

CHEMISTRY 344: Quantitative Methods of Analysis Fall 2008

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Office Hours: Tuesday & Thursday, 10:15 a.m. – 11:15 a.m. and by appointment

Textbook: *Fundamentals of Analytical Chemistry*, Douglas A. Skoog, et. al, 8th ed. **2004**.
Chemistry 344 Quantitative Methods of Analysis Laboratory Packet, A. Bazzi

I. LEARNING OBJECTIVES

Quantitative Methods of Analysis (Chemistry 344) is the first course in the analytical chemistry sequence in the Chemistry program. The second analytical chemistry course is Instrumental Methods of Analysis (Chemistry 447) which is offered regularly in the Winter term. Quantitative Methods of Analysis (Chemistry 344) aims at providing the fundamental knowledge and the laboratory training so the student can achieve the following objectives:

1. Learn the principles, theories, and practices of classical analytical chemistry.
2. Learn the basic principles, instrumentation and applications of selected modern instrumental analysis techniques.
3. Learn how to keep a good laboratory notebook and develop sound analytical laboratory skills, which are useful to conduct research and the job market.
4. Develop problem-solving abilities in the area of chemical analysis.
5. Understand the sources of errors in chemical analysis and develop the capabilities to critically examine experimental data and use statistics to evaluate analytical results.
6. Learn how the principles and techniques of analytical chemistry are applied to solve problems in science with emphasis on their applications in the environmental and biochemical fields.

II. LECTURE AND EXAM SCHEDULES

DATE	TOPIC	CHAPTERS AND ASSIGNMENTS
9/4	What is Quantitative Methods of Analysis (Chem 344)? Discussion of the Syllabus and Course Requirements and The Nature of Analytical Chemistry.	Ch 1
9/9-9/11	Gravimetric Methods of Analysis	Ch. 12 (1-5, 9,10, 23, 19,26, & 29)
9/16–9/18	Principles of Titrimetric Methods & Titrimetric Calculations	Ch 13 (1-5, 8,9,10,12, 13, 15, 16,18,19, 23, & 24)
9/23–9/30	Errors in Chemical Analysis and Applications of Statistics to the Treatment and Evaluation of Experimental Data.	Ch. 5 (1–11) Ch. 6 (1–5,7-E, 14 &17) Ch. 7(1,4,6,14,16,22,28,31 &32)
10/2	Standardization and Calibration Methods in Analytical Chemistry	Ch. 8 (14,21,22, & 23)
10/09	***EXAM 1***	Chapters 1, 12,13, 3, 4, 5&8
10/7-10/14	Fundamentals of Spectrophotometry	Ch. 24 (1–5,13,18,21,22,&23)
10/16–10/21	Atomic Spectroscopy	Ch. 28 (1,2,3,6,7,13,15 & 17)

10/23–10/30	Potentiometry & Electrogravimetry <i>Please do the self review on Fundamentals of Electrochemistry before this lecture.</i>	Self Review: Read Chap. 18 with emphasis on Section 18 C-3 & 18C-5. (Do 18,19, & 24). Read Chap. 19 with emphasis on 19 A (Do 8) Ch. 21 (1,4,5,11,15,17,18,19,20,22, & 29) Ch 22 (9,18, 20,28, 29)
11/4-11/6	Introduction to Analytical Separations (with emphasis on chromatography)	Ch. 30 (5,6,7,8,19,21,22 & 25)
11/13	*** EXAM 2 ***	Ch. 24,28,21,22 &30
11//11–1/20	Monoprotic Acid-Base Equilibria and Titration Curves for Weak Acids and Weak Bases <i>Please review chapter 9 section A on Acid/Base before this lecture.</i>	Ch. 9 (sections B-6 & C, problems 20,21,22, 23,24,25,27,26,29,30,31 &32,) Ch. 14 (1,2,3,4,5,7,10,13,14,18,25,28,29, 32,37,41,46 &4744)
11/25–12/02	Polyprotic Acid/Base Equilibria & Titration Curves for Complex Acid/Base Systems	Ch. 15 (1,2,3,4,8,9,10,16,18,20,22,23,26, &30)
12/4–12/9	Complex Formation Titration Equilibria and Calculations Involving EDTA Titrations	Ch. 17 (1,2,3,13,14,15,17,20,21,30,31,33 & 34)
12/11	*** FINAL EXAM *** 11:30 am – 2:30 pm.	COMPREHENSIVE (About 50% from Chapters 9, 14, 15, and 17 and 50% from the other chapters covered during the term)

III. HOMEWORK ASSIGNMENTS, DUE DATES (POSSIBLE QUIZ DATE)

Chapter(s)	Due Date	Chapter(s)	Due Date
1, 12	9/16	28	10/23
13	9/23	21, 22	11/4
5, 6, 7	10/2	30	11/11
8	10/7	9, 14	11/25
24	10/16	15	12/4

- A. **Exams and Quizzes:** A number of *unannounced* quizzes, two one-hour exams, and a comprehensive final are given during the term. Each quiz *may* be given during the lecture period on the day the homework assignment is due. The quiz will cover the material included in the homework assignment. **There are no make-up exams or quizzes under any circumstances. If a student is absent for a valid reason (which must be documented), the scores of the available exams and quizzes will be adjusted and used to determine the grade of the student.** Any questions regarding points earned on quizzes, exams, reports, etc. must be resolved within one week.

The final exam, which is comprehensive, is on Thursday, December 11, 2008, from 11:30 am to 2:30 p.m.

- B. **Homework Assignments:** Assignments *will not* be collected. These assignments are quintessential to performing well in the course and furthering the understanding of the course material. **A quiz may be given during the lecture period on the day the homework**

assignment is due. The solutions to the homework assignments will be placed on reserve in the library.

- C. **Science Learning Module:** *All the students are required to complete an interactive atomic absorption module by 10/17/08.* **The completion of the module on time will add 12 points to the laboratory score of the student.**

V. **GRADING SCALE**

The contributors to the student's final grade along with their respective percentages are given below:

<u>Contributor</u>	<u>Percentage</u>
Quizzes	6%
Hour Exams	24%
Final Exam	30%
Laboratory	40%

The following scale is representative as to how the final grades are assigned:

<u>Total Score</u>	<u>Grade</u>
>90	A
87-90	A-
77-86	B- to B+
61-76	C- to C+
50-60	D- to D+
<50	E

For a student whose total score is on the borderline of a grade, class attendance, class participation, and the opinion of the lab instructor are additional factors that will be considered in determining the final grade of such a student.

VI. **STUDENTS WITH DISABILITIES**

The University will make reasonable accommodations for persons with documented disabilities. Students need to register with Disability Resource Services (DRS) every semester they are enrolled for classes. DRS is located in Counseling and Support Service, 2157 UC. To be assured of having services when they are needed, students should register no later than the third week after the first day of classes.

VII. **STATEMENT OF ACADEMIC INTEGRITY**

The University of Michigan-Dearborn values academic honesty and integrity. Each student has a responsibility to understand, accept, and comply with the University's standard of academic conduct as set forth by the Code of Academic Conduct, as well as policies established by the schools and colleges. Cheating, collusion, misconduct, fabrication, and plagiarism are considered serious offenses. Violations will not be tolerated and may result in penalties, up to and including expulsion from the University.

VIII. **LABORATORY INSTRUCTORS**

Section	Time	Instructor
001	MW 1:05 pm – 4:55 pm	Y. Deng
003	MW 5:10 pm – 9:00 pm	J. Bazzi
002	TR 1:05 pm – 4:55 pm	A. Bazzi
004	TR 5:10 pm – 9:00 pm	J. Bazzi

IX. LABORATORY ATTENDANCE

Laboratory attendance is mandatory. Failure to attend two laboratory periods may result in an instructor initiated drop.