



**CHEMISTRY 205**  
**Introductory Chemistry Laboratory (1.4; 2 cr.)**  
**Spring 2017-18**

**INSTRUCTOR:**

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**Office Hours:** Tuesday: 2:00 - 3:00  
 Thursday: 11:00 - 12:00  
 Others: by appointment

**LABORATORY LECTURE AND SESSIONS SCHEDULE**

Laboratory Lecture	Laboratory Session	Section	Laboratory Room
Tuesday 12:30 Room: SLH	Thursday 1:00 – 5:00	1	107 Chem
		2	111 Chem
	Friday 1:00 – 5:00	3	107 Chem

**CATALOGUE COURSE DESCRIPTION:**

CHEM 205 Introductory Chemistry Laboratory, 1.4; 2cr. A laboratory course on the methods of quantitative analysis, physical chemistry measurements, and inorganic semi-micro qualitative analysis. *Not open to chemistry majors. Pre- or co-requisite: CHEM 200, 201, or 202. Each semester.*

## REFERENCES AND RESOURCES

**Moodle:** Moodle Course ID is **CHEM 205\_hd00**

The syllabus, basic lecture notes (PowerPoint presentations), assignments, report forms, handouts and other course- related materials, in addition to announcements pertaining to the course, will be posted on moodle.

**Laboratory Manual:** posted on Moodle

**Reference Textbooks:** available on Closed Reserve in the Science Library

- 1) R. Chang, "Chemistry", 9<sup>th</sup> edition, McGraw Hill, 2007
- 2) M. Hein and S. Arena, "Foundations of College Chemistry", 11<sup>th</sup> edition, Brooks/Cole Publishing Company, 2004.

## TOPICS COVERED

1. Safety rules in the laboratory.
2. Scientific measurements: Learn the technique of using mass and volume measurement devices, report measurements to the proper precision, count the number of significant figures in such measurements, and handle significant figures in calculations.
3. Acid-Base titration: practice the analytical technique of acid-base titration, prepare a primary standard solution, and determine the concentration of an unknown solution by titration.
4. Redox titration: practice the volumetric analysis technique of redox titration, review the stoichiometry of an oxidation-reduction reaction, learn the terminology used in oxidation-reduction reactions, determine the concentration of an unknown solution and the percent by mass of Fe(II) in a mixture by redox titration.
5. Spectrophotometry: use a spectrophotometer and learn the principles of chemical analysis by spectrophotometric means, draw an absorption spectrum, construct and use a calibration curve, apply Beer-Lambert's law, and determine the concentration of iron in an unknown solution and in a vitamin tablet.
6. Determination of the equilibrium constant  $K_c$  for a chemical reaction: review the concepts and principles of chemical equilibrium, study the effects of temperature and concentration changes on the position of equilibrium of some reversible reactions, and determine, spectrophotometrically, an equilibrium constant ( $K_c$ ) at a given temperature.
7. Kinetics; rate of iodination of acetone: revise the kinetics of a chemical reaction; determine the order, the rate, the rate constant, and the activation energy for the reaction at a given temperature.
8. Electrochemistry: study the relative activity of different metals, use a voltmeter to measure the cell potentials of different galvanic cells and a concentration cell, analyze experimental data and compare the results to the literature values, and identify the reactions occurring at the anode and cathode during the electrolysis of aqueous potassium iodide solution.
9. Qualitative Analysis; Methods of separation and analysis of group I ions: apply qualitative methods of separating cations from one another in a mixture, separate and

- identify a mixture of group I cations in a known and an unknown sample and write relevant stoichiometric chemical reactions.
10. Impurities in natural water: test for contaminants of natural water (mostly ions), and apply some techniques for the purification of natural water and its softening using ion-exchange resins.
  11. Colligative properties: perform a Hands-on experiment, and verify experimentally that colligative properties depend on solute particles' number and not identity.

### LEARNING OUTCOMES

At the end of the course, students will be able to:

- Apply general laboratory rules, including safety rules, for proper handling of chemicals and performance of laboratory work.
- Apply introductory laboratory techniques based on the correct use of mass measurement and volumetric devices, proper operation of simple equipment (spectrophotometer, voltmeter, pH meter, centrifuging machine, ...) and appropriate use of special software.
- Present scientific data in a useful way, and correctly with the right precision.
- Analyze experimental results based on the value of the percent error and the possible sources of error.
- Conduct experiments that translate theoretical principles into practical applications: acid-base titration, oxidation-reduction reactions, spectrophotometry, chemical equilibrium, electrochemistry, kinetics, separation of metal ions, purification of natural water, and colligative properties.
- Write reports that present systematically the practical work and its association with the theoretical concepts.
- Get valuable numerical results and reliable qualitative determinations from experimentally related exercises.
- Design simple chemical tests and new experiments related to the learned chemical principles and performed experiments.
- Use library resources to find course related information.

### STUDENT ASSESSMENT

Student performance is assessed based on:

<b>Activity</b>	<b>Percentile</b>
Pre-laboratory Assignments	10 %
Laboratory Reports	30 %
Drop Quizzes	15 %
Evaluation by the Lab. Instructor	10 %
Comprehensive Final Examination	35 %

## COURSE CALENDAR

Date	Lab. Lecture	Lab. Session		Lecture / Experiment Topic
	Tuesday	Thursday	Friday	
Feb. 6 – 9	Feb. 6	Feb. 8	Feb. 9 <i>Holiday</i>	Introduction, Safety, and Scientific Measurements Lecture
Feb. 13 - 16	Feb. 13	Feb. 15	Feb. 16	Check-in and Acid – Base Titration Lecture and Experiment
Feb. 20 - 23	Feb. 20	Feb. 22	Feb. 23	Redox Titration Lecture and Experiment
Feb. 27 – Mar. 2	Feb. 27	Mar. 1	Mar. 2	Spectrophotometry Lecture and Experiment
Mar. 6 - 9	March 6	Mar. 8	Mar. 9	Determination of the Equilibrium Constant for a Chemical Reaction Lecture and Experiment
Mar. 13 - 16	Mar. 13	Mar. 15	Mar. 16	Kinetics; Rate of Iodination of Acetone Lecture and Experiment
Mar. 20 - 23	Mar. 20	Mar. 22	Mar. 23	Electrochemistry Lecture and Experiment
Mar. 27 - 30	Mar. 27	Mar. 29	Mar. 30	<i>No Lecture and no Experiment Easter Holidays</i>
Apr. 3 - 6	Apr. 3	Apr. 5	Apr. 6	
Apr. 10 - 13	Apr. 10	Apr. 12	Apr. 13	Qualitative Analysis Lecture and Experiment
Apr. 17 - 20	Apr. 17	Apr. 19	Apr. 20	Impurities in Natural Water Lecture and Experiment
Apr. 24 - 27	Apr. 24	Apr. 26	Apr. 27	Colligative Properties Lecture and Experiment
May 1- 4	May 1	May 3	May 4	<i>No lecture</i> Make-up and Check-out session
	<b>May 8</b>			<b>Final Exam at 12:30 in SLH</b>

## COURSE POLICY

The main guidelines that describe each of the laboratory work requirements and procedures are as follows:

### Pre-Laboratory Assignments:

The pre-laboratory assignment for each experiment will be posted on moodle. Download and solve the assignment before the lab. session. Assignments must be submitted at the beginning of the lab. session. Zero grade will be given for late assignment.

### Reports:

A report is required for each experiment. Every student should prepare the report before coming to the lab. and submit his/her own report, even in the case of group work. The report forms are posted on moodle. Download the relevant report form, familiarize yourself with its content and get any needed theoretical values, if applicable, for the experiment. Enter the collected experimental data/observations directly in your report while performing the experiment, complete the report and submit it at the end of the lab. session.

### Drop Quizzes:

A ten- minute drop quiz might be given at the beginning of the lab. session. The drop quiz questions are related to the assigned experiment.

### Instructor's Evaluation:

The Laboratory Instructor personal evaluation of the student's work is based mainly on the student's conduct, preparation, compliance with the safety rules and laboratory regulations, attitude, responsibility, techniques and skills development, in addition to proper communication and overall performance.

### Attendance and Make-ups:

Students must attend all laboratory lectures and sessions. If **more than two** laboratory sessions are missed, students may be asked to withdraw.

A make-up for **one experiment** only is allowed. Students can make up a missed laboratory session only upon presenting a valid excuse (an official medical report from the university infirmary), otherwise, zero grade will be given for the missed work.

**No Make-up drop quizzes will be given.**

### Laboratory Safety:

Students are required to carefully read and understand the safety rules mentioned in the Manual and those circulated by the Environmental Health, Safety, and Risk Management Center at AUB and abide by them.

They must strictly abide by the **dress code** mentioned (**long laboratory coat, closed shoes and no ballerinas, shorts, or skirts**), otherwise, they will not be allowed to perform the experiment or to make it up later.

Violation of the mentioned rules and regulations will result in dismissal from the lab. and a grade of zero.

### **Laboratory Work Requirements:**

During each laboratory session, students are required to:

- Have their laboratory manual, the cabinet key, and a calculator.
- Have their detergent, sponge, towel, and matches/lighter.
- Wear a white gown and safety goggles.
- Abide strictly by the safety rules and laboratory regulations as set forth in the manual.
- Come prepared to the lab. Read and understand the experiment, prepare an outline of the procedure to be followed, and answer the questions of the pre-lab assignment.
- Clean everything after finishing the experiment (used equipment, glassware, benches and sinks, etc.)

### **UNIVERSITY POLICIES**

#### **Academic Integrity:**

Please refer to AUB Student Code of Conduct:

<http://www.aub.edu.lb/pnp/generaluniversitypolicies/Documents/StudentCodeConduct/StudentCodeConduct.pdf> , in particular section 1.1, which concerns academic misconduct including cheating, plagiarism, in-class disruption, and dishonesty. Please be aware that misconduct is vigorously prosecuted and that AUB has a zero tolerance policy. Course policy is that **credible evidence of cheating will result in course failure.**

#### **Recommended Accessibility Statement to Acknowledge the Unique Learning Needs of Students with Disabilities:**

AUB strives to make learning experiences as accessible as possible. If you anticipate or experience academic barriers due to a disability (including mental health, chronic or temporary medical conditions), please inform me immediately so that we can privately discuss options. In order to help establish reasonable accommodations and facilitate a smooth accommodations process, you are encouraged to contact the Accessible Education Office: [accessibility@aub.edu.lb](mailto:accessibility@aub.edu.lb); +961-1-350000, x3246; West Hall, 314.

#### **Non-Discrimination:**

AUB is committed to facilitating a campus free of all forms of discrimination including sex/gender-based harassment prohibited by Title IX. The University's non-discrimination policy applies to, and protects, all students, faculty, and staff. 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, or [titleix@aub.edu.lb](mailto:titleix@aub.edu.lb) . An anonymous report may be submitted online via 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.