

## Chemistry 216: Analytical Chemistry Lab (2 credits)

Course Syllabus  
Spring 2018

Lecturer	Lab Manager	Lab Instructors
Dr. Antoine Ghauch Room 430 Chem. Ext. 3990 <a href="mailto:ag23@aub.edu.lb">ag23@aub.edu.lb</a> Office Hours: TR 9:30 -11:00 am	Mrs. Lara Abramian Room 203 Chem. Ext. 3977 <a href="mailto:la30@aub.edu.lb">la30@aub.edu.lb</a>	TBD

### CLASS SCHEDULE

Section	CRN	Lab Lectures for common experiments (Regular Sessions)	Lab Lectures for Rotational Experiments (Extra Sessions)	Lab Experiments
1	20872	Tuesday 2:00 pm-2:50 pm Phys 329	TBD	Friday 1:00 pm - 5:00 pm Room 211
2	20874	Dr. A. Ghauch	Dr. A. Ghauch	Monday 1:00 pm - 5:00 pm Room 211

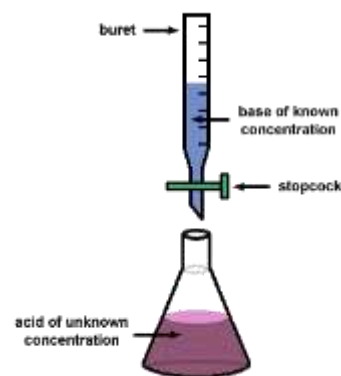
### TEXTBOOKS, READING MATERIALS AND RESSOURCES

- Harris, Quantitative Chemical Analysis, 8<sup>th</sup> or 9<sup>th</sup> Edition (Mandatory).
- Student Solutions Manual to accompany Harris.
- Moodle Course ID: CHEM216\_ag23
- Chem216 Lab Manual

### COURSE DETAILS

#### ☞ Lab Description:

This lab course is designed to provide Chemistry students with the experimental background for understanding the behaviors and properties of aqueous solutions. 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.



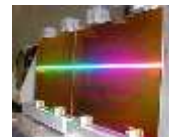
## ☞ Lab Objectives:

A major objective of this lab course is to provide a strong background in those chemical principles that are particularly important to analytical chemistry.

A second goal is to develop an appreciation for the difficult task of judging the accuracy and precision of experimental data and to show how these judgments can be sharpened by the application of statistical methods.

A third aim is to introduce a wide range of techniques that are useful in modern analytical chemistry.

A fourth goal is to develop the skills needed to solve analytical problems in a quantitative manner, particularly with the aid of the **spreadsheet tools** that are commonly available. A final goal is to teach those laboratory skills that will give students confidence in their ability to obtain high-quality analytical data.



## ☞ Grading Scheme:

Reports	20%
Oral Quizzes during lab sessions	10%
Project (ICT in learning)	20%
Attendance and Participation	10%
Final Exam (Practical Exam)	40 %

## \* Exam dates:

Practical Final Exam

**April 20/23, 2018**



## ☞ GENERAL GUIDELINES

### Policy on Attendance:

Attendance will be taken regularly every meeting. If you 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 grades 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.

## Students with Special Needs:

*"If you have documented special needs and anticipate difficulties with the content or format of the course due to a physical or learning disability, please contact me and/or your academic advisor, as well as the Counseling Center in the Office of Student Affairs (Ext. 3196), as soon as possible to discuss options for accommodations. Those seeking accommodations must submit the Special Needs Support Request Form along with the required documentation."*

## Laboratory

Laboratory experiments are essential to the complete understanding of quantitative analysis especially Chem215 and to introduce you to Chem234 (Chemistry elective course). For this part, we will meet once a week. One lab lecture is scheduled on Tuesday @ 2:00 p.m. (All sections). Two lab periods (experimental work) are scheduled on Monday and Friday from 1 to 5 pm.

This course is **time consuming**: The time required to successfully accomplish a lab experiment is about 4-5 hours and the time needed to prepare the experiment before coming to the lab and after carrying out the experiments is also about 4-5 hours.



You will require a **laboratory notebook / student** to record measurements, experimental conditions important observation, and any other significant information you collect during the course of an analysis. The book should be permanently bound with consecutively numbered pages. If your pages are not numbered, hand-number them before you make entries.

The first pages of your notebook should be saved for a table of contents that you can update as entries are made.

Thus, you will be graded on the way how you maintain your Lab Notebook. Your Notebook must be checked by the **Lab Instructor** and signed by him/her at the end of every lab session.

More information on the laboratory work and policy issues is included in the *Lab Manual* which will be distributed before check-in in the first lab period. We often upgrade the instrumentation and experiments in the lab so the *Manual* is always under revision.

Any requisite additions/replacements for sections of the *Lab Manual* will be distributed at least a week before the given experiment is to be performed. If an error appears in the manual lab, do not hesitate to inform the Professor, the TA or the Lab Instructors for corrections.

## The Big Picture!

The lab experiments will be performed in two tracks of five rotational experiments. Those will be preceded by laboratory lectures as per schedule developed in the next page.

### Track 1 Experiments

[Experiment # 2: Determination of Fluoride in Aqueous Samples via ISE](#)-----

[Notes for the Lab Report](#)-----

[Experiment # 3: Determination of Iron in a Vitamin Tablet by Ultraviolet-Visible Spectroscopy](#)

[Notes for the Lab Report](#)-----

[Experiment # 8: Determination of Iron in a Vitamin Tablet by Atomic Absorption Spectroscopy \(AAS\)](#)-----

[Notes for the Lab Report](#)-----

[Experiment # 4: Analysis of the Components in an Over-the-Counter Analgesic Drug using Ultraviolet Spectroscopy](#)-----

[Notes for the Lab Report](#)-----

[Experiment # 9: Determination of Na, Ca and K in mineral water by Flame Emission Photometry \(FEP\)](#)

[Notes for the Lab Report](#)-----

### Track 2 Experiments

[Experiment # 6: Determination of the \*d\*-Limonene Content in Orange Rind Using Gas Chromatography<sup>1</sup>](#)----

[Notes for the Lab Report](#)-----

[Experiment # 7: Optimization of Gas Chromatographic Analysis: The van Deemter Plot](#)

[Notes for the Lab Report](#)-----

[Experiment # 5: Analysis of the Components in an Over-the-Counter Analgesic Drug using High Performance Liquid Chromatography \(HPLC\)](#)-----

[Notes for the Lab Report](#)-----

[Experiment # 10: Determination of Some Anions in Aqueous Samples via Ion Chromatography](#)-----

[Notes for the Lab Report](#)-----

Experiments in the lab manual are not following the order mentioned above in Track 1 and Track 2.

## LABORATORY SCHEDULE (TENTATIVE)

### 1. Lab lectures and Experiments Schedule

The below schedule will be amended in the last version of this Syllabus by end of January 2018 to be posted on Moodle.

W	Sec #	Date	Event	Schedule of all experiments (Set of (5 + 4 = 9)) Rotational Experiments per period for a total of 2 Tracks extending from February 6 to April 10, 2017.				
1	All	Jan. 27	No LAB	Drop and Add Period				
		Jan. 24	LAB Lecture	As scheduled on your SIS for the whole semester				
		Jan. 27	LAB Lecture	Lab Lecture				
				TRACK I EXPERIMENTS (1-5)				
				Group Name				
				A	B	C	D	E
2	1	Feb. 10	Track I	ISE	Fe UV/Vis	Fe AAS	Drug UV	Cations FEP
	2	Feb. 13	Experiment #	ISE	Fe UV/Vis	Fe AAS	Drug UV	Cations FEP
				A	B	C	D	E
3	1	Feb. 17	Track I	Fe UV/Vis	Fe AAS	Drug UV	Cations FEP	ISE
	2	Feb. 20	Experiment #	Fe UV/Vis	Fe AAS	Drug UV	Cations FEP	ISE
				A	B	C	D	E
4	1	Feb. 24	Track I	Fe AAS	Drug UV	Cations FEP	ISE	Fe UV/Vis
	2	Feb. 27	Experiment #	Fe AAS	Drug UV	Cations FEP	ISE	Fe UV/Vis
				A	B	C	D	E
5	1	Mar. 3	Track I	Drug UV	Cations FEP	ISE	Fe UV/Vis	Fe AAS
	2	Mar. 6	Experiment #	Drug UV	Cations FEP	ISE	Fe UV/Vis	Fe AAS
				A	B	C	D	E
6	1	Mar. 10	Track I	Cations FEP	ISE	Fe UV/Vis	Fe AAS	Drug UV
	2	Mar. 13	Experiment #	Cations FEP	ISE	Fe UV/Vis	Fe AAS	Drug UV
				A	B	C	D	E
				TRACK II EXPERIMENTS (6-9)				
				Group Name				
				A	B	C	D	E
7	1	Mar. 17	Track II	GC/ECD	GC/FID	HPLC drugs	Ion Chromato	
	2	Mar. 20	Experiment #	GC/ECD	GC/FID	HPLC drugs	Ion Chromato	
				A	B	C	D	E
8	1	Mar. 24	Track II	GC/FID	HPLC drugs	Ion Chromato	GC/ECD	
	2	Mar. 27	Experiment #	GC/FID	HPLC drugs	Ion Chromato	GC/ECD	
				A	B	C	D	E
9	1	Mar. 31	Track II	HPLC drugs	Ion Chromato	GC/ECD	GC/FID	
	2	Apr. 3	Experiment #	HPLC drugs	Ion Chromato	GC/ECD	GC/FID	
				A	B	C	D	E
10	1	Apr. 7	Track II	Ion Chromato	GC/ECD	GC/FID	HPLC drugs	
	2	Apr. 10	Experiment #	Ion Chromato	GC/ECD	GC/FID	HPLC drugs	
				A	B	C	D	E
11	1	Apr. 14	Holiday	Holiday				
	2	Apr. 17	Holiday	Holiday				
				A	B	C	D	E
12	1	Aril 21	Final	Final Exam				
	2	Apr. 24	Final	Final Exam				

### 2. Laboratory Report Due Dates

The laboratory due date period is one week after performing the experiment. No additional time will be provided and a grade of zero will be attributed to students that do not abide by this rule.

**Remember that Safety is always the first main concern in any laboratory.** Please Read carefully the corresponding sections at the beginning of your laboratory manual: Environmental Health & Safety Center emergency Procedures.



During experiments, Your Teaching Assistant will show you how to comply with the requirements for maintaining a safe environment and using safe laboratory techniques.

**Prior** to doing a laboratory experiment, you must understand the lab in detail and be prepared to work efficiently.



**The Professor, the Teaching Assistant** and the **Lab Instructors** will be circulating during the laboratory to answer questions, aid you, and also to examine your overall laboratory performance while doing an experiment. The value you report for your unknown will be within a certain **range around the true or known value.**



Your **Accuracy grade** will be higher the closer that the value you report for your unknown comes to the true value.

Accuracy is graded in 2.5-point increments: 10, 7.5, 5, 2.5 and 0. Each experiment has its own *tolerance* or *window* within which your result must fall for a particular grade.



For example, if the true value for your unknown is 100 (e.g.  $\text{mg}\cdot\text{L}^{-1}$ ), and the tolerance for that experiment is  $\pm 0.3\%$  *relative error*, your reported result must fall in the range  $100 \pm 0.3$ , (from 99.7 to 100.3) to earn the full grade of 10.

If your result lies outside this range, but within the next set of 0.3 ppb windows,  $100 \pm 0.6$ , you earn a grade of 7.5, and so forth.

If the tolerance for an experiment is  $\pm 2\%$  relative error, your result must fall between  $100 \pm 2$ , (from 98 to 102) to earn the full grade of 0 points.

Outside this window, but inside  $100 \pm 4$ , (from 96 to 104) for 5.0 points, etc.

If your reported result is wrong because of some calculation error, even something as simple as a factor of 2 or a power of 10, your result is wrong.

Be very sure about your calculations before you turn in your report to the Teaching Assistant. An error in your calculation will not be taken into consideration.



A detailed grading scheme is mentioned for each experiment in the lab manual.

**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](http://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](mailto:titleix@aub.edu.lb) Confidential reports may be submitted anonymously online through EthicsPoint at [www.aub.ethicspoint.com](http://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!!! 😊*

Updated October 25, 2017