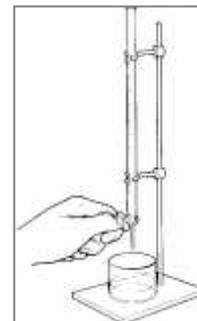


Chemistry 215
Analytical Chemistry 3.0; 3cr.

Course Syllabus
Spring 2018

- ☞ **Lecturer:** Dr. Antoine GHAUCH
- ☞ **Office:** Room 430 (Chemistry Bldg.)
- ☞ **Office Hours:** 10:30-12:30 PM MT and by appointment
- ☞ **Phone Ext:** 3990
- ☞ **E-mail:** ag23@aub.edu.lb

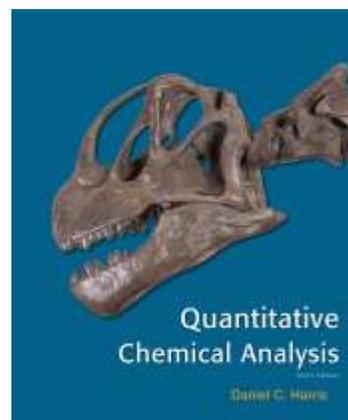
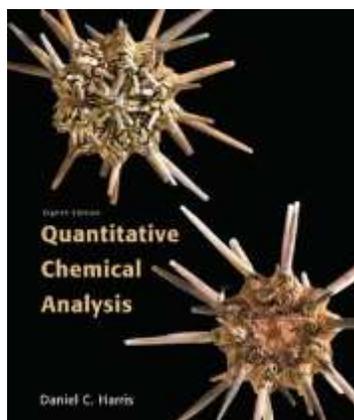


☞ **Meeting Times**

<i>Section</i>	<i>CRN</i>	<i>Main Lecture</i>	<i>Location</i>
1	20870	T R 11:00-12:15	Chem101

☞ **Textbook**

- Quantitative Chemical Analysis, Daniel HARRIS 8th or 9th edition
- Moodle Course ID: chem215_ag23



☞ **What is analytical chemistry?**

A process of understanding complex natural phenomena through **analysis**: taking things apart to identify, separate, and measure (quantify) specific chemical substances (analytes).

☞ **How is it important and relevant to you?**

The techniques and tools of analytical chemistry play a **crucial** role in many areas of science and “modern” life including biology, medicine, environmental science, forensics, pharmaceutical etc.

☞ **Course Description**

This course is designed to provide Chemistry students with the theoretical and experimental background for understanding the behaviors and properties of aqueous media. The analytical chemistry approach encourages students to think and act more independently when separation and identification of various mixtures is discussed. The main goal is to lay the foundation for the students to observe, search for information, analyze and develop their own analytical chemistry projects.

☞ **Course Purpose**

The main purpose of this course is to introduce you to the basic concepts, general problem-solving strategies, technology (chemical, instrumental, and statistical), and communication requirements associated with the omnipresent problems of chemical analysis. Professionals in the disciplines of chemistry, biochemistry, chemical engineering, environmental health, forensic science, toxicology, industrial hygiene, medicine, pharmacology, pharmacy, geology, agriculture, and all sorts of manufacturing companies are recurrently faced with the need to get the analysis of the chemical composition or chemical properties of substances. The business of chemical analysis is not only a matter of experts knowing what to do with samples brought to them for investigation, but, just as importantly, it involves communication — accurate statements of the problem requiring analysis, as well as accurate reports of the results of the chemist's work.



☞ **Learning Objectives**

There are four major learning objectives for CHEM 215:

1. To provide you with a solid background in those chemical principles that are particularly important to analytical chemistry.
2. To develop an appreciation for the task of judging the accuracy and precision of experimental data and to show how these judgments may be sharpened by the application of statistical methods.
3. To introduce you to a wide range of techniques that is useful in modern analytical chemistry, some of which you will gain hands on experience in the laboratory (CHEM 216).
4. To develop skills necessary to solve analytical problems in a quantitative manner, particularly with the aid of the spreadsheet tools that are commonly available.

☞ **Learning outcomes**

After completion of this course, students should be able to:

1. Analyze in a critical way the analytical data obtained from a specific analytical technique.
2. Differentiate between systematic error and random error.
3. Determine the absolute and relative uncertainties and calculate the propagation of uncertainty.
4. Compare standard deviations using different methods and apply statistical analysis to validate an analytical result after studying a set of data.
5. Find out linear correlation for establishing calibration curves and apply LINEST function via an excel sheet to determine all statistical parameters.
6. Use the appropriate calibration methods e.g. the internal standard and standard addition methods to ameliorate sensitivity, accuracy and reproducibility in analysis.
7. Create excel worksheets to calculate concentrations of solutes in a mixture by applying the multi-component analysis method.
8. Determine the concentration of an acid or a base in an aqueous sample, apply the systematic treatment of equilibrium and calculate the ionic strength and activity of ions into the solution.
9. Use electrochemical sensors and propose the adequate electrode for a specific ion monitoring in solution.
10. Describe and design spectrophotometers and propose the adequate light source and detector for specific applications.
11. Apply the Beer-Lambert law where appropriate and determine the concentration of molecular species in solutions.
12. Describe briefly separation techniques including liquid and gas chromatography and their components e.g. columns, injectors, detectors, etc.
13. Describe the operational mode of relevant apparatus.

☞ Grading Scheme

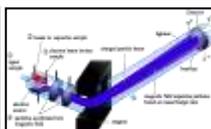
Two Exams*	60 % (higher 35%, lower 25%)
Final Exam	40 %

* **Exam dates:**

Quiz I, **TBD**

Quiz II, **TBD**

Final Exam, as shall be scheduled by the Registrar's Office (May 2018).



Course Outline: The Big Picture!

Selected parts of the following chapters will be covered (see table), most likely presented in the order shown. The text covers a great deal of material and not every chapter can be fully discussed.

Schedule	Chapters in Text	Quantitative Chemical Analysis (Harris 8 th edition)
4 weeks	Chapter 0	The Analytical Process
	Chapter 1	Measurements
	Chapter 3	Experimental Error
	Chapter 4	Statistics
QUIZ 1 second week of March 2018 All above		
4-5 weeks	Chapters 6	Chemical Equilibrium
	Chapter 7	Activity and the Systematic Treatment of Equilibrium
	Chapter 8	Monoprotic Acid Equilibria
	Chapter 9	Polyprotic Acid Equilibria
	Chapter 10	Acid-Base Titration
	Chapter 11	<i>EDTA Titrations or Complexation and Precipitation Titrations</i>
QUIZ 2 Third week of April 2018 All above		
3 weeks	Chapter 13	Fundamentals of Electrochemistry
	Chapter 14	Electrode and Potentiometry
	Chapter 15	<i>Redox Titration</i>
3 weeks	Chapter 17	Fundamentals of Spectrophotometry
	Chapter 18	<i>Applications of Spectrophotometry</i>
	Chapter 19	Spectrophotometers
	Chapter 20	<i>Atomic spectroscopy</i>
Final Exam May 2018 TBA by the Registrar's office All above		

🔑 GUIDELINES

Policy on Attendance:

Although I take attendance at random intervals during class meetings, I encourage you to take advantage of class time as an opportunity to more fully engage yourself with the material. If you do need to miss class for legitimate reasons, or if you simply don't feel like coming, it is your responsibility to know and understand what was covered. Ask a classmate for a copy of his or her notes, drop by my office or visit the course's web-site (check your Moodle continuously). We cannot take class time to review material for students who



were unable to attend class. *Missing a class on a day emphasizing participation is not a good idea.*

Missing Exams:

- Absence from exams and/or the final exam is not allowed unless under hindering circumstances.
- In case of absence for reasons beyond control, a valid excuse should be submitted to your Professor as soon as possible.
- No make up exams will be given. If the excuse is accepted, a new grading scheme will be decided upon for the course final grade calculations.
- If two exams are missed, the student will be asked to withdraw from the course.
- In case of absence from the final examination with a valid reason, a student is entitled to a make-up final upon consent of the Professor and the Arts and Sciences Dean's office.

Academic Integrity and Student's Responsibility:

- Dishonesty of any kind will not be tolerated in this course. Cheating is a violation of the University's academic regulations and is subject to disciplinary action.
- Cheating on exams and/or copying of assignments will result in a grade of zero for that exam/assignment.
- Students should familiarize themselves with the details of the University's Student Code-of-Conduct as published in the annual Student Handbook.
- During lectures students are expected to be quiet and well behaved. Students deemed to be disruptive will be asked to leave.
- Frequent observed misconduct in the classroom subjects the student to disciplinary action and the loss of the 5% allocated to "Attendance and Participation".
- Students are held responsible for all announcements in class and on Moodle, whether they are present or absent for that day.

NB:

- The professor has the right to schedule additional lectures or make up sessions so as to cover the entire material in the benefit of the students.
- No additional assignments are allowed in order to improve grades.
- The professor has the right to modify this Syllabus anytime.

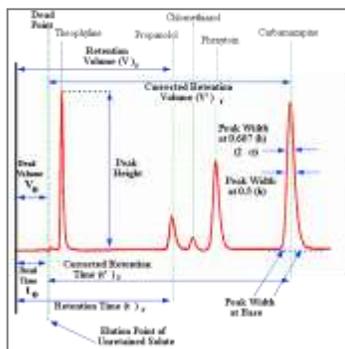
Additional information to read carefully:

"If you have documented special needs and/or anticipate difficulties with the content or format of the course and may require accommodations, please contact me and/or your academic advisor, as well as the Accessible Education Officer in the Office of Student Affairs (x3246), as soon as possible to discuss options for accommodations. Those seeking accommodations must submit a Student Support Request Form along with supporting documentation to the Accessible Education Officer."

"AUB is committed to facilitating a learning environment that is free of all forms of prohibited discrimination. The University's non-discrimination policy and Title IX apply to, and protect, all students, faculty, and staff. Under Title IX, discrimination based on

sex and gender, including sexual harassment, is prohibited. If you think you have experienced discrimination or harassment, including sexual misconduct, we encourage you to tell someone promptly. If you speak to a faculty or staff member about an issue such as harassment, sexual violence, or discrimination, the information will be kept as private as possible, however, faculty and designated staff are required to bring it to the attention of the University's Title IX Coordinator. Faculty can refer you to fully confidential resources, and you can find information and contacts at www.aub.edu.lb/titleix. To report an incident, contact the University's Title IX Coordinator Trudi Hodges at 01-350000 ext. 2514, 03-595525, or titleix@aub.edu.lb Confidential reports may be submitted anonymously online through EthicsPoint at www.aub.ethicspoint.com.”

“if you are pregnant or planning to be pregnant, you should consult with your healthcare provider so you become fully informed of the potential risks and understand the precautions that you should take.”



Have a Great Semester !!!



😊 This course is co/prerequisite for Chem216 analytical chemistry lab

Updated Syllabus on October 25, 2017