67
200 - 209	C+	2.33
190 - 199	C	2.0
180 - 189	C-	1.67
170 - 179	D+	1.33
160 - 169	D	1.0
150 - 159	D-	0.67
< 150	E	0

Tentative Lecture Schedule CHM 6158C

Date	Topic	Lab Unit
T 01/06	**1.** Course logistics	
R 01/08	**2.** DC circuits, Kirchhoff's Laws	
T 01/13	**3.** Capacitors, diodes, transistors	
R 01/15	**4.** DMM, oscilloscope, function generator	
T 01/20	**5.** Binary number system, electrically encoded information	
R 01/22	**6.** Digital logic, logic families	
T 01/27	**7.** *Discussion*	**1**
R 01/29	**8.** Flip flops, counting measurements	**1**
T 02/03	**9.** LabView Introduction	**2**
R 02/05	**10. Guest lecture.** LabView applications (Damon Allen)	**2**
T 02/10	**11.** Filters, noise, digitization	**2**
R 02/12	**12.** DC power supplies	**3**
T 02/17	**13.** *Discussion*	**3**
R 02/19	**14.** Op amps	**3**
T 02/24	**15.** Op amp circuits	**3**
R 02/26	**Mid-term EXAM**	**3**
T 03/03	*No class (Spring break)*	
R 03/05	*No class (Spring break)*	
T 03/10	*Exam discussion*	**4**
R 03/12	**16.** *Discussion*	**4**
T 03/17	**17.** RF amplification, AC circuits	**4**
R 03/19	**18.** Resonant RF circuits	**4**
T 03/24	**19.** Microcomputers	**5**
R 03/26	**20.** *Discussion*	**5**
T 03/31		**5**
R 04/02		**5**
T 04/07		**X**
R 04/09		**6**
T 04/14		**6**
R 04/16		**6**
T 04/21		**6**
R 04/23		**6**

Final exam