

**INSTRUMENTAL METHODS III: SPECTROSCOPY**  
CHEM 4190/6190 Laboratory (3.0 credits)  
Department of Chemistry, Georgia State University  
2017 Fall semester



**Instructor:** Gregory M. K. Poon, Ph.D.  
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**Time and location:** Thursdays, 1:00 to 4:15 pm, Kell Hall 698

**Office Hours:** Thursdays, 11:45 am to 12:45 pm, or by appointment.

**Prerequisites:** CHEM 4000 and CHEM4120 with grade of C or higher

**Course Objective:**

Spectroscopy in all its forms is among the most powerful experimental techniques in chemical research. This course provides hands-on opportunities for operate and analyze data generated by absorption spectroscopy, fluorescence, FT-NMR, and FT-IR spectroscopy in probing physical properties of chemicals and their interactions.

**Expected Learning Outcomes:**

1. Understand the principles of physical chemistry spectroscopic detection by UV, visible, and IR absorption, fluorescence, NMR;
2. Become competent in operating contemporary UV/VIS absorption and fluorescence instrumentation;
3. Develop skills to quantitatively analyze spectroscopic data.
4. Write ACS-style laboratory reports.

**Course materials:**

A laboratory manual will be distributed at the first laboratory period. Additional handouts will be provided as needed. While not required, students may find the following text helpful: *Principles of Instrumental Analysis* by Skoog, Holler and Crouch, 6<sup>th</sup> edition (2007), Cengage Learning, Independence, KY.

**Class Attendance:**

Students are expected to attend all laboratory sessions. There is no allowance for an exemption from any experiment. Each lab begins with a pre-lab lecture during which important, practical details of the lab are discussed. You will be not allowed to do the experiment if you miss pre lab lecture. **State law also requires that you sign in and out of each laboratory. Please include the time in and time out.**

**Laboratory Notebooks:**

A bound (stitched, not spiral or loose-leaf) notebook is required and must be used for recording data and observations in all laboratory sessions. All data taken by your group must be included in your notebook. If a sample was prepared by another member of your group, you may simply state the fact (i.e., cite the member) in your notebook. **Include copies in your notebook of all spectra presented, discussed, or reported as data in your formal laboratory reports.** You must submit the laboratory notebook along with your final laboratory report. In addition, when you turn in any laboratory report, the corresponding section of your notebook must be complete and up to

date. Instructors may spot check your notebook, and any omissions (e.g., spectra) in the notebook may result in a lower grade on the submitted report. Graded notebooks can be picked up within one week after final semester grades are due at the registrar's office outside of the instructor's office, after which they may be discarded.

### **Laboratory safety:**

**Safety is the first priority in the laboratory.** State law requires that you wear regular glasses or safety glasses as part of your personal protective equipment at all times while in the laboratory. **Contact lenses are not recommended.** However, you can fill out a waiver of your right to sue Georgia State University and then wear them with safety glasses at your own risk. Students are also reminded to dress appropriately: no open-toe shoes (flip-flops, sandals, crocs, etc.); no very short shorts/skirts. No food, drink, gum, etc. is allowed in the lab whether it is actively being consumed or not.

### **Grading and assessments:**

Lab reports, lab preparation, and notebook	30%
Lecture Quizzes & Final Exam	70%

### **Laboratory report requirements:**

- Three (3) lab reports are required for all students, covering UV/VIS, fluorescence, and FT-NMR experiments. Re-submission of any report is not permitted.
- **For students enrolled in CHEM 4190**, each report (UV/VIS, fluorescence and FT-NMR spectroscopy) will be worth 10% of the total grade for the course. The FT-IR report is optional. If a student chooses to submit all four reports instead of three, the best three scores are counted in the final lab grade.
- **For students enrolled in CHEM 6190**, in addition to the above three reports, the fourth report on FT-IR is required. Each report will be worth 7.5% of the total grade for the course.
- Students will work in groups, but are required to analyze the data and write each report independently. Copying other another student's data/discussion in the paper without attribution is plagiarism and is a serious academic offense (cheating). In such an event, the report will receive a zero score and the student may be referred to administration for disciplinary action.
- A past-due penalty will be given, 5% off for each past-due day. Reports over two (2) days overdue will not be accepted for grading.
- **Reports are due at the beginning of the laboratory on the dates indicated in the schedule.**

### **Chemistry Department's Student Integrity Policy:**

The Department of Chemistry follows the University policy on academic honesty published in the "Faculty Affairs Handbook" and the "On Campus: The Undergraduate Co-Curricular Affairs Handbook". All tests taken must represent the student's individual, unaided effort. To receive or offer information during any examination will be considered cheating. Any suspected offense may be referred to the Department's Chair for further action. Class will never be cancelled unless an official from the Chemistry Department gives the class personal notification. Don't assume a note to be enough without checking the Department's office. **The University requires that faculty members must, on a date after the mid-point of the course to be set by the Provost (or her designee) give a WF to all students who are on their rolls but are no longer taking the class and report the last day the student attended or turned in an assignment.** Students who are withdrawn may petition the Departmental Chair for reinstatement into their classes.

**Grading Scale:**

Students can be assured of the following grades by attaining the following scores:

94%	<b>A+</b>	84%	<b>B+</b>	74%	<b>C+</b>	60%	<b>D</b>
90%	<b>A</b>	80%	<b>B</b>	70%	<b>C</b>	Below 50%	<b>F</b>
87%	<b>A-</b>	77%	<b>B-</b>	67%	<b>C-</b>		

**Tentative Schedule:**

<b>Date</b>	<b>Lab Session</b>	<b>SCHEDULE</b>
<b>8/24/2017</b>	Lab 1	Check In
<b>9/31/2017</b>	Lab 2	UV/VIS Part A
<b>9/7/2017</b>	Lab 3	UV/VIS Part A
<b>9/14/2017</b>	Lab 4	UV/VIS Part B
<b>9/21/2017</b>	Lab 5	UV/VIS Part B
<b>9/28/2017</b>	Lab 6	Catch up
<b>10/5/2017</b>	Lab 7 (Report #1 due)	Fluorescence
<b>10/12/2017</b>	Lab 8	Fluorescence
<b>10/19/2017</b>	Lab 9	Catch up
<b>10/26/2017</b>	Lab 10 (Report #2 due)	FT-NMR
<b>11/2/2017</b>	Lab 11	FT-NMR
<b>11/9/2017</b>	Lab 12	IR
<b>11/16/2017</b>	Lab 13 (Report #3 due)	Catch up
<b>11/30/2017</b>	Lab 14 (Report #4 due)	Check out