**CHEM 2214: Quantitative Chemical Analysis**

**Fall 2018**

**Course Description and Pre-requisites**

This course examines the theory behind and laboratory practices of quantitative chemical analysis.

Pre-requisite: CHEM 1212K (Chemical Principles II)

**Course Components**

Recitation Monday 10:10—11:00am (attendance optional)

Lecture Wednesday and Friday 10:10—11:00am

Laboratories Tuesday or Thursday 1:30—7:15pm

Wednesday or Friday 1:55—7:40pm

**Course Objectives**

* Provide students with the theoretical underpinnings of modern chemical analysis methods
* Enhance their understanding of the applications and limitations of wet chemistry techniques in analysis
* Provide students with experience in applying the systematic approach to solve complex equilibrium problems
* Promote an introductory level understanding of the applications of sampling, statistics, separation, and analysis in determining the composition of chemical mixtures

**Required Course Materials**

* Quantitative Chemical Analysis, 8th or 9th Edition by Daniel C. Harris (hardcopy or online version)
* Applications of Microsoft Excel in Analytical Chemistry, 2nd Edition by Stanley R. Crouch and F. James Holler
* Electronic homework via Sapling Learning (http://saplinglearning.com)

**Course Grades and Grading Policies**

Lecture accounts for 60% of the course grade. Components of the lecture grade include:

Electronic homework 10%

Attendance, class participation, and quizzes 10%

Exams 15% x 3 = 45%

Cumulative final exam 35%

Laboratory accounts for 40% of the course grade. Components of the laboratory grade include:

Laboratory notebook entries 10%

Laboratory reports (11) 70%

Laboratory practicum 20%

***Laboratory and Exam Absences***

Comprehensive guidelines regarding class attendance and excused absences can be found in the Georgia Tech catalog. Please read through the policies in their entirety.

<http://www.catalog.gatech.edu/rules/4/>  
<http://www.catalog.gatech.edu/policies/student-absence-regulations/>

*Guideline summary:*  
You are permitted to miss an exam or lab for Institute approved absences (athletics, etc.) You should inform the lecture or lab instructor as soon as you have your travel schedule so that we can make arrangements for you to take the exam at an alternate time.

If you miss an exam or lab due to illness, then you should submit medical documentation to the Office of the Dean of Students. They will contact the course instructors, and we will work with you to determine the best course of action. Please also email the lecture or lab instructor as soon as you know you will miss or have missed an exam or lab due to illness. You do not need to provide details regarding the illness.

Students may miss exams or labs due to personal emergencies. Again, documentation of some sort should be provided to the Office of the Dean of Students who will communicate with course instructors. Please also email the lecture or lab instructor as soon as you know you will miss or have missed an exam or labs due to personal emergency.

Students who are absent because of participation in a particular religious observance will be permitted to make up the work missed during their absence with no late penalty, provided the student informs the course instructors of the upcoming absence, in writing, within the first two weeks of class, and provided that the student makes up the missed material within the time frame established by the course instructors. This also applies to exams and labs.

**Office of Disability Services (ODS)**

Student learning disabilities documented through ODS will be honored as detailed to the instructors. Please inform the lecture *and* lab instructors of your accommodations *within the first week of the course or as soon as possible.* <http://disabilityservices.gatech.edu/>

**Honor Code**The Academic Honor Code can be found at:<http://osi.gatech.edu/content/honor-code>

 Students are expected to read this code and abide by it.  Please note that plagiarism will not be tolerated. Plagiarizing is defined by Webster’s as “to steal and pass off (the ideas or words of another) as one's own: use (another's production) without crediting the source.” You are strongly encouraged to: (1) Quote and attribute any words that are not your own. (2) Do not cut and paste ANYTHING into your papers. (3) Do not use "word.” (With "word" being any material a student may have acquired from a previous semester of your class.) (4) Submit the data that you acquired in lab, not data acquired by others. Students suspected of academic misconduct will be referred to the Office of Student Integrity for adjudication.

**Lecture Topics**

* Introduction to Statistics in Chemical Analysis
* Acid-Base Titrimetry
* Gravimetric Methods of Analysis
* Complexometric Titrations
* Potentiometry
* Analytical Spectroscopy
* Fundamentals of Extraction
* Electrophoresis

**List of Laboratory Experiments**

* Excel and Laboratory Safety Exercise
* Expt 1: Introduction to the Analytical Balance
* Expt 2: Standardization of Sodium Hydroxide Reagent
* Expt 3: Molecular Weight of a Polymer
* Expt 4: Determination of Glucose
* Expt 5: Gravimetric Determination of Nickel
* Expt 6: BCA Assay of Casein in Milk
* Expt 7: Complexometric Titration of Zinc with EDTA
* Expt 8: Potentiometric Titration of Iron (II)
* Expt 9: Spectrophotometric Analysis of a Complex Mixture
* Expt 10: Extraction of a Zinc Complex
* Laboratory Practicum: Determination of Water Hardness by Complexometric Titration
* Expt 11: Separation of Textile Dyes by Electrophoresis