

Fall 2019

CHEM 222-001: Analytical Chemistry

Omowunmi Sadik

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Chemistry: *Fall 2019 Course Syllabus*

NJIT Academic Integrity Code: All Students should be aware that the Department of Chemistry & Environmental Science (CES) takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description: This course is designed to introduce students to the fundamentals of Analytical Chemistry. Analytical Chemistry is a sub-discipline of Chemistry, which deals with the identification, and assay of materials and their components. Quantitative Analysis deals with the latter of these processes; i.e. how much of a certain substance is in the material to be analyzed. CHEM 222 is an introduction to the theory and applications of quantitative chemical analysis developed from a rich variety of phenomena such as the law of mass action, the Nernst equation, conservation of mass and charge to mention just a few. Topics to be covered include data analysis, chemical equilibria, acid-base chemistry, titrimetric methods, electrochemistry, spectroscopy, and mass spectrometry and separation techniques. Classical techniques will be complemented with discussions on the use of database and statistical methods.

Number of Credits: 3

Prerequisites: CHEM 125, CHEM 126, and CHEM 124

Course-Section and Instructors

Course-Section	Instructor
CHEM 222-100	Dr. Omowunmi “Wunmi” Sadik
	E:mail: sadik@njit.edu
	Office: 151 Tiernan Hall -

Office Hours for All Chemistry & Environmental Science Instructors:

Class time: Tue & Thur 10-11:20am

Office hours: Thursday 10am – 12pm or by appointment.

E-Mail: All E-mails should include CHEM 222 in the subject so that it can be filtered appropriately.

Textbook: *Quantitative Chemical Analysis*, 9th Ed., D.C. Harris, WH Freeman, NY, 2016, ISBN-10: 1-4641-3538-X

University-wide Withdrawal Date: The last day to withdraw with a W is Monday, November 11, 2019. It will be strictly enforced.

POLICIES

All CES students must familiarize themselves with, and adhere to, all official university-wide student policies. CES takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

Homework	10%
Quizzes	10%
Midterm Exam I	20%
Midterm Exam II	20%
Comprehensive Final Exam	30%
Literature Research/Group Learning	10%

Your final letter grade in this course will be based on the following tentative curve:

A	90-100	C	70-75
B+	86-89	D	60-69
B	80-85	F	<60
C+	76-79		

Attendance Policy: Attendance at classes will be recorded and is **mandatory**. Each class is a learning experience that cannot be replicated through simply “getting the notes.”

Homework Policy: Homework is an expectation of the course. The homework problems set by the instructor are to be handed in for grading and will be used in the determination of the final letter grade as described above.

Exams: There will be two midterm exams held in class during the semester and one comprehensive final exam. The following exam periods are tentative and therefore possibly subject to change:

Midterm Exam I	October 10, 2019
Midterm Exam II	November 21, 2019
Final Exam Period	December 14 - 20, 2019

The final exam will test your knowledge of all the course material taught in the entire course.

Makeup Exam Policy: There will normally be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event that a student has a legitimate reason for missing a quiz or exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor’s note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the CES Department Office/Instructor that the exam will be missed so that appropriate steps can be taken to make up the grade.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times. Such devices must be stowed in bags during exams or quizzes.

ADDITIONAL RESOURCES

Chemistry Tutoring Center: Located in the Central King Building, Lower Level, Rm. G12. Hours of operation are Monday - Friday 10:00 am - 6:00 pm. For further information please click [here](#).

Accommodation of Disabilities: Office of Accessibility Resources and Services (*formerly known as Disability Support Services*) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director at the Office of Accessibility Resources and Services at 973-596-5417 or via email at lyles@njit.edu. The office is located in Fenster Hall Room 260. A Letter of Accommodation Eligibility from the Office of Accessibility Resources Services office authorizing your accommodations will be required.

For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Accessibility Resources and Services (OARS) website at:

- <http://www5.njit.edu/studentsuccess/disability-support-services/>

Important Dates (See: [Fall 2019 Academic Calendar, Registrar](#))

Date	Day	Event
September 3	T	First Day of Classes
September 13	F	Last Day to Add/Drop Classes
November 11	M	Last Day to Withdraw
November 26	T	Thursday Classes Meet
November 27	W	Friday Classes Meet
November 28 - December 1	R - Su	Thanksgiving Break - University Closed
December 11	W	Last Day of Classes
December 12-13	R - F	Reading Day
December 14-20	Sa - F	Final Exam Period

Class Participation

Class participation includes, but is not limited to, class engagement; attendance and response to questions during class. This is a discussion driven and student-centered class, students are expected to be actively involved in discussions and other class activities that would generate the robust energy needed for a successful discussion. Active participation includes completing assignments on time, being present for impromptu class discussions and quizzes. Students who record four or more unexcused absences will receive no points for class participation. You are strongly advised to use all means available to contact me if you need to be excused from class in an emergency. When you miss a class, it will be your responsibility to find out what was discussed.

Literature Research/Group Learning

Group learning is a prospective approach to be pursued as part of this course. The objective is to instill creative-problem solving skills, and to relate the concepts of chemistry principles to real-life situations. Students will be grouped into sub-teams and each team is required to diagnose these problems in a team setting during class and provide answers. A typical problem solving class exercise will require analytical, evaluative, or creative thinking. Students would need to explain familiar phenomena in terms of course concepts.

Course Outline

Course Objectives and Learning Outcome*

The objectives of this course are to:

1. develop a sound physical understanding of the principles of analytical chemistry
2. show how these principles are applied through laboratory exercises and problem-solving skills, and
3. develop an understanding of the limitations and uncertainties of results using statistics and spreadsheets exercises.

Lecture	Section	Topic	Assignment
1	September 3	Welcome and Introduction to Analytical Chemistry	
2	September 5	Methods & Operations of Analytical Chemistry	
3	September 10	Statistical Manipulation of Analytical Data	
4	September 12	Errors in Chemical Analyses and Spreadsheets	
5	September 17	Gravimetry	
6	September 19	Volumetric Titration	
7	September 24	Chemical Equilibrium & Activity	
8	September 26	Class Interactive Discussion (Quiz)	
9	October 1	Acid-base Equilibria	
10	October 3	Systematic Treatment of Equilibrium	
11	October 8	Volumetric Calculations, Review for Exam 1	
12	October 10	Midterm Exam I	
13	October 15	Acid-Base Titrations	
14	October 17	Buffers, Polyprotic Acids	
15	October 22	Alphas, Problem Solving	
16	October 24	Metal-complex Equilibria	
17	October 29	Problem Solving/ Class Interactive Discussion II(Quiz)	
18	October 31	Fundamentals of Electrochemistry	
19	November 5	Redox Equilibria and Redox Titrations	
20	November 7	Potentiometry, Voltammetry & Electroanalytical	
21	November 12	Introduction to Spectrometric Methods	
22	November 14	Atomic Spectroscopy	
23	November 19	Problem Solving & Review for Exam II	
24	November 21	Midterm Exam II	
25	November 26	Introduction to Analytical Separations	
24	November 28	Thanksgiving Holiday	
25	December 3	GC and HPLC	
26	December 5	Mass Spectrometry	
27	December 10	Problem Solving & Review for Final Exam	
28	December 14-20	Final Exam	

* A learning outcome for CHEM 222 is that, given a citation, students will be able to look up information in a journal article using both online and traditional print databases. *Integration of Biochemistry across the curriculum, include biochemical

examples in the syllabus, lectures and exams.

*Updated by Genti Price - August 2019
Department of Chemistry & Environmental Sciences (CES)
Course Syllabus, Fall 2019*
