

# Chemistry 450 Syllabus

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Class Meetings: W from 2:00 – 2:50 in Julian 372; Th from 9:00 – 11:50 in Julian 338

If you pick up and read almost any paper from the chemical literature you will find sections that rely on a careful chemical analysis. A paper in physical organic chemistry, for example, might include a detailed kinetic analysis of a chemical reaction using a technique called stopped-flow kinetics. The paper's experimental section provides the necessary details regarding how the kinetic studies were completed. But how do the authors know that their method produces acceptable results and, more importantly, why should you trust that it does? If you trace back through the paper's references, eventually you will find a paper describing a careful evaluation of stopped-flow kinetics that characterizes its analytical usefulness. Developing such analytical methods is an important part of the field known as analytical chemistry.

**Course Goals.** The goal of Chem 450 is to gain practical experience in designing, characterizing and validating an analytical method. To accomplish this you will learn how to

- evaluate the importance of measurement errors
- standardize analytical methods using external standards, internal standards or standard additions
- obtain representative samples
- optimize and characterize an experimental protocol
- validate the quality of analytical work

**Course Mechanics.** A tentative schedule is shown on the following page. During the first three weeks we will use class and lab sessions to introduce several important concepts that are at the heart of method development: the treatment of measurement errors, the importance of sampling and the need for standardization. You also will use this time to select and research your method development project (see below for further information about this project). During the remainder of the semester you will work on your method development project with class sessions divided between individual meetings to discuss your project and the presentation of progress reports to the class.

Week of	Wednesday	Thursday
August 22 <sup>nd</sup>	Introduction to Course and to the Method Development Project	Check-In and Proficiency Testing
August 29 <sup>th</sup>	Treatment of Measurement Errors	Sampling and “The Weakest Link”
September 5 <sup>th</sup>	Individual Meetings	The Need for Standardizations and “Developing an Analytical Method for PNP”
September 12 <sup>th</sup>	Individual Meetings	Method Development Project
September 19 <sup>th</sup>	Individual Meetings	Method Development Project
September 26 <sup>th</sup>	Progress Reports	Method Development Project
October 3 <sup>rd</sup>	Individual Meetings	Method Development Project
October 10 <sup>th</sup>	Project Reports	Method Development Project
October 17 <sup>th</sup>	Fall Break	Fall Break
October 24 <sup>th</sup>	Individual Meetings	Method Development Project
October 31 <sup>st</sup>	Progress Reports	Method Development Project
November 7 <sup>th</sup>	Individual Meetings	Method Development Project
November 14 <sup>th</sup>	Progress Reports	Method Development Project
November 21 <sup>st</sup>	Thanksgiving Break	Thanksgiving Break
November 28 <sup>th</sup>	Individual Meetings	Method Development Project
December 5 <sup>th</sup>	Individual Meetings	Check-out of lab and Final Reports

**The Method Development Project.** This project, which is the course’s centerpiece, is a ten-week exercise in developing an analytical method. During this project you will select an analytical problem, research that problem and identify an appropriate analytical method, characterize the analytical method’s performance, optimize the method and validate its utility. Further details are provided in a separate handout.

**Textbook and Other Required Materials.** The textbook for the course is *Modern Analytical Chemistry*, which is available from the Fine Print Bookstore in downtown Greencastle. The also is the textbook for Chem 351 (Chemometrics), Chem 352 (Analytical Equilibrium) and Chem 353 (Instrumental Analysis). In addition, you will need a laboratory notebook for working in lab; if you wish, feel free to use one left over from another course.

**Grading:** The method development project accounts for 80% of your final grade. The remaining 20% of your final grade is evenly split between participation during class meetings and miscellaneous assignments.

Grades are assigned using the following scale:

A 100 to 93	B+ 89 to 87	C+ 79 to 77	D+ 69 to 67	F 59 and below
A- 92 to 90	B 86 to 83	C 76 to 73	D 66 to 63	
	B- 82 to 80	C- 72 to 70	D- 62 to 60	

These ranges are fixed with the following caveats: At the instructor's discretion, grades on a borderline may be moved up or down by a maximum of 1 point to account for intangible factors; thus, for example, a 79 (C+) may become an 80 (B-), or an 83 (B) may become a 82 (B-). Intangible factors that may affect your grade include, but are not limited to, a particularly strong or weak final exam, a steady improvement or decline in performance during the term or a particularly strong or weak contribution to the class.

This course is offered as a W-course. To achieve W-certification you must complete the method development project with a grade of C or better.

**Policy on Late Work.** Due dates are intended to keep you from falling behind in your work. In this course due dates are not absolute deadlines. However, *and this is a huge however*, once I have finished grading a set of assignments, any work that has not been turned in will receive a grade of 0 (zero) – no exceptions.

**Policy on Attendance.** Although I do not require attendance during class meetings, I encourage you to take advantage of class time as an opportunity to more fully engage yourself with the material. If you do need to miss class for legitimate reasons, or if you simply don't feel like coming, it is your responsibility to know and understand what was covered. Ask classmates, drop by my office or visit the course's web-site. We cannot take class time to review material for students who were unable to attend class.

**Office Hours:** I do not limit office hours to a few prescribed times scattered throughout the week. Instead, my office door is usually open and you are encouraged to stop by whenever you have free time. Particularly good times to find me are 8-10 MWF and all day T. If you are uncomfortable just dropping by, or wish to ensure that I will be available, feel free to schedule an appointment; my contact information is at the beginning of the syllabus. My home phone number is listed at the beginning of the syllabus should you need to reach me in the evenings (before 10 PM) or on the weekends.

**Academic Dishonesty:** Academic dishonesty serves no useful purpose. Although you are encouraged to work with other students, and at times are required to do so, any work that you submit as your own must represent your understanding of the assignment. Written materials containing the same sentences or similar paragraph structures do not meet this criterion. When problems are to be submitted independently, do not simply photocopy solutions or print multiple copies of computer-generated output; these items should be completed separately. Projects submitted as a group must include contributions from all group members and all group members must agree that the assignment is complete and acceptable. Affixing your **signature** to written work indicates that you have adhered to this policy.