



Quantitative Analysis

CHEM 2103

Summer 2018

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- ▶ **Class Days:** Tuesday/Thursday
- ▶ **Class Times:** Starting 1:00 pm (period 3) Room 319G
- ▶ **First Class Day:** Tuesday, June 5

Web Site

www.getnickt.com - Here you will find important information about the course (note: instructor does not use Blackboard)

Facebook Page

The instructor has a Facebook group for classes. This is a convenient way to communicate with students throughout the term so please join the group, which is private so no one else can read anything on the pages other than those in the group. Go to Facebook and type in AUM Chemistry in the top left search box. When the page comes up, ask to join the group. At the end of the term you can leave the group.

Course Description

Quantitative Analysis (4). Pr., CHEM 1200 and CHEM 1201. Theory and application of volumetric and gravimetric analysis. Most industrial employment opportunities require CHEM 2103 and a knowledge of instrumental analysis.

Textbook

To be announced (none to buy). The Quantitative Analysis lab manual is available at the AUM bookstore (you must buy this and every student needs his or her own copy). **Safety goggles** must be obtained by each student and worn for every lab and **at all times**. Students who have to be reminded to keep safety goggles on will have 10% lab grade deducted - no ifs, buts, or maybes! A list of experiments to be performed can be found on the course timetable link.

Course Objective

The course is designed to illustrate the theoretical principles and practical techniques of quantitative analysis. Laboratory work is an essential component of this course and will consist of a set of experiments which illustrate techniques. There will be TEN experiments for students

to perform. Students will work in groups but each student will record his or her own data, and write up reports individually. You will change lab partners every week.

Attendance

Students have an obligation to attend ON TIME all lectures and laboratory sessions. Lectures commence Tuesday, June 5, and will begin promptly at 1:00 pm each Tuesday/Thursday (period 3) in room 319 Goodwyn Hall - see timetable. Please be on time as late arrivals can be disturbing. Labs are Tuesday/Thursday (usually both days, but not every week - see timetable). Regardless of whether or not we have lab/lecture on a particular day, always come to room 319 first. Sometimes we have lecture/no lab; sometimes lab/no lecture; sometimes both.

Important: Attendance will be taken every day in class and an attendance grade will be included in the overall course grade. Students are required to sign an attendance roll each class day for the entire term. Details during the first class meeting.

Lecture and lab are both requirements for CHEM 2103 for which you will receive one final letter grade based on the following scale:

A = 90-100 % B = 80-89 % C = 65-79 % D = 50-64 % F < 50 %

Note:

- 1. Unless you have a pending emergency please switch off cellphone ringers whilst in class as they are very distracting to all.*
- 2. No cell phones/iPads/music devices etc. may be used during exams; only non-programmable calculators*

Registration

All students must be officially registered. Contact the registrar's office if you have any doubts concerning your registration status.

Course Outline

- ☆ Introduction. Review of fundamental concepts. Practical applications of analytical chemistry (e.g. quality control, pollution monitoring, forensic chemistry). Apparatus used.
- ☆ Steps in a chemical analysis. Plan of analysis. Sampling, sample preparation and problems encountered during analysis. Evaluation of results. Modern analytical techniques.
- ☆ Gravimetric analysis. Basic techniques. Problems encountered during analysis.
- ☆ Treatment of data. Statistical analysis of results. Significant figures and error calculations.
- ☆ Volumetric analysis. Introduction and general procedure.
- ☆ Spectrophotometric analysis.

Grading

1. Tests

There will be 3 tests during the term and one optional final comprehensive exam. Each is a 1-hr duration. Each of the 3 tests will count 200 points towards the final grade. The final exam at the end of the term may be taken as a makeup exam if one of the 3 tests is missed. Or, it can be taken to replace one of the 3 tests in an attempt to get a higher test score. Or, you can simply not take it

if you are happy with your 3 test scores. No individual makeup tests will be given for any of the 3 tests during the term - the final will be the make-up for any missed test. (*Contact the instructor if an official AUM event such as playing in a sporting event conflicts with a test date. A letter from a coach must be provided if this is the case.*)

Note: test questions will come primarily from lecture materials and worked class examples. This is why it is imperative to attend class.

2. Lab

Students must complete TEN lab experiments during the term, and one may be dropped. Thus 9 labs and their written reports will contribute to the overall course assessment. Each of the nine labs will be graded out of a 20, for a total of 180 points for lab (almost as much as a test).

Important: If a lab is missed FOR ANY REASON, it will automatically be the dropped lab. A grade of zero will be given for all other missed labs (it is not possible to make up ANY missed labs). **All lab reports will be due the following class, except the gravimetric labs as will be explained in class.** Late labs will lose 1 points per day, no exceptions. Also, if you miss a lab, you CANNOT obtain results from another student. You must do the lab and obtain the results yourself in order to get credit.

Lab cleanliness: The area around the lab balances is all too often left in a deplorable state with solids spilled all over the balances and bench. So if you spill a reagent while weighing, CLEAN IT UP. To ensure this, it is necessary to employ the following rule: if at the end of lab class, the balance area is soiled with spilled chemicals EVERYONE in the class will lose 2 points on that lab. To avoid that, simply clean up after yourself. And if you're the last group to finish in the lab, check the balance area and a quick cleanup will prevent loss of points.

Waste containers: Waste containers will be provided by the balances when chemicals cannot be disposed of down the drain.

Analytical balances: Our sensitive, accurate analytical balances are housed in the balance room. Never take any bottle of chemicals into the balance room to weigh. Details will be explained in class.

3. Attendance

A total of 20 points are assigned for attendance. Details in first class meeting - so you better attend!

4. Quizzes

Basic General Chemistry calculations are essential in analytical calculations, so these will be tested continually throughout the term. There will be 3 short quizzes with a max time limit of 20 min for each. The first quiz will be on the day of the first class meeting. That's right, first day of class. Only one of the quizzes will count (obviously the highest grade), so you can take one or all three to get a better score. More details will be posted on the Facebook page before class begins.

Topics include: measurements/metric system, density, stoichiometry, molar mass, moles, molarity, % yield, nomenclature, acids/bases, redox, writing/balancing chemical equations and predicting products. Links for review are at the bottom of the instructor's the website.

5. Bonus Points

Throughout the term, bonus points can be earned by various short classroom activities. These will NOT be announced in advance. If you are not present in class, you will miss the opportunity to earn these bonus points.

Points breakdown:

3 tests, 200 pts each	600 pts
9 labs, 20 pts each	180 pts
Attendance	20 pts
Review quiz (highest score)	50 pts
Total	850 pts

Make-up tests

Explained above, but to repeat: Individual make-up tests will NOT be given. If one test is missed FOR ANY REASON (other than an official documented university activity), it will automatically be made up with the comprehensive make-up exam at the end of the semester.

Make-up labs

Again, explained above: Individual make-up labs will NOT be given. You can drop one lab; any other missed lab will be given a zero grade.

Lab reports

Labs will be held in Room 306G. A short pre-lab discussion will be given in the classroom (319G) at the **beginning** of the lecture preceding the lab. **Be sure to be on time** - if you miss this information, you're on your own with the lab manual!

Each lab report should contain an introduction (summary of what the lab is about), the completed data sheet, and answers to questions/calculations. Be sure to show **all steps** in calculations for full credit and give answers to the correct number of significant figures. Remember, you collect and share the data with your lab partner, but **each person must write and submit his or her own report**.

Labs are usually due the next lab class. Staple pages together and place report in folders provided on the front desk of the lab. Each lab is graded out of 20. After your graded labs are returned, keep them until the end of the term.

Write lab reports neatly, otherwise they will be returned ungraded.

Important: Once the instructor returns the graded labs to the class, late labs will not be accepted under ANY circumstances. Emailed labs will not be accepted. **And just so you're clear:** If you miss a lab you CANNOT get results from someone else and submit a report. You must complete a lab yourself to get credit.

Check-in sheets and safety regulation sheets (found at the end of the lab manual) are to be read, signed, removed from the lab manual, and given to the instructor on the first day of lab. On the

first lab day you will be required to check through your lab drawers to make sure all equipment is present.

Special Needs

Students with disabilities who require special attention should contact the instructor during an office hour in the first week of the term or after class. *AUM attempts to make reasonable accommodations to meet the special needs of its disabled students.*

Assistance

Office hours will be posted on the instructor's office door. Additional appointments may be made with the instructor. The Instructional Support Lab (203G) can provide tutoring.

Learning Outcomes

After completion of this course, students will be able to analyze:

1. Methods of gravimetric, volumetric and spectrophotometric analysis
2. Error and data calculations
3. Methods of quantitative analysis

Please note the following

Chemistry is a 'cumulative' subject. Knowledge of material covered in CHEM 1100 and CHEM 1200 is assumed.

A exam book (blue book) will be required for each exam; **graph paper** will be needed for the final exam and last lab.

Significant home study **each day** is therefore essential for this course.

And finally....

Be professional in your approach to this (and all classes) and take pride in your work. That means arriving on time to all classes, not skipping classes, attending all exams and labs (and be on time), writing lab reports neatly and clearly, obviously handing completed lab reports in on time, and wearing safety goggles in lab at all times. Cheating of any kind will not be tolerated and reported to the appropriate AUM discipline committee. At best, cheating results in the gaining of only a few points on a test and is simply not worth the risk of failing a course or academic suspension.