Instrumental Analysis lab will be meeting in SSMB321. You will need to bring the following supplies with you:

- Safety glasses or goggles
- Lab Coat
- Nitrile Gloves (not latex)
- Composition book to serve as laboratory notebook
- Folder or binder to hold all printed data (will be cross-referenced with relevant notebook pages)
- Ballpoint pen, black preferred, for all lab notebook recording

Always remember, Safety First!

If you do not have the appropriate safety gear, you will not be allowed to work in the lab.

No exceptions.

Safety Gear

- You must wear your safety glasses or goggles at all times in the lab.
- Long pants are required. You can keep a pair in your lab drawer if you choose.
- Footwear must provide adequate protection to the entire foot. Sandals, open toe shoes, mesh top shoes and shoes with extremely high or narrow heels are considered inappropriate for laboratory conditions and will not be permitted. No skin should be visible below the knees.
- Socks are required. If you wear leggings and ankle socks to class, you will be asked to leave until you have socks that cover your ankles. No skin should be visible below the knees.
- You are advised to tie back long hair and wear shirts that offer full coverage.
- Lab coats are required to cover your arms and protect your clothes.
- Nitrile gloves must be worn when working with solutions and other reagents.

Learning Outcomes

- Given instructions for using a particular instrument model and software, perform instrumental analytical methods including spectrometric and chromatographic methods.
- Demonstrate quantitative laboratory skills capable of obtaining precise and accurate results including:
  - ways to prevent the contamination of reagents, glassware, and instrumentation
  - dispensing a known mass of a substance
  - methods of quantitative transfer and making dilutions
  - reading analog and digital devices
- Demonstrate proper use of volumetric glassware, including the pipet and volumetric flask and when their use is warranted.
- Keep a good laboratory notebook.
- Take data from the instrument and incorporate it into a written report that effectively communicates the analytical results
- Properly communicate results using appropriate calculations, statistical analyses, estimates of precision (significant figures), and units.
- Prepare high quality plots using Excel to visualize and analyze data.
• Apply appropriate methods of safely handling chemicals and performing laboratory procedures, analyze health and safety information from safety data sheets (MSDS or SDS) and chemical labels, and identify chemical safety hazards.

Lab Procedures
Handouts outlining the laboratory procedures will be distributed on our course OAKS page. You are expected to read the procedure in advance and be prepared for the experiment each week.

Lab Notebook and Folder/Binder
A laboratory notebook should provide a full record of what was performed during the experiment. Most importantly, all data must be recorded in your notebook as soon as it is generated. Calculations should be done as soon as possible and examples of each should be entered into your notebook when applicable.

Your laboratory instructor will check lab notebooks at the end of each lab period to confirm that all information has been entered legibly in a way that can be followed by others. All calculations should be shown in the laboratory notebook such that the instructor may follow your logic and check for calculation errors. Each student is expected to observe the College of Charleston Policy on Scientific Integrity.

When recorded data is printed, this must be kept in a lab folder or binder. Spectra, chromatograms, voltammograms, etc will be cross-referenced with the pertinent lab notebook pages. This process will be described in lab.

CHEM 421L Experiments
Throughout this semester you will work in small groups to perform the experiments listed below. All of the handouts and the experimental rotation are available on the OAKS page for each lab section. You should consult the OAKS page to see when your group is performing each lab and to give you plenty of time to read the handout(s) before the lab period.

Experiments: subject to change depending on sample and instrument availability
• Basic Electronic Components
• GC-MS Determination of Cocaine on Currency
• Chiral HPLC
• LC-MS
• ESI-MS of Proteins
• Build Your Own Spectrometer to Investigate Emission Lines
• FT-IR Spectrometry of Plastics
• Raman Spectroscopy for Explosives Detection
• ICP-MS of Trace Metals
• Voltammetry of Pharmaceuticals

Report Section Submission
You and your partner(s) will be responsible for writing sections of a lab report for these experiments. Sections will be assigned at the time of the experiment and include Introduction, Experimental, Results and Discussion, and Conclusion.

Report sections are due at the beginning of the lab the week following the experiment. Slipping it under an office door after lab, or turning it in the next day, results in 10 points deducted from your grade. Twenty points will be deducted for every week that the report is late.

Lab Final Exam
The lab final will be held during the final lab session of the semester. It will be a written exam based on lab procedures, data, and conclusions. This exam will be open notebook (just your lab notebook, not copies of the procedures). If your printed data is properly cross-referenced with your notebook and organized in a folder or binder, you will be allowed to use it as well.
**Grading Policy**

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Lab Notebook: 15%
Report Sections: 75%
Lab Final Exam: 10%


**Attendance Policy**

You are expected to attend all laboratory meetings. You are responsible for completing all assigned labs, no exceptions. If you miss a lab due to illness or emergency, talk to your instructor immediately about attending the other lab section to make up your work. Otherwise, missed labs will count as a zero.

Labs are experiential learning courses that emphasize the scientific method and data interpretation and they provide training in essential technical skills for chemists and other scientists. Furthermore, the technical lab skills presented in one course are assumed to be mastered in subsequent chemistry courses. Thus, attendance in all lab periods is crucial. In all cases, if a student misses 3 lab periods without making up the lab in another section, **whether these absences are excused or unexcused**, that student will receive a WA for a final grade. Students should recognize that it is not always possible to make up work in another section, so students should make every effort to minimize absence from lab.

**College of Charleston Honor Code and Academic Integrity**: Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved.

Incidents where the instructor determines the student’s actions are related more to a misunderstanding will handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the student’s file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XXF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student’s transcript for two years after which the student may petition for the XX to be expunged. The F is permanent. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

Students should be aware that unauthorized collaboration--working together without permission-- is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others’ exams, **fabricating data**, and giving unauthorized assistance. Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor.

Students can find the complete Honor Code and all related processes in the **Student Handbook** at: [http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php](http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php)