Chem 790.1
Laboratory Techniques for Analytical/Inorganic/Physical Chemistry
Queens College and the Graduate Center of CUNY, Spring 2020

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http://chem.qc.cuny.edu/~jliu/Liu_page/Liu_main.htm
Office Hours: Wednesday 5:30 pm - 6:30 pm or by appointment, NSB B312

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Lectures Monday 9:25 am – 11:15 am REM 205

Labs Monday 1:40 pm – 5:30 pm REM 354

Textbook
1) D. A. Skoog, F. J. Holler, and S. R. Crouch, *Principles of Instrumental Analysis*, 7th ed., Cengage Learning, 2017. (Required)
2) J. Travis, and J. Kring, *LabVIEW for Everyone*, 3rd ed., Prentice Hall, 2007
3) PowerPoint slides are available at http://chem.qc.cuny.edu/~jliu/Liu_page/teaching.htm

Grading
1) Lab reports – 40 %
2) Project design based on literature review and original research idea
   Written report – 30%
   Oral defense – 10%
3) Homework – 20%

Others Attendance: It is your responsibility to attend and to be punctual. *Do not come late.* Every unexcused absence will result in a 5% grade penalty. To avoid the penalty, you must obtain the instructor′s permission. No make up for missed laboratory/lecture.

Plagiarism: Any student caught plagiarizing a report from any source will receive a zero on the assignment in question and a warning. The second time that a student is caught will result in the automatic failure of the course.

Lecture Schedule for 790.1 in Spring 2020

Date	Meeting	Lecture Topics	Assignments Due
Jan 27	1	Topic 1 (Chapters 1-5): Instrumentation basics: Signals, noises, and DAQ	
Feb 3	2		
Feb 10	3	Topic 2 (Chapter 6-7): Optical instruments and techniques	
Feb 24	4		Report topics for project design
Mar 2	5	Topic 3 (Chapters 13-18): Molecular Spectroscopy: Electronic and vibrational spectrometry	Homework 1
Mar 9	6		
Mar 16	7	Topic 4 (Chapters 11&20): Mass spectrometry: Principles, techniques and applications	Outline for project report
Mar 23	8		
Mar 30	9		
Apr 6	10		
Apr 20	11	Topic 5 (Chapters 26-28): Chromatographic separation techniques	Project report (first version)
Apr 27	12		Homework 1
May 4	13	Topic 6 Project presentation	Revised project report (R1)
May 11	14		

Project Design

Written Report for Project Design (30% of course grade)

NSF proposal style, single-line spaced, 1-inch margin, font size #11 Times New Roman or Arial

Include in the project design a brief introduction describing the field in general and the significance of the science proposed. However, include only the details which are relevant to your proposed research. Avoid **paraphrasing** articles. Do not copy or plagiarize the articles. **Assessment of the work is based on your original research idea**. The report will be reviewed and sent back for revisions!

Project Summary (1 page) including

Section 1 Overview
Section 2 Intellectual Merits
Section 3 Broader Impacts

Project Description (10 - 15 pages, with figure and table embedded in the text) including

Section 1 Intellectual Merit
- Introduction and Significance
- Experimental facilities and methodologies
- Proposed experiments (and computation)

Section 2 Broader Impacts
- Development of novel instrumental techniques
- Enhance understanding of XYZ

Section 3 Summary
- The priorities of a variety of experimental (and computational) work is proposed.
- Project Timeline
- Concluding sentences

References Cited (no page limitation)

Citations of journal paper, book and software

1. S. Steenken and S. V. Jovanovic, "How easily oxidizable is DNA? One-electron reduction potentials of adenosine and guanosine radicals in aqueous solution" *J. Am. Chem. Soc.* **119**, 617-618 (1997)
2. W. L. Hase, *Advances in classical trajectory methods, Vol. 1: Intramolecular and nonlinear dynamics*. JAI: Greenwich, 1998.
3. M. J. Frisch, G. W. Trucks, H. B. Schlegel, G. E. Scuseria, M. A. Robb, J. R. Cheeseman, G. Scalmani, V. Barone, G. A. Petersson, H. Nakatsuji, et al. *Gaussian 16 Rev. B.01*, Wallingford, CT (2016).

Oral defense (10% of course grade)

Each student will deliver an oral presentation based on the revised project design. The presentation should be 45 minutes in length, including 5 – 10 minutes of Q&A. The oral presentation should include an introduction of the relevant background information, a summary of techniques and methods, detailed project design and expected outcomes, and conclusions. Presentation should be prepared using Power Point slides. A paper copy of the slides should be provided to each student and the instructor before the start of the presentation. Be prepared to answer questions on your proposal.