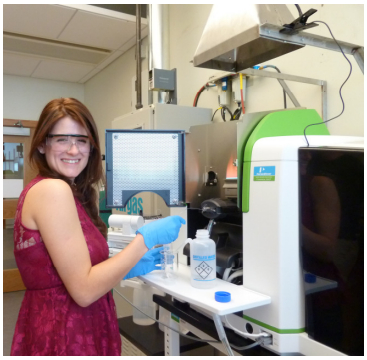
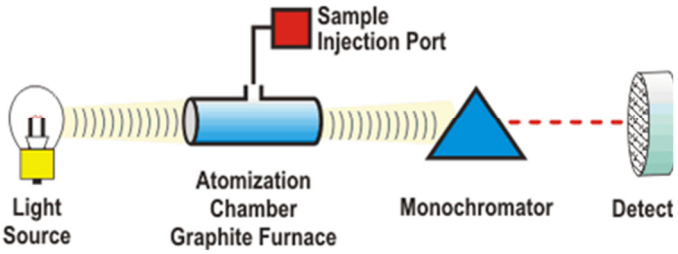
CHEMISTRY 450: INSTRUMENTAL ANALYSIS
Fall 2013 Semester
Meets TR 8:00-9:15 AM





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Office hours: **TR 9:30-10:30 or by appointment**

Text: D.A. Skoog, F. J. Holler, and S.R. Crouch, *Principles of Instrumental Analysis*. Thomson Brooks/Cole: 2006 (6th edition). ISBN-13: 978-0-495-01201-6 ISBN-10: 0-495-01201-7

Requirements: A 2" binder, scientific calculator, safety goggles and a composition notebook (lab)

Grading system: Your final grade for the course will be based on the following:
70 % Lecture grade
- 40 % from 3 in-class exams and 1 final
- 20 % from homework
- 10 % from group research paper

30 % Laboratory - refer to the lab syllabus for details

Class Policy

Attendance: Class attendance is strongly encouraged! You are expected to arrive on time for class. Class attendance will be taken on a daily basis. You are responsible for obtaining missed lecture notes and assignments. *Students who are regularly absent will be withdrawn from the class.*

Seating arrangements during an exam: I reserve the right to decide on your seating arrangement during an exam, including the final.

Class Policy (Cont.)

Making up missed work: Makeup exam *will only be given if* you have a valid excuse for your absence, provided that I have been notified within 24 hours of your absence and a written, supporting documentation (e.g. a doctor's note) of your absence has been presented soon after you come back to class. If you failed to provide me with valid documentation of your absence *a grade of zero* will be assigned for the missed exam. Unless I decided otherwise, *you have until the following meeting to makeup for a missed exam*; otherwise a grade of zero will be assigned for that exam.

Late *homework* will NOT be accepted. There are no exceptions to this rule, so a missed or late homework incurs a grade of zero. You have until 5 pm to bring your homework to me (or slip it under my door) the day it is due. However, unless it was handed to me, I will not be responsible for lost homework.

While discussion of ideas related to an assigned problem is acceptable, copying one's work or copying each other either word for word or by rephrasing someone's statement will be considered a form of cheating, thus will be treated as an academic misconduct. I expect you to write your own ideas and responses to assigned problems as an individual, not as a group. At this point, I also expect you to know how to use quotations if a response is quoted from the text or another source, and to list that text or any other sources used, including those taken from internet sites, towards the end of your problem set. Likewise, if you derived the ideas/ responses from the text or another source, ***cite your references*** as well. In summary, *problem sets that I have deemed identical or close to being identical will receive a grade of zero*! Read the section below about academic integrity for more details.

Academic Integrity:
From the University Handbook: "At Bridgewater State University, academic honesty is expected of all students; plagiarism and cheating are not condoned and are subject to academic penalty, which may result in a failure for the course in which the violation took place. A record of the violation is kept and may result in suspension or dismissal from the university". Academic dishonesty may include cheating on exams; plagiarism; the blatant copying of problem assignments or projects; and removal of documents from the course binder. Any one of these examples may result in dismissal from the course with an F grade.

For more information please read the university's policy on academic dishonesty at:
http://www.bridgew.edu/Handbook/PoliciesProcedures/academicintegrity.cfm

Email as an Official Means of Communication to Students
For detailed information about BSU's policy on email communication, go to:
http://it.bridgew.edu/Policy/EmailCommPolicy.cfm

You are required to check your email at least once a day as I will be making announcements regarding class requirements, including possible changes in the lab schedule, via email. If you are using an email account other than your BSU email, it is your responsibility to make sure your BSU correspondence gets forwarded to your other email account.

Course objectives

My primary ***teaching goals for CHEM450*** are to: (1) provide students with a solid foundation in chemical analysis using modern instrumental methods, (2) help them become excellent problem solvers in the field of chemistry, and (3) provide extensive hands-on experience on the use of modern analytical instruments. To fulfill these goals, homework will be assigned throughout the semester on top of three examinations to help students retain the materials covered. The lab experiments were carefully selected based on recent developments in modern instrumentation (such as those obtained from the Journal of Chemical Education).

Guidelines for Group Paper

A. Finding an article about the selected topic

1. Find an article from a scientific journal (preferably J. Chem Ed.) or from my recommended list, about your instrumental method/technique. The article should be a laboratory experiment that uses the technique (e.g. if your selected technique is Supercritical Fluid Chromatography or SFC, pick an article on the use of SFC to separate compounds X and Y in a mixture).

2. Once you found an article, bring me a copy for approval. [My advice: Select 2-3 articles so if one is rejected at least you have another article for approval]

3. Once your article is approved, you may start putting your paper together.

B. Putting your paper together

Your paper should be at least 5 pages in length, but not to exceed 10 pages. Use font 12 and 1 ½ spacing. Your paper must include the following sections. Use a section heading for each part of your paper and don't forget to cite references throughout the text.

1. Introduction ~ 1-1 ½ pages

- Give some background information about the technique
- If there are terms to introduce, give a list of terminologies and their definitions
- If needed, give background information about related concepts (for example, when I talked about molecular UV/Vis spectroscopy, I discussed the different types of transition undergone by molecules upon absorption of UV or visible light)
- If there is enough room for this, you can give a short history on the development and/or use of such technique

2. Methodology and Applications ~ 3-4 pages, including diagrams and data

- Show a picture or a block diagram of your technique (much like you've seen in class). This could be something you put together or copied (and pasted) from the literature but remember to cite your reference
- Describe the typical procedure followed when using your technique
- Discuss the use of such technique – what types of samples can be analyzed with such technique, how long is the analysis, how accurate and/or precise are the results, what is the typical LOD (if method is quantitative)
- Show and explain sample data gathered using your technique from the article that I approved
- Discuss the results of the experiment from the article and the appropriateness of the technique for such experiment

3. Conclusion ~ ½ - 1 page

- What are the limitations of your technique
- What are the advantages of your technique over other related techniques?
- If available, show an estimated cost of an instrument that utilizes such technique

4. References – follow the ACS style guide for citing references (separate handout)

Your grade for this paper will be based on the following criteria:

- Completeness (all the required elements are met, including references)
- Organization (includes use of section headings)
- Clarity of presentation
- Neatness
- Individual meeting with me (where I'll ask a few questions about your paper)

COURSE OUTLINE AND TENTATIVE SCHEDULE

Week	Date	Lecture Topic
1	9/05	Ch 1 Introduction; Review – Data Handling and Statistical Analysis (App. 1); Significant Figures
2	9/10, 12	Continue Ch 1; Ch 2-5 (Parts) Measurement Basics
3	9/17, 19	Ch 6 Introduction to Spectrometry; Ch 7 Optical Instruments
4	9/24, 26	Ch 13 & 14 Molecular UV/Vis Spectrometry
5	10/01, 03	Ch 13 & 14 – Cont. **Oct. 3 (R) - Exam 1: Intro (Ch 1) to Molecular UV/Vis**
6	10/08, 10	Ch 7-10 (parts) Atomic Spectrometry (AS)
7	10/15, 17	Ch 16 & 17 Infrared (IR) Spectroscopy
8	10/22, 24	Continue Ch 16 & 17; Ch 19 NMR Spectroscopy
9	10/29, 31	Cont. Ch 19; Ch 11: Atomic Mass Spectrometry **Oct. 31 (R) - Exam 2: AS, IR & NMR**
10	11/05, 07	Ch 20 Molecular Mass Spectrometry (MS)
11	11/12, 14	Ch 26 Intro to Chromatographic Separations Ch 27-30 (parts) Gas and Liquid Chromatography
12	11/19, 21	Work on group project
13	11/26	Cont. Ch 27-30 (parts)
14	12/03, 05	Continue Ch 27-30 **Dec. 05 (R) - Exam 3: IR, NMR and MS**
15	12/10	***Group Presentations*** *(lecture and lab time)*

Final Exam: Tuesday, Dec. 17, 8-10 AM; *Semi-comprehensive,* with emphasis on Chromatography