

Analytical Chemistry: CHE 508

University at Buffalo

Spring Semester 2017

Instructor

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Office hours: by appointment, 578 NSC

Class#14834

Location: 422 Fronzak Hall

Time: MWF 10:00-10:50am

Course Description

This course will cover aspects of separation science, starting with the fundamental principles and theories that govern the separation process. This will be followed by a discussion of modern techniques and instrumentation used in chemical analysis; these will include liquid chromatography, gas chromatography, supercritical fluid chromatography, capillary electrophoresis, and capillary electrochromatography. As time allows it, we will also discuss data handling and statistical data analysis in analytical chemistry.

Objectives/Learning Outcomes

The course should enable the students to acquire a strong foundation on the theories of separation science and knowledge of the complementary separation techniques. At the end of the course, successful students will be able to articulate the basic principles and theories of these techniques, differentiate among their different formats, and use the learned knowledge to design separation methods to elucidate problems in chemical analysis. The students should also be capable of describing the general aspects of the chemical instrumentation related to these technologies, their use, and how to apply such in a given situation. Further, the student should be able to critically evaluate the separation science literature related to gas chromatography, liquid chromatography, supercritical fluid chromatography, and electrically driven separations (e.g., CE and CEC) and form an educated opinion on the separation methodology used. In addition, students will be able to apply standard statistical analysis to assess experimental data.

Course Format

Very few textbooks cover in detail all the topics that we will discuss in class. They could also be expensive! Therefore, the course will rely on lectures and supplementary reading material distributed in class. There are several good references books that can be consulted. For those of you interested in having good references in separation science, the major subject of this course, see the recommend list below.

The Essence of Chromatography by C. Poole (Elsevier 2003). This is an excellent reference book that includes all the subjects that we will discuss in class.

Unified Separations by J. Calvin Giddings (Wiley 1991). This is book covers the theory of separation science.

Practical Gas Chromatography by K. Dettmer-Wilde and W. Engewald, Eds (Springer-Verlag Berlin Heidelberg 2014). This reference book addresses all aspects of gas chromatography.

Practical Capillary Electrophoresis, 2nd ed. by Weinberger (Academic Press, 2000). This book addresses the fundamentals and application of CE.

HPLC Columns: Theory, Technology, and Practice by Uwe D. Neue, (Wiley 1997). Contains fundamental, as well as a practical aspect, of HPLC and column technology.

Practical HPLC Method Development 2nd ed. by Snyder, Kirkland, and Glajch (Wiley 1997). For serious method development in addition to fundamentals, this is a well-acclaimed textbook.

Class Materials and Handouts

All pertinent material, including this syllabus and class notes, will be posted on a UB secured cloud folder (i.e., UB BOX). An email will be sent to all with the appropriate link to join the shared folder. Instructions will be provided in class.

Lectures/attendance

This class depends heavily on the material presented and discussed in the class lectures. Therefore, attendance is exceedingly important to succeed in this course.

Assessment

Exams: Two examinations will be given during the semester. Both will be take home exams. In addition, quizzes and homework will be administered throughout the semester. The first exam is scheduled for distribution on March 31, 2017, and the final take-home exam will be distributed the last week of classes. The exams will be due a week after distribution at 11am. The in-class quizzes will be announced at least one class period before the quiz. Due dates for homework to be collected will be announce at the time of the assignment. The grade for the class is based on a total of 300 points. The exams will have a value of 100 points each. The quizzes and the homework combined will be normalized to have a weight of 100 points. Students registered for audit will not have to take the examinations; however, they will have to take the quizzes and do the homework.

Final Grade: The final letter grade will be determined based on the percentage of the total points earned in the two exams, quizzes, and project. The plus/minus grade system will be applied.

- We adhere to the university rules regarding the grade of incomplete ("I"); please see <http://grad.buffalo.edu/Academics/Policies-Procedures/Grading-Procedures.html>

Academic Integrity

You are encouraged to study with others if that helps you understand the subject better. However, for all graded work you are expected to work on your own. Collaboration on problem sets to be collected, quizzes, and exams is not permitted. The university rules on academic dishonesty will be enforced. (see <http://grad.buffalo.edu/Academics/Policies-Procedures/Academic-Integrity.html>)

Academic dishonesty (i.e., cheating) may be defined as the use of unauthorized materials or the giving or receiving of unauthorized assistance during a quiz, class test, examination, laboratory experiment, or other academic exercise. This includes copying the work of another individual or the unauthorized collaboration between two or more students during an academic exercise such as a homework assignment, quiz, class test, laboratory exercise, or examination. Cheating also includes unauthorized modification of returned homework assignments, class tests, laboratory reports, or examinations for reconsideration or re-grading by the instructor or teaching assistant. Plagiarism may be defined as the use of another individual's work without authorization, consent, or appropriate acknowledgement.

Homework will be examined for evidence of copying and plagiarism. Exams and quizzes will be monitored for acts of cheating. If an act of academic dishonesty is detected, a grade of "F" will be assigned for that particular examination/quiz/homework. If a second offence takes place a grade of "F" will be assigned for the entire course.

Accessibility Resources

If you have a diagnosed disability (physical, learning or psychological) which will make it difficult for you to carry out the course work as outlined, or requires accommodations such as recruiting note takers, readers, or extended time on exams and/or assignments, please advise me during the first two weeks of the course so we may review possible arrangements for reasonable accommodations. You must also be registered with the UB's Accessibility Resourced Office.