

**CHM 4143C/6158C**  
**ELECTRONICS AND INSTRUMENTATION**  
**Spring Semester 2025, 3 Credits**

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**COURSE INFORMATION**

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**Instructor:** Yong Zeng  
**Office:** LEI114  
**Email:** [zengy@ufl.edu](mailto:zengy@ufl.edu)  
**Teaching Assistant:** Jacob M. Samuel ([jacob.samuel@chem.ufl.edu](mailto:jacob.samuel@chem.ufl.edu))  
**Lectures:** Mon, Wed, 11:45 AM - 12:35 PM (Period 5), LEI 400  
**Labs:** Mon, Wed, 12:50 PM - 3:50 PM (Periods 6-8), LEI 444  
**Course website:** E-learning (Canvas)  
**Office hours:** Drop by my office anytime, or e-mail me to set up an appointment.  
**Textbooks:** These books are not required, but may serve as useful references.  
    *"Principles of Electronic Instrumentation,"* 3<sup>rd</sup> Edition, A. James Diefenderfer and Brian E. Holton;  
    *"The Art of Electronics,"* 3<sup>rd</sup> Edition, Paul Horowitz and Winfield Hill;  
    *"Basic Electronics: An Introduction to Electronics for Science Students"* 2nd Edition, Curtis A. Meyer (<http://www.curtismeyer.com/index.php/book>)

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**COURSE OBJECTIVES**

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CHM 4143C/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 and physical chemistry.

It is expected that by the end of the course students will be familiar with basics of electronics circuits, including DC measurements, logic circuits, and op-amp circuits. The students will also have acquired sufficient coding experience and should be able to design a LabView project to automate and control laboratory measurements.

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**EVALUATION**

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**Evaluation of Grades**

| Assignment    | Points | Final Grade |
|---------------|--------|-------------|
| Midterm Exam  | 100    | 15%         |
| Final Exam    | 100    | 20%         |
| Labs          | 550    | 50%         |
| Final Project | 150    | 15%         |
| Overall       | 900    | 100%        |

**Grading.** All grade calculations will be done on a percentage basis. The final grade will be a weighted average of all components. The letter grades will be assigned according to the current UF grading policies: (<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>).

**Course policies:** Attendance at lectures and **at least 6 hours of lab per week** is expected. Request for absence should be made to Dr. Zeng as far in advance as possible. Absence is subject to UF regulations <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

UF students are bound by The Honor Pledge which states: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honorcode/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class."

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations 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/results/>.

For counseling the following resources are available: **U Matter, We Care:** If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352-392-1575. **Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc/Default.aspx>, 352-392-1575; the University Police Department: 352-392-1111 or 911 for emergencies. **Sexual Assault Recovery Services (SARS):** Student Health Care Center, 352-392-1161.

**Lab experiments:** There are a total of 7 lab units that will be covered in the laboratory section of the course. The 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. 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 your grade. 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.

## Exams

Two in-class exams will take place on the scheduled days:

**Mid-term exam:** Wed, Feb 24th, 2025, in lecture.

**Cumulative final exam:** Tue, April 29th, 2025, 3:00 PM - 5:00 PM in LEI 400.

There will be **NO make-up exams** with the **ONLY** exemption for medical absence with doctor documents. In that case, students should arrange with the instructor for the time for the make-up exam.

**University Honesty Policy:** UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the

highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. For academic misconduct in this course, *at the very minimum, you will receive a grade of zero on any work in which you violate these integrity standards and all violations will be reported to the appropriate University officials.* The instructor reserves the right to retain copies of all submitted work.

### TENTATIVE LECTURE SCHEDULE

| <u>Week</u> | <u>Date</u> | <u>Lecture</u> | <u>Topic</u>                                | <u>Lab</u> | <u>Textbook</u> |
|-------------|-------------|----------------|---|------------|-----------------|
| 1           | 1/13        | 1              | Course Overview                             |            |                 |
| 1           | 1/15        | 2              | DC circuits                                 | 1          | DH Ch. 1        |
| 2           | 1/20        |                | <i>No class- MLK Day</i>                    |            |                 |
| 2           | 1/22        | 3              | DC circuit                                  | 1          | DH Ch. 1        |
| 3           | 1/27        | 4              | AC circuit                                  | 1          | DH Ch. 3        |
| 3           | 1/29        | 5              | AC circuit & filters                        | 2          | DH Ch. 3        |
| 4           | 2/3         | 6              | AC circuit & filters                        | 2          | DH Ch. 3        |
| 4           | 2/5         | 7              | Diodes & Transistors                        | 2          | DH Ch. 2        |
| 5           | 2/10        | 8              | Operational amplifiers                      | 2          | DH Ch. 9        |
| 5           | 2/12        | 9              | Op amp circuits                             | 3          | DH Ch. 9        |
| 6           | 2/17        | 10             | Op amp circuits                             | 3          | DH Ch. 9        |
| 6           | 2/19        | 11             | Op amp circuits                             | 3          | DH Ch. 9        |
| <b>7</b>    | <b>2/24</b> |                | <b>Mid-term Exam</b> (in lecture)           | 4          |                 |
| 7           | 2/26        | 12             | Digital electronics introduction            | 3          | DH Ch. 11/13    |
| 8           | 3/3         | 13             | Digital logic, logic families               | 4          | DH Ch. 11       |
| 8           | 3/5         | 14             | Digital logic, logic families               | 4          | DH Ch. 11       |
| 9           | 3/10        | 15             | Digital logic, logic families               | 4          | DH Ch. 11       |
| 9           | 3/12        | 16             | LabVIEW introduction                        | 5          | DH Ch. 12       |
| 10          | <b>3/17</b> |                | <i>No class- Spring Break</i>               |            |                 |
| 10          | <b>3/19</b> |                | <i>No class- Spring Break</i>               |            |                 |
| 11          | 3/24        | 17             | Noises, Lock-in amplifier, & Digitization   | 6          | DH Ch. 15       |
| 11          | 3/26        | 18             | LT Spice Lab (In-lecture)                   | 6          |                 |
| 12          | 3/31        | 19             | LT Spice Lab (In-lecture)                   | 6          |                 |
| 12          | 4/2         | 20             | LT Spice Lab (In-lecture)                   | 6          |                 |
| 13          | 4/7         |                | <i>Office hour for project</i>              | 6          |                 |
| 13          | 4/9         |                | <i>Office hour for project</i>              | 7          |                 |
| 14          | 4/14        |                | <i>Office hour for project</i>              | 7          |                 |
| 14          | 4/16        |                | <i>Review/Discussion</i>                    | 7          |                 |
| 15          | 4/21        |                | Presentation of projects                    | 7          |                 |
| 15          | 4/23        |                | Presentation of projects                    | 7          |                 |
| <b>4/29</b> |             |                | <b>Final Exam (3:00-5:00 PM in LEI 400)</b> |            |                 |

## TENTATIVE LAB SCHEDULE

| <u>Date</u>                | <u>Lab</u> | <u>Topic</u>                                       | <u>Points</u> | <u>Lab Start &amp; (Due)</u><br><u>Dates</u> |
|----------------------------|------------|--|---------------|--|
| Week 1-2<br>(3 periods)    | 1          | Breadboarding, DC measurements, Analog Signals     | 50            | 1/15<br>(1/29)                               |
| Week 3-4<br>(4 periods)    | 2          | AC Measurements                                    | 75            | 1/27<br>(2/12)                               |
| Week 5-6<br>(4 periods)    | 3          | Operational Amplifiers and Power Supplies          | 125           | 2/10<br>(2/26)                               |
| Week 7-8<br>(4 periods)    | 4          | Digital Signals, Logic Gates, Flip-Flops, Counters | 100           | 2/24<br>(3/12)                               |
| Week 9<br>(2 period)       | 5          | Arduino  | 50            | 3/10<br>(3/24)                               |
| Week 11-13<br>(5 periods)  | 6          | LabVIEW and Virtual Instruments                    | 100           | 3/24<br>(4/14)                               |
| Week 12 -13<br>(3 periods) | 6.5        | LT Spice (In-Lecture)                              | 50            | 3/23<br>(4/16)                               |
| Week 13-15<br>(5 periods)  | 7          | Final Projects                                     | 150           | 4/9<br>(4/29)                                |
| <b>Lab Total</b>           |            |  | <b>700</b>    |  |