

John Jay College of Criminal Justice/CUNY
524 W59th Street, New York, NY 10019

Department of Sciences

Che 220: Quantitative Analysis (4 credits)

Instructor: Dr. Yi He
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Lecture: M/W 1:40 pm – 4:20 pm

Office Hour: by appointment

Prerequisites: Eng. 101, Che 103-104

Course description:

Quantitative Analysis (Che 220) introduces the theory and application of classical methods of gravimetric and volumetric analysis. Basic principle of aqueous solution and chemical equilibria will be discussed. Basic calculations and data treatment methods used in quantitative analysis are covered. Students learning will be assessed.

Student Learning Goal:

After completing this course students are expected to:

- (1) Acquire basic knowledge in classical analytical chemistry;
- (2) Understand the application of scientific principles in the gathering and interpretation of scientific data;
- (3) Develop advanced critical thinking and analytical reasoning skills, and competence in oral and written form of scientific communication.

Course outline:

class	Date	Topics	Readings
1	5/28	Introduction, Ethics, Laboratory techniques	Chapter 1,2,3
2	6/1	Basic calculations; Errors and data handling	Chapter 4, 5
3	6/4	Statistical data treatment; Calibration methods	Chapter 6,7D,8
4	6/9	Class review; Exam 1	
5	6/11	Exam review Aqueous solution and chemical equilibria	Chapter 9
6	6/16	Aqueous solution and chemical equilibria	Chapter 9
7	6/18	(active learning)	
8	6/23		
9	6/25	Ionic strength and activity	Chapter 10
10	6/30	Class review; Exam 2	

11	7/2	Exam review; Gravimetric Analysis	Chapter 12
		Titrimetric methods, Precipitation titrimetry	Chapter 13
		Neutralization titration	Chapter 14
12	7/7	Complex acid/base system and application of neutralization titration	Chapter 15, 16
13	7/9	Class review; Exam 3	
14	7/14	Exam review; Complexometric titration	Chapter 17
15	7/16	Redox titration	Chapter 19, 20
16	7/21	Introduction to Electroanalysis	Chapter 18
		Class review	
		Final Exam (7/23/2014)	

Grading:

The final course grade is contributed by lab (40%), a research paper (5 %), quiz (5%), three hour-exams (two highest grades will be used, and the lowest one will be dropped. 30%, 15% each), and a final exam (20%). During exams, other than a scientific calculator, no other electronic devices are allowed to be used. The grade solely depends on student's performance, rather than any other personal reason, and there is no compromise of the grade. If the student misses the hour-exam because of unexpected reason, for example, sickness, a make-up exam can be requested within seven business days with an official statement to prove that reason; otherwise there will be no make-up exam and the grade will be zero. Missing the final exam will lead to an incomplete grade.

Course objective:

This course mainly focuses on introducing the theory and fundamentals of classical analytical methods, and application of the related knowledge to perform quantitative analysis in a laboratory. The students are expected to gain basic scientific writing skills through completing lab reports and a writing assignment.

Expected Learning outcomes:*Reasoning*

- Collect and properly analyze and interpret data from analytical procedures.
- Use acquired data to solve appropriate problems related to analysis of various materials.
- Define the principles of optimization of results of variables based on experimental data
- Use statistical tools to treat and interpret data

Knowledge

- Identify relevant scientific literature for classical analytical chemistry
- Demonstrate ability to search and use library resources.
- Describe the materials by relating them to real life in physical and biological aspects

Practical skills

- Apply different analytical techniques to laboratory experiments.

- Apply statistical methods as a test of accuracy and reliability for data analysis
- Maintain accurate record and documentations for all procedures carried out in the laboratory

Communication

- Conduct scientific discussion during class; enforce scientific writing skills by assigning comprehensive laboratory report and research paper

Cheating:

The students are expected to complete the laboratory work independently. Submission of identical lab report or sharing data without the permission of the lab instructor is treated as cheating. Cheating on an exam, homework or lab assignment will result in a zero for that particular experience, or lead to a stricter penalty based on college policy.

Statement of College Policy on Plagiarism:

Plagiarism is the presentation of someone else's ideas, words, or artistic, scientific, or technical work as one's own creation. Using the ideas or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations to the original source.

Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism.

It is the student's responsibility to recognize the difference between statements that are common knowledge (which do not require documentation) and restatements of the ideas of others. Paraphrase, summary, and direct quotation are acceptable forms of restatement, as long as the source is cited.

Students who are unsure how and when to provide documentation are advised to consult with their instructors. The Library has free guides designed to help students with problems of documentation.

(From the John Jay College of Criminal Justice Undergraduate Bulletin, p. 36)

Textbook:

D.A. Skoog, D.M. West, F.J. Holler, *Fundamentals of Analytical Chemistry*, 8th ed. Thomson/Brooks Cole Publishing, 2004 ISBN: 0-03-035523-0