Instrumental Analysis
CHEM 7420G
Spring Semester 2020
01/27/20 – 5/27/20
431 & 447 New Ingersoll

Instructor: Professor Brian R. Gibney 2411 Ingersoll
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Recommended Text: *Principles of Instrumental Analysis*, 6th edition, Skoog, Holler, Crouch Brooks/Cole, New York, 2007

Scheduled Lectures: M/W 5:05 – 6:20 pm (432 NE)
Scheduled Labs: M/W 6:40 – 9:20 pm (443 NE)

Office Hours: M/W 3:30 – 4:30 pm (2411 Ingersoll) and by appointment

Course Goals: Scientists from all disciplines rely on increasingly sophisticated instrumentation to perform detailed chemical analyses of samples. This course will provide you with both theoretical and practical instruction on the fundamental principles behind most of the common instrumentation used for chemical analyses. Through both lecture and laboratory instruction, you will become proficient in how each instrument is designed, how each collects and processes analytical signals, and how to evaluate the quality and reliability of the data collected. This knowledge will aid you in assessing experimental data, make you more adept at designing critical experiments, and will serve as your foundation for future work involving instrumental techniques.

Learning Outcomes: Upon successful completion of this course, you will be able to:

- list multiple electrochemical, spectroscopic and chromatographic methods used to measure chemical samples
- recognize the critical components of modern analytical instrumentation
- construct calibration curves to interpret electrical signals from instrumentals as chemical properties
- demonstrate competent application of multiple analytical techniques
- evaluate the quality and reliability of the data collected
- recognize the limitations of each instrumental method used
- choose the optimal instrumental technique to use in solving a specific problem
- accurately perform experiments using modern instrumentation
- interpret the results, draw valid conclusions and document experiments in scientific reports in the American Chemical Society style.

Assignments: Homework exercises from the text will be given and the solutions posted the following week. Homework is not collected or graded, however professionalism demands that you keep current with the homework and reading assignments. I am not here to spoon feed you exam information. The homework will serve as an indication as to the type and level of difficultly of the questions/problems that you will find on the exams.

Grading: There will be one quiz, two one-hour exams and one two-hour final examination. The quiz is worth 10% of your grade, each hour exam is worth 15% of your grade, the final is worth 20% of your grade and the remaining 40% is made up from your laboratory reports. You must pass the lecture portion of the course to pass the course. The final grade may be curved.

- 90 -100% A
- 80 -89% B
- 70 -79% C
- 60 -69% D
- below 60% F

As per department policy, any request for an examination regrade must be made in writing using the form available on the Department website.

Academic Honesty: Academic dishonesty will not be tolerated in any form. Evidence of cheating on exams, or copying of lab reports will result in a failing grade for the course, without exception. The CUNY policy on Academic Integrity can be found at:

http://www.cuny.edu/about/administration/offices/la/Academic_Integrity_Policy.pdf

Laboratory: Laboratory attendance is obligatory and you are strongly advised to be punctual and to maintain a laboratory notebook. Information on proper practice of a laboratory notebook will be distributed.

Course Topics:

Chapters 1-5 Measurement Basics
DC Electronics
AC Electronics
Signals and Noise

Quiz : February 19

Chapters 22-25 Electrochemical Methods
Potentiometry
Coulometry
Voltammetry

Exam I : March 11

Chapters 6-10 Spectroscopic Methods
Atomic Absorption
Atomic Emission

Chapters 13-16, 18
UV-visible Absorption Spectrometry
Luminescence Spectrometry
Infrared Spectrometry
Raman Spectrometry

Exam II : April 22

Chapters 19-20
Nuclear Magnetic Resonance Spectrometry
Mass Spectrometry

Chapters 26-28, 30 Separation Techniques
Gas Chromatography
Liquid Chromatograpy

Final Exam : May 18