I. Logistics

Instructor          Professor Betsy Stone  
                    Chemistry Building W376  
                    (319) 384-1863  
                    betsy-stone@uiowa.edu

Class Location/Time      Chemistry Building E215  
                          3:30 – 4:45 PM Tuesdays and Thursdays

Office Hours       Wednesdays 10:00AM-11:00AM  
                    Thursdays 10:00AM-12:00PM  
                    By appointment

II. Course Description and Objectives

Description  Modern techniques for analytical separations will be examined in terms of basic theory, instrumentation, and practical applications. Emphasis is placed on gas and liquid chromatography, electrophoresis, and mass spectrometry. Topics will be explored through a combination of scientific readings, case studies, and independent projects.

Learning Goals and Objectives

1. Develop an understanding of the fundamental principles of analytical separations.
2. Gain practical knowledge of chromatography and mass spectrometry instrumentation.
3. Understand how to apply extractions and sample clean-up in chemical analysis.
4. Interpret data from separation methods for the purpose of method development, validation, and quantitation.
5. Select and apply the appropriate chromatographic and detection techniques for real world analyses.

III. Course Content and Resources

Topics

1. Introduction to Separations
   a. Thermodynamic Basis for Separations
   b. Preparative Separations
2. Chromatography
   a. General Theory and Background
   b. Gas Chromatography: theory, instrumentation, method development, applications
   c. Liquid Chromatography: theory, variations, instrumentation, sample preparation, applications
   d. Supercritical Fluid Chromatography: extractions and instrumentation
   e. Electrophoresis: theory, instrumentation, applications

3. Detection Techniques
   a. Mass Spectrometry: Introduction, instrumentation, fragmentation, data analysis, interfaces, and advanced techniques
   b. Other Detection Methods (as time allows)

Textbook
There is no required textbook for this course. Assigned readings will be available on the course website and through the University of Iowa online journal holdings.

Recommended Readings
A good textbook in analytical chemistry or instrumental analysis will provide you with basic knowledge of separation techniques to supplement course readings.

The following resources are also recommended as higher-level references for the subjects of separations and mass spectrometry:

Books


Journals
*The Analyst*
*Analytical and Bioanalytical Chemistry*
Analytical Chemistry
Biomedical Chromatography
European Mass Spectrometry Journal
International Journal of Mass Spectrometry
Journal of Chromatography A & B
Journal of High Resolution Mass Spectrometry
Journal of Mass Spectrometry
Journal of Separation Science
Journal of the American Society for Mass Spectrometry
Mass Spectrometry Reviews
Rapid Communications in Mass Spectrometry
Trends in Analytical Chemistry

Course Website  The course website is posted on ICON (http://icon.uiowa.edu). Login with your username and password. Announcements, syllabus, assignments, and readings will be posted here. Completed assignments may also be submitted through the drop box. Please visit this website frequently for announcements and updates that may contain pertinent and/or clarifying information.

Other Resources  The University of Iowa Libraries (to access e-books and journal holdings); http://www.lib.uiowa.edu/

The Writing Center, 110 English Philosophy Building; (319) 335-0188; http://www.uiowa.edu/~writingc

IV. Grading

Grading Scheme  Assignments  40%
Midterm exam  30%
Final Project  30%

Tentative Grading Schedule  A  Excellent mastery and intelligent discussion of concepts
B  Very good understanding of concepts and ability to apply them to new situations
C  Understanding of concepts and patterns
D  Incomplete understanding, memorization
F  Insufficient effort and performance

Format  Plus or minus grades will be appended to letter grades.

Re-grading  Adjustments to grades will only be considered within one week after an assignment or exam is returned. The re-grade request must be accompanied by a written, detailed description of the grading concern. Re-grading will involve re-assessment of the entire assignment and may increase or decrease of the grade.
**Attendance**  
Attendance at class is strongly encouraged and is mandatory for exams and student presentations.

**Key Dates**
- **Mid Term Exam**: March 29
- **Final Project Deadlines**
  - Proposal Due: March 9
  - Abstract Due: March 23
  - Report Due: April 27
  - Presentations: May 1, 3, Final Exam Period (TBA)

### V. Administrative Details

| Chemistry Center | Chemistry Building E225  
|                 | (319) 335-1341 |
| Department of Chemistry Office | Mark Arnold, Departmental Executive Officer  
|                 | Chemistry Building E331  
|                 | (319) 335-1350 |

**Administrative Home**  
The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook.

**Electronic Communication**  
University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences. (*Operations Manual, III.15.2. Scroll down to k.11.)*

**Accommodating Disabilities**  
A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See [www.uiowa.edu/~sds/](http://www.uiowa.edu/~sds/) for more information.

**Academic Honesty**  
All CLAS students have, in essence, agreed to the College's [Code of Academic Honesty](http://www.uiowa.edu/~sds/): "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS [Academic Policies Handbook](http://www.uiowa.edu/~sds/)).
| **CLAS Final Examination Policies** | The date and time of every final examination is announced during the fifth week of the semester; each CLAS student will receive an email from the Registrar stating the dates and times of the student's final exams. Final exams are offered only during the official final examination period. **No exams of any kind are allowed during the last week of classes.** All students should plan on being at the UI through the final examination period. |
| **Making a Suggestion or a Complaint** | Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS Academic Policies Handbook). |
| **Understanding Sexual Harassment** | Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy. |
| **Reacting Safely to Severe Weather** | In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Public Safety web site. |