

Course Organization

1. Instructor

Dr. Gary Small, 238 IATL, 335-3214, gary-small@uiowa.edu

Office Hours: 1:00-2:00 pm, Monday, Wednesday, Friday, or by appointment.

2. Departmental Office

Department of Chemistry, 305 CB, 335-1350

3. Course Web Site (ICON)

<http://icon.uiowa.edu>

4. Class Meetings

Monday, Wednesday, Friday – 10:30-11:20 am, 112 MH

5. Prerequisite

Chemistry 4:111

6. Textbook

Principles of Instrumental Analysis, 5th Edition, by D. A. Skoog, F. J. Holler, T. A. Nieman, Saunders College Publishing, 1998.

7. Course Material

This course provides an introductory survey of modern instrumental techniques in analytical spectroscopy and separations. Coverage is provided of spectroscopic methods for the determination of both atomic and molecular species. Specific topics in spectroscopy to be considered are atomic spectroscopy, molecular UV-visible absorption and luminescence spectroscopy, vibrational spectroscopy, and mass spectrometry. Topics in separation include gas chromatography, high performance liquid chromatography, size exclusion chromatography, ion exchange chromatography, and capillary electrophoresis.

8. Summary of Course Requirements

The course grade will be determined from the following elements:

Homework assignments -- 5@10 points = 50 points

Hour exams -- 3@100 points = 300 points

Final exam – 150 points

Total – 500 points

9. Exams

There will be three in-class hour exams given during the course along with a comprehensive final exam. The final exam will consist of 100 points derived from all the course material and

50 points based on material covered after Exam #3. Sample exams will be made available to assist your preparation.

10. Calculation of Overall Grades

Grades will be assigned on the basis of the distribution of point totals. The average score will likely lie at the B-/C+ border. The +/- grading scale will be used. Only an exceptional performance will receive an A+.

11. Policy on Late Assignments

Homework assignments will be due at noon on the day due. Late assignments will be penalized at the rate of two points per day.

12. Assistance to Students with Disabilities

I would like to hear from anyone who has a disability which may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please contact me during my office hours.

13. Student Rights and Responsibilities

Students in the College of Liberal Arts and Sciences have specific rights and responsibilities. You have the right to adjudication of any complaints you have about classroom activities or instructor actions. Information is available in the College's Student Academic Handbook (http://www.clas.uiowa.edu/students/academic_handbook/). You have the right to a classroom environment that enables you to learn, including modifications if you have a disability.

Your responsibilities to this class-and to your education as a whole-include attendance and participation. You are also expected to be honest and honorable in your fulfillment of assignments and in test-taking situations (the College's policy on plagiarism and cheating is on-line in the College's Student Academic Handbook, at http://www.clas.uiowa.edu/students/academic_handbook/). The work you perform in this course is expected to be your own. Homework assignments are to be done independently. If you have questions regarding an assignment, see the instructor. You will receive no credit if it is determined that the work you turn in is not your own.

You have a responsibility to the rest of the class and to the instructor to help create a classroom environment where all may learn. At the most basic level, this means that you will respect the other members of the class and the instructor, and treat them with the courtesy you hope to receive in turn.

14. Notice for Students Outside the College of Liberal Arts and Sciences

This course is given by the College of Liberal Arts and Sciences. This means that class policies on matters such as requirements, grading, and sanctions for academic dishonesty are governed by the College of Liberal Arts and Sciences. Students wishing to add or drop this course after the official deadline must receive the approval of the Dean of the College of Liberal Arts and Sciences. Details of the University policy of cross enrollments may be found at: <http://www.uiowa.edu/~provost/deos/crossenroll.doc>

Course Syllabus

- Jan. 17 Introduction (Chapter 1)
19 Introduction (Chapter 1)
22 Principles of spectroscopy (Chapter 6 (6A, 6B-1, 6B-2, 6B-3, 6B-4, 6B-5, 6B-7, 6C-1, 6C-2, 6C-3, 6C-4, 6C-5), Problems 6-2, 6-3, 6-8, 6-9*))
24 Principles of spectroscopy (Chapter 6)
26 Principles of spectroscopy (Chapter 6)
29 Instrumentation for optical spectroscopy (Chapter 7 (7A, 7B, 7C, 7D, 7E), Problems 7-12, 7-14, Chapter 13 (13D-1), Chapter 16 (16B-1, 16B-2))
31 Instrumentation for optical spectroscopy (Chapter 7, 13, 16)
- Feb. 2 Instrumentation for optical spectroscopy (Chapter 7, 13, 16); **Homework #1 due**
5 Instrumentation for optical spectroscopy (Chapter 7, 13, 16)
7 Instrumentation for optical spectroscopy (Chapter 7, 13, 16)
9 Instrumentation for optical spectroscopy (Chapter 7, 13, 16)
12 Molecular UV-visible spectroscopy (Chapter 13 (13A, 13B, 13B-1, 13B-2, 13D), Problems 13-1, 13-2, 13-5, 13-9, Chapter 14 (14A, 14B, 14C, 14D), Problems 14-4, 14-6, 14-7, 14-12)
14 Molecular UV-visible spectroscopy (Chapters 13, 14)
16 **Exam #1**
19 Molecular UV-visible spectroscopy (Chapters 13, 14)
21 Molecular luminescence (Chapter 15 (15A, 15B, 15C, 15D), Problem 15-9)
23 Molecular luminescence (Chapter 15)
26 Infrared and Raman spectroscopy (Chapter 7 (7I), Problem 7-22, Chapter 16 (16A-1, 16A-2, 16A-3, 16B-1, 16B-2, 16C-1, 16C-2), Problem 16-12, Chapter 17 (17A-2, 17A-3), Chapter 18 (18A-1, 18A-2, 18A-3, 18B, 18C))
28 **No class**
- Mar. 2 Infrared and Raman spectroscopy (Chapters 7, 16, 17, 18); **Homework #2 due**
5 Infrared and Raman spectroscopy (Chapters 7, 16, 17, 18)
7 Infrared and Raman spectroscopy (Chapters 7, 16, 17, 18)
9 Atomic spectroscopy (Chapter 8 (8A), Chapter 9 (9A, 9B-1, 9B-2, 9C-2, 9D), Chapter 10 (10A-1, 10A-3, 10A-4, 10B))
12 **Spring Break**
14 **Spring Break**
16 **Spring Break**
19 Atomic spectroscopy (Chapters 8, 9, 10)
21 Atomic spectroscopy (Chapters 8, 9, 10)
23 **Exam #2**
26 Atomic spectroscopy (Chapters 8, 9, 10)
28 Mass spectrometry (Chapters 11 (11A, 11B, 11C), 20 (20A, 20B, 20C))
30 Mass spectrometry (Chapters 11, 20); **Homework #3 due**
- Apr. 2 Mass spectrometry (Chapters 11, 20); **Last day to drop course**
4 Mass spectrometry (Chapters 11, 20)
6 Introduction to chromatography (Chapter 26 (26A, 26B, 26C, 26D, 26E, 26F) Problems 26-12, 26-13, 26-14, 26-24)
9 Introduction to chromatography (Chapter 26)
11 Introduction to chromatography (Chapter 26); **Homework #4 due**
13 Introduction to chromatography (Chapter 26)
16 Gas chromatography (Chapter 27 (27A, 27B, 27C, 27D), Problems 27-21, 27-22)
18 Gas chromatography (Chapter 27)
20 **Exam #3**
23 High performance liquid chromatography (Chapter 28 (28A, 28B, 28C, 28D, 28E, 28F, 28G), Problem 28-13)

- 25 High performance liquid chromatography (Chapter 28)
- 27 High performance liquid chromatography (Chapter 28)
- 30 High performance liquid chromatography (Chapter 28); **Homework #5 due**
- 2 Capillary electrophoresis (Chapter 30 (30A, 30B, 30C, 30D))
- 4 Capillary electrophoresis (Chapter 30)

Final Exam: Tuesday, May 8, 12:00 pm, 112 MH

*Problems assigned from the textbook will not be turned in or graded.