

Professor: Richard Stolzberg NSCI 192

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Office Hours: Mon. 11 - 12 AM, Tues. 3 - 4 PM, Thurs. 4 - 5 PM, or by appointment

Teaching assistant: Jonathan Nigg email: fsjdn6@uaf.edu

Lecture time: MWF 1:00 - 2:00 PM, REIC 204

Lab time: F 2:15 - 5:15, REIC 245

#### Course Text and Reference Texts:

"Principles of Instrumental Analysis" 5th ed., D. A. Skoog, F. J. Holler, S. R. Crouch

"Lab Manual for Chem 312: Instrumental Analytical", Fall, 2009", R. J. Stolzberg (in preparation)

Catalog Description: Analytical theory, instrumentation, and methodology course focused on the analysis of inorganic and organic compounds present in various environmental matrices. Subjects include gas and liquid chromatography, atomic spectrophotometry, electrochemistry, and mass spectrometry. The lab component of the course will allow students an opportunity to directly apply lecture material in hands-on experiments using modern analytical instrumentation.

Prerequisites: CHEM F212. Co-requisites: CHEM F331. (3+3)

#### Course Outline

There are four major goals for Chem 312. They are to enable the student to:

- understand how chemical scientists use instruments to acquire *accurate* information about the identity and concentration of specific chemical species
- understand the underlying physical, chemical, and mathematical principles that underlie the ability to acquire the accurate information
- develop an understanding of *effective* experimental planning and execution
- develop skills in *critically evaluating* observations and data

#### Course Overview

If you understand the fundamental principles upon which modern measuring devices are based, then you will be able to use them effectively for solving chemical problems. The capabilities and limitations of an instrumental method must be considered. The focus of the course will be to study the principles controlling chromatographic and spectroscopic methods of quantitative chemical analysis. The roles of calibration and interpretation of instrumental output will be addressed. By the end of the course, you should be able to use theory as a guide to answer real-world chemical problems.

Class time will be a mix of lectures that clarify and expand upon text material and of group discussions of upcoming laboratory experiments. Participation of all students in class discussion and attendance at class are expected.

In general, homework assignments are due at 5 PM on Monday. Most will be end-of-chapter problems. Some will be due in two days so that results can be discussed during the next class hour. These will typically require using simulation software and spreadsheet analysis of

data. The computer laboratory in REIC 172 will have the needed software. Computer Lab information and policies are available at <http://www.uaf.edu/chem/NewNetwork.html>. “How To” viewlets are at <http://www.uaf.edu/chem/Viewlets/ChemLabHowTo.html>.

If you wish, you may work homework problems collectively with one or two other students in the class and pass in a single group paper. All members of the group will receive the same score. If you choose this option, I expect that all members of the group contribute a similar effort. You should have the same expectation of your group members.

Two take-home exams and a final will be given. Some questions will be concrete problems similar to those on the end of chapter problems. Some will require you to use theory to solve problems. Others will require reading articles or abstracts in a journal such as *Analytical Chemistry*. Some problems will require you to use the computer. All exam work is done individually. Your only sources of help will be your text, journal readings, lecture notes, computer output, and Prof. Stolzberg.

The laboratory portion of the course will allow each student to use a range of research grade instruments to characterize simple environmental samples and synthetic samples. They will have opportunity to learn the practical aspects the routine data acquisition and data manipulation functions of the instruments. They will also learn effective strategies of experimental design and data analysis. The relative merits of univariate and multivariate designs will be investigated. A lab report will be required for each laboratory experiment. Because this is not a writing intensive course, lab reports will focus on only “results and discussion”. Although some experiments may be performed with shared chemicals, all instrumental measurements, calculations, and written laboratory reports must be done individually, except when explicitly stated otherwise.

Students will plan their experiments before laboratory time, and they will outline the experimental approach in a laboratory notebook. Students must keep an up-to-date laboratory notebook.

Course grades will not include pluses and minuses. They will be assigned with this approximate scale:

|  |            |                            |
|--|------------|----------------------------|
| 2 Take Home Exams  | 200        | Letter Grades: A=595 (85%) |
| Final Exam   | 50         | B=525 (75%)                |
| Homework   | 150        | C=455 (65%)                |
| Laboratory preparation and execution, including notebook | 150        | D=385 (55%)                |
| <u>Laboratory Reports</u>                                | <u>150</u> |                            |
| Total Points   | 700        |                            |

Thus, if you get at least 595 points, you get an “A”. Prof. Stolzberg may elect to set the grade cutoffs lower, but he will not set them higher.

**Incomplete (I) grade:** A grade of “I” is assigned only when a student misses the final exam or multiple laboratory classes for a documentable reason, such as a medical problem, a death in the family, etc.

**Accommodations For Students With Disabilities:** Students with physical or learning

disabilities are required to identify themselves to Mary Matthews in the Disability Services office, 208 Whitaker, (474-5655). The student must provide documentation of the disability. Disability Services will then notify Prof. Stolzberg of special arrangements for taking tests, working homework assignments, and doing lab work.

**Important Dates:**

Last day to drop class and get 100% refund.....Friday, September 11  
Last day to drop class w 50% refund (course not on academic record) .....Friday, September 18  
Freshmen progress reports due.....Friday, October 9  
Last day for student- or instructor- withdrawal (“W” on academic record)....Friday, Oct. 30  
Last of lecture. .... Thursday, Dec. 10  
Final Exam.....1 -3 PM Wednesday, Dec. 16

The Chemistry "Department Policy on Cheating" is this: *"Any student caught cheating will be assigned a course grade of F. The student's academic advisor will be notified of this failing grade and the student will not be allowed to drop the course."*

As a UAF student, you are subject to UAF's Student Code of Conduct. (See <http://www.uaf.edu/catalog/current/academics/regs3.html> for details.) This is an excerpt.

*“Honesty is a primary responsibility of you and every other UAF student. The following are common guidelines regarding academic integrity:*

- 1. Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless the instructor of the course grants permission. Only those materials permitted by the instructor may be used to assist in quizzes and examinations.*
- 2. Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrases) in compositions, theses, and other reports.*
- 3. No work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors.*

*Alleged violations of the Code of Conduct will be reviewed in accordance with procedures specified in regents’ policy, university regulations and UAF rules and procedures. For additional information and details about the Student Code of Conduct, contact the dean of student affairs, visit the Board of Regents Home Page [www.alaska.edu/bor/](http://www.alaska.edu/bor/), or refer to the student handbook that is printed in the back of the class schedule for each semester. Students are encouraged to review the entire code.”*