

**QUANTITATIVE CHEMICAL ANALYSIS
SYLLABUS**

Chemistry 3000
Fall Semester, 2018

Instructors: Joel M. Harris
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Lecture, TH 12:55 PM - 1:45 PM

Lab Sect. 2, MW 1:00 PM - 5:00 PM

Lab Sect. 3, TH 2:00 PM - 6:00 PM

Lab Sect. 4, MW 5:00 PM - 9:00 PM

Lab Sect. 5, TH 6:00 PM - 10:00 PM

Textbook: *Quantitative Chemical Analysis*, 7th Edition, by D. C. Harris, Freeman, 2006.

Course Website: <https://utah.instructure.com/courses/511510>

Grading:

Lecture

Problem Sets	125
Hour Exams (2 at 100 points each)	200
Final Exam (comprehensive)	<u>200</u>
Subtotal	525

Laboratory

Experiments 1 - 8	220
Preparation and Lab Citizenship	50
Special Project Abstract	30
Special Project Proposal	100
Special Project Oral Presentation	25
Special Project Report	<u>100</u>
Subtotal	525

Grand Total 1050

Academic Honesty: Analytical Chemistry is a subject where honesty in measurements, reporting of data, uncertainties, and errors is crucial. The results of analysis are used in environmental assessment (affecting the health of the planet), clinical diagnosis (life and death decisions), and legal questions (where fortunes may be at stake). As a result, this course cannot be tolerant of any dishonesty or cheating, because you are studying to become an accurate and honest analytical chemist. Therefore, your homework and exams must represent your own work; your laboratory writing assignments must be written in your own words and not copied from other sources (that's plagiarism). Violations of these principles and rules are subject to severe sanctions, according to the University of Utah Student Honor Code: <http://www.admin.utah.edu/ppmanual/8/8-10.html>

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you need accommodations in the class, prior notice needs to be given to the Center for Disability Services (CDS), 162 Union Building. CDS will work with you and the instructor to make arrangements for accommodations.

University of Utah Career Services Center

Translating your Chemistry Skills to an Employer: Focus on Transferable Skills

Aside from technical ability, employers seek similar skills in their employees. When approaching your job and internship search, first think about what employers want:

*Communication Skills, Problem Solving Skills,
Teamwork Skills, Interpersonal Skills, Motivation/Initiative.*

Through your resume, cover letter, and interviews, tell employers about how your degree has given you some of these skills.

Employability Skill

Evidence

Problem solving

Conduct experiments and apply knowledge and understanding to solve problems

Ability to work in teams

Group laboratory projects, volunteer work

Communication

Listening, conveying complex information, presenting scientific material & arguments clearly and correctly, in writing & orally

Planning & organizing

Organizing workload as you plan, design, and execute investigations, from problem recognition to evaluation

Decision making

Practical assignments, ability to select appropriate techniques and procedures

Initiative

Pursuing independent ideas, recognition of novel problems

Independent learning

Time-management and organizational skills demonstrated through independent lab work

LECTURE SCHEDULE

<i>Date</i>	<i>Chapter*</i>	<i>Topic</i>
8/21		Class organization and requirements
8/23	0,1	Introduction to Chemical Analysis
8/28	3	Errors in Measurements, Propagation of Uncertainty
8/30	4	Coping with Random Error (distributions)
9/4	4	Interpreting Data from a Few Measurements
9/6	5	Linear Least Squares, Calibration Methods
9/11	28	Sampling and Standards
9/13	6,8	Quantitative Chemical Reactions and Equilibria
9/18	9	Acid-Base Reactions and Equilibria
9/20		Catch-up and review session
9/25		Hour Exam 1 (in class)
9/27	9	Acid-Base Equilibria, Graphical Methods
10/2	10	Polyprotic Acids, Bases, and Buffers
10/4	7,11	Acid-Base Titrations
10/9, 10/11		Fall Break
10/16	12	Metal-ion Complexation Reactions and Titrations
10/18	14	Oxidation-Reduction Reactions
10/23	14	Electrochemical cells
10/25	16	Redox Titrations
10/30	15	Potentiometry and ion-selective electrodes
11/1		Catch-up and review session
11/6		Hour Exam 2 (in class)
11/8	18,20	Introduction to Spectroscopy
11/13	18,19	Quantitative Spectrophotometry, Beer's Law
11/15	21	Atomic Spectroscopy, theory
11/20	21	Atomic Spectroscopy, applications
11/22		Thanksgiving
11/27	23	Introduction to Chemical Separations
11/29	24	Gas-Liquid Chromatography
12/4	25	High Performance Liquid Chromatography
12/6		Catch-up and review session
12/13	Thursday, 1:00PM - 3:00PM	Comprehensive Final Exam

* Chapters refer to D. C. Harris (no relation), *Quantitative Chemical Analysis*, Seventh Edition Freeman: New York, 2006. ISBN: 0716770415.

Note: Homework is due at the beginning of lecture. Papers need to be submitted in class to be graded. E-mailed or late homework papers will be returned but not graded.

LABORATORY SCHEDULE

<i>Week</i>	<i>M, T Activity</i>	<i>W, Th Activity</i>
8/27	No Meeting	Check-In and Lab Orientation
9/3	Labor Day Holiday	Exp. 1. Review of Basic Operations
9/10	Exp. 1. Review of Basic Operations	Exp. 1. Review of Basic Operations
9/17	Exp. 2. Applied Acid-Base Titrations	Exp. 2. Applied Acid-Base Titrations
9/24	Exp. 3. Redox Titration of Iron in Ore	Exp. 3. Redox Titration of Iron in Ore
10/1	Exp. 4. Spectrophotometric Determination of Iron	
10/8	Fall Break	Fall Break
10/15	Rotation of Exps. 5 - 8	Exp. 5 Inductively-Coupled Plasma Emission
10/22	Rotation of Exps. 5 - 8	Exp. 6 Gas Chromatography
10/29	Rotation of Exps. 5 - 8	Exp. 7 High Performance Liquid Chromatography
11/5	Rotation of Exps. 5 - 8	Exp. 8 Multicomponent Spectrophotometric Analysis
11/12	Special Project	Special Project
11/19	Special Project	Thanksgiving Holiday
11/26	Special Project	Special Project, Check out
12/3	Special Project Oral Reports	Special Project Report due Friday

Special Project Team Formation by Tuesday, September 18, 8:00PM (on Canvas)

Special Project Proposal Abstract due Monday, October 1, 4:00 PM (on Canvas)

Special Project Proposal due Friday, October 26, 4:00 PM (on Canvas)

Special Project Reports due in Friday, December 7, 4:00 PM (on Canvas)