Course Syllabus

CHM 2354 Analytical Chemistry, Winter 2015

Course Overview

Most people who practice analytical chemistry do not identify themselves as analytical chemists. For example, chemical analysis is an essential tool used by biologists to understand how organisms function and by doctors to diagnose disease and monitor the response of a patient to treatment. Environmental scientists measure chemical changes in the atmosphere, water, and soil that occur in response to the activities of both man and nature. Forensic scientists identify and sometimes measure drugs, combustion residues, and fibres from crime scenes. You are taking this course because you might make chemical measurements yourself or you will need to understand analytical results reported by others. This course describes the principles of analytical chemistry and demonstrates how analytical chemistry may be applied to organic, inorganic and physical chemistry as well as to life science. We will review and expand on fundamental concepts explained in Principles of Chemistry (CHM1301 or CHM1311) focusing on their application to analytical procedures. The laboratory of this course is designed to teach you skills in handling substances and apparatus in a quantitative manner.

Course Schedule

Tuesday LEC	10:00-11:30	Montpetit Hall (MNT)	Room: 202
Thursday LEC	08:30-10:00	Montpetit Hall (MNT)	Room: 202
Tuesday DGD	14:30-15:30	Hagen Hall (HGN)	Room: 302
Thursday DGD	14:30-15:30	Social Science Building (FSS)	Room: 2005
Monday LAB	14:30-18:30	Marion Hall (MRN)	Room: 301 (first lab starts on January 12th)
Monday LAB	08:30-12:30	Marion Hall (MRN)	Room: 301

Instructor

Professor Maxim Berezovski

Office:

Address: D'Iorio Hall room 201
Phone: 613-562-5800 ext. 1898
e-mail: Maxim.Berezovski@uottawa.ca
web page: http://mysite.science.uottawa.ca/mberezov/

Office Hours:

15:30-17:30 Tuesday & Thursday (after your DGDs)

Course Calendar and Grading

Date	Chapter	Lecture Topic	Mark
13-Jan	0, 1	Measurements	
15-Jan	2, 3	Tools & Errors	
15-20 Jan	Assignment 1 (online, based on ch. 0-3)		10 pts (2%)
20-Jan	4	Statistics	
22-Jan	5	Calibration	
22-27 Jan	Assignment 2 (online, based on ch. 4, 5)		10 pts (2%)
27-Jan	6	Titrations	
29-Jan	7	Gravimetric & Combustion Analysis	
29-Jan - 3-Feb	Assignment 3 (online, based on ch. 6, 7)		10 pts (2%)
3-Feb	8	Monoprotic Acid/Base	
5-Feb	9	Buffers	
5-10 Feb	Assignment 4 (online, based on ch. 8, 9)		10 pts (2%)
10-Feb	10	Acid/Base Titration	
12-Feb	11	Polyprotic Acid/Base	
16-22 Feb	Reading week		
19-27 Feb	Assignment 5 (online, based on ch. 10-13)		10 pts (2%)
24-Feb	12	Activity & Ionic Strength	
26-Feb	13	EDTA Titration	
1-Mar	Midterm Exam (offline, closed book, ch.0-13, MNT202, 12:30 PM – 2:30 PM)		100 pts (20%)

3-Mar	14	Electrode Potentials	
5-Mar	15	Electrodes & Potentiometry	
5-10 Mar	Assignment 6 (online, based on ch. 14, 15)		10 pts (2%)
10-Mar	16	Redox Titration	
12-Mar	17	Instrumental Methods in Electrochemistry	
12-17 Mar	Assignment 7 (online, based on ch. 16, 17)		10 pts (2%)
17-Mar	18	Spectrophotometry	
19-Mar	19	Luminescence	
19-24 Mar	Assignment 8 (online, based on ch. 18, 19)		10 pts (2%)
24-Mar	20	Atomic Spectroscopy	
26-Mar	21	Principles of Chromatography	
26-31 Mar	Assignment 9 (online, based on ch. 20)		5 pts (1%)
31-Mar	21	Liquid Chromatography	
2-Apr	22	Gas Chromatography	
7-Apr	22	Mass Spectrometry	
9-Apr	23	Electrophoresis	
1-14 Apr	Assignment 10 (online, based on ch. 21, 22, 23)		15 pts (3%)
Laboratory (6 experiments, reports-due to the end of each lab, except lab 2)			100 pts (20%)
TBA	Final Exam (offline, closed book, all chapters)		200 pts (40%)
Class Activity			Bonus 15 pts
Practice Assignment			Bonus 2 pts
Total: 500 pts (100%) + 17 pts (3.4%, extra points)			

Required Items

1. Textbook: "Exploring Chemical Analysis" 5/e Daniel C. Harris, Freeman & Co., New York
   http://www.macmillanhighered.com/Catalog/product/exploringchemicalanalysis-fifthedition-harris
   http://www.amazon.ca/Exploring-Chemical-Analysis-Daniel-Harris/dp/1429295767/ref=sr_1_1?ie=UTF8&qid=1418084415&sr=8-1&keywords=Exploring+Chemical+Analysis
2. Solutions Manual for Exploring Chemical Analysis (optional)
3. Sapling Learning Online Account ($38.25) http://www2.saplinglearning.com/higher-education
4. Lecture Tools Online Account ($0)
https://my.lecturetools.com/users/generic_invite/e7b9fa8da9ee41d619e9d7b34ac51161
5. Lab Manual (can be downloaded from the Sapling Learning web site)
6. Safety glasses and a lab coat
7. 2 bound notebooks (hard cover or spiral bound), a calculator, a permanent marker, a ruler

Lectures

The lectures include the theory, application and numerical examples relevant to a variety of analytical chemical procedures. You will be expected to understand the underlying theories and principles behind analytical procedures, to explain their application to chemical and biochemical systems and solve problems based on these principles. Lecture slides will be posted on Lecture Tools and Sapling Learning websites. Your in-class activity will be also evaluated (max. bonus - 15 pts).

Assignments

There will be 10 online assignments on material from each chapter of the textbook. They should be completed independently and submitted online for grading (see due dates above) through Sapling Learning website. Some questions will be addressed at DGDs. The purpose of the assignments is to reinforce the theory covered in lectures in preparation for offline midterm and final exams. Similar questions from assignments will be on the exams.

DGDs

You will solve assignments problems from Sapling Learning with your TAs.

Labs

Laboratory work is a requirement to pass the course. Labs are starting on January 12 (be prepared for labs # 2 and 5) and held on Mondays (mornings or afternoons). If you are unable to attend the laboratory session, you must provide a medical certificate. Professor Heshel Teitelbaum (Heshel.Teitelbaum@uottawa.ca) is your instructor for the labs.