

Fayetteville State University
College of Arts and Sciences
Department of Natural Sciences
CHEM 210-01 Analytical Chemistry
Spring Semester /Year 2009

I. Locator Information

Instructor: Shubo Han, Ph. D.
Course # and Name: CHEM210-01, Analytical Chemistry Office Location: Lyons 326

Semester Credit Hours: 5 Office hours: MWF 9:00 am-10:00 am

Day and Time Class Meets: Lecture MWF 10:00 am – 10:50 am
Lab TR 11:00 am – 01:50 pm 11:00 am-12:40 pm

Office Phone: 910-672-1303
Total Contact Hours for Class: 9
Email address: shan@uncfsu.edu

FSU Policy on Electronic Mail: Fayetteville State University provides to each student, free of charge, an electronic mail account (username@uncfsu.edu) that is easily accessible via the Internet. The university has established FSU email as the primary mode of correspondence between university officials and enrolled students. Inquiries and requests from students pertaining to academic records, grades, bills, financial aid, and other matters of a confidential nature must be submitted via FSU email. Inquiries or requests from personal email accounts are not assured a response. The university maintains open-use computer laboratories throughout the campus that can be used to access electronic mail.
Rules and regulations governing the use of FSU email may be found at <http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf>

II. Course Description: CHEM 210 (5-3-6) Analytical Chemistry. A one semester course that investigates the principles of quantitative analytical chemistry and how these principles are applied in chemistry and related disciplines. Lecture and laboratory concentrate on tools, experimental error, statistics, quality assurance, calibration methods, systematic treatment of equilibrium, acid-base titration, EDTA titration, redox titration, gravimetric analysis, introduction to electroanalytical and spectrometric methods, concepts of analytical separation and application of Excel in analytical chemistry. Prerequisites: CHEM 160 with a grade of "C" or higher.

III. Disabled Student Services: In accordance with Section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act (ACA) of 1990, if you have a disability or think you have a disability to please contact the Center for Personal Development in the Spaulding Building, Room 155 (1st Floor); 910-672-1203.

IV. Textbook: Daniel C. Harris, Quantitative Chemical Analysis, 7th ed, W. H. Freeman and Company. ISBN: 0-7167-7041-5.

V. Student Learning Outcomes

Upon completion of this course, students will be able to carry out the following tasks:

- a. Meeting specific competencies required by American Chemistry Society Accreditation Program.
- b. Evaluation of a chemical problem and the selection of appropriate analytical techniques to address it, keeping in mind the chemistry behind each method and the limitations associated with it.
- c. Carrying out the analytical methods in the laboratory, keeping in mind safety, the required precision, and the maximum use of laboratory time.

- d. Analysis of the raw data using spreadsheet technology, arriving at not only a numerical result, but also an estimate of the precision and the statistical confidence associated with any answers to questions associated with the result.
- e. Effective communication of the process behind solving the problem, including the theory behind the technique and any problems that were encountered.
- f. Quantitative transfer of a solid reagent, carrying out dilutions, drying or washing volumetric glassware with the solution being measured when necessary.
- g. Preparation of standard solution, buffers, indicators and samples.

VI. Course Requirements and Evaluation Criteria:

- a. *Grading Scale:* Final grades are calculated on a four-point system and affect a student's grade point average as indicated below.

Grade	Credit Hours	Quality Points	Meaning
A	Hours attempted and earned	4 per credit hour;	Exceptionally high
B	Hours attempted and earned	3 per credit hour	Good
C	Hours attempted and earned	2 per credit hour	Satisfactory
D	Hours attempted and earned	1 per credit hour	Marginally passing
F	Hours attempted – Not earned	0 per credit hour	Failing
FN	Hours attempted – Not earned	0 per credit hour	Failing due to non-attendance. (Student registered, but <u>never</u> attended.)
W	Hours attempted – Not earned	No impact on GPA	Class withdrawal prior to deadline (see Academic Calendar)
P	Hours attempted and earned	No impact on GPA	Satisfactory - Assigned only in classes specified as Pass/Fail
WU	Hours attempted – Not earned	No impact on GPA	Withdrawal from all classes for semester or term
AU	Hours attempted – Not earned	No impact on GPA	Auditing

- b. *Attendance Requirements* – Students are expected to attend all lecture and laboratory sessions, except in cases of illness and other unforeseen emergencies. Attendance will be taken promptly at the beginning of each session. Any student coming in after the roll has been called will have been marked absence. It is the student's responsibility to see that all tardies have been duly noted. Students will also be charged with a tardy for departure from the class before the specified end of class. The accumulation of three (3) tardies will result in the student being charged with one (1) absence. It is the student's responsibility to contact the instructor about the steps that must be taken for making up any and all missed work. It is recommended that contact with the instructor take place within twenty-four (24) hours of having missed class. The university policy concerning absences from class will be strictly enforced.

- INTERIM GRADE X = NO SHOW – Assigned to students who are on a class roster, but never attend class. For warning purposes only; NOT a final grade.

STUDENTS: Check interim grades early in the semester. If you have an X grade, either begin attending the class or withdraw from it. If you do not take action in response to an X grade, you will receive a final grade of FN.

- INTERIM GRADE EA = EXCESSIVE ABSENCES - Assigned to students whose class absences exceed 10% of the total contact hours. For warning purposes only, NOT a final grade.

STUDENTS: Check your interim grades often. If you have an “EA” grade for a class, you are in jeopardy of failure if you do not take immediate actions. Either resume attending the class or withdraw from it.

- **FN = FAILURE DUE TO NON-ATTENDANCE** – Assigned to students who are on class roster, but never attend the class. An FN grades is equivalent to an F grade in the calculation of the GPA.

STUDENTS: You must attend (or withdraw from) all the classes for which you are enrolled.

c. *Graded Assignments and Value of Each Assignment*

The progress of each student will be evaluated by means of three one-hour examinations given during the semester, laboratory reports, homework in each chapter, quizzes, and a final examination.

Grade distribution	Points	Percentage represented in the Final Grade
Three one-hour exams	100 × 3	25%
Laboratory reports and quizzes	10 each	25%
Homework	10 each	25%
Final examination	100	25%
Total		100%

d. *Policy on Missed or Late Assignments*

You are expected to take all examinations at the scheduled times. No student will be allowed to take an exam before or following the scheduled exam time. Should an illness, family emergency, official university-sanctioned event or other unavoidable problem necessitate your missing a scheduled exam, you may take a make-up exam provided that (1) the instructor is notified prior to the exam, and (2) you show verifiable evidence for the condition/situation/event that resulted in your missing the regularly scheduled exam. The latter may be in the form of a note from a doctor or the university’s student health clinic in the event of serious illness, a note from another Fayetteville State faculty or the athletic department indicating your involvement in an official university-sanctioned event, a bulletin from a funeral service, a note from an employer, etc. In all cases, contact information, i.e., a phone number, must be included. The make-up exam will be administered at a time agreed upon by both the student and the instructor. Note that makeup exams may be longer, more difficult, and have a different format than the exam given to the class as a whole.

Late submissions of homework and lab reports are penalized 30% of whole points. Missed submissions of homework and lab reports are received 0 points for that assignment.

e. *Other* – To accommodate emergent circumstances, the professor reserves the right to make reasonable changes in the syllabus while the course is in progress. Any understandings between a student and the professor including, but not limited to, changes, expectations, or modifications to course requirements or procedures must be in writing and must be signed by both parties. Any question of interpretation of course requirements or of understandings between a student and the professor will be at the discretion of the professor.

FSU Policy on Disruptive Behavior in the Classroom

The *Code of the University of North Carolina* (of which FSU is a constituent institution) and the *FSU Code of Student Conduct* affirm that all students have the right to receive instruction without interference from other students who disrupt classes.

FSU Core Curriculum Learning Outcome under Ethics and Civic Engagement (6.03): All students will “prepare themselves for responsible citizenship by fulfilling roles and responsibilities associated with membership in various organizations.” Each classroom is a mini-community. Students learn and demonstrate responsible citizenship by abiding by the rules of classroom behavior and respecting the rights all members of the class.

The FSU Policy on Disruptive Behavior (see FSU website for complete policy) identifies the following behaviors as disruptive:

1. Failure to respect the rights of other students to express their viewpoints by behaviors such as repeatedly

- interrupting others while they speak, using profanity and/or disrespectful names or labels for others, ridiculing others for their viewpoints, and other similar behaviors;
- Excessive talking to other students while the faculty member or other students are presenting information or expressing their viewpoints.
 - Use of cell phones and other electronic devices
 - Overt inattentiveness (sleeping, reading newspapers)
 - Eating in class (except as permitted by the faculty member)
 - Threats or statements that jeopardize the safety of the student and others
 - Failure to follow reasonable requests of faculty members
 - Entering class late or leaving class early on regular basis
 - Others as specified by the instructor.

The instructor may take the following actions in response to disruptive behavior. Students should recognize that refusing to comply with reasonable requests from the faculty member is another incidence of disruptive behavior.

- Direct student to cease disruptive behavior.
- Direct student to change seating locations.
- Require student to have individual conference with faculty member. At his meeting the faculty member will explain the consequences of continued disruptive behavior.
- Dismiss class for the remainder of the period. (Must be reported to department chair.)
- Lower the student's final exam by a maximum of one-letter grade.
- File a complaint with the Dean of Students for more severe disciplinary action.

Students who believe the faculty member has unfairly applied the policy to them may make an appeal with the faculty member's department chair.

VII. Academic Support Resources

Blackboard: <http://blackboard.uncfsu.edu/>

Smarthinking Student Site: <http://www.smarthinking.com/>

American Chemical Society Site: <http://www.chemistry.org/portal/a/c/s/1/educatorsandstudents.html>

VIII. Course Outline and Assignment Schedule

<i>Week</i>	<i>Chapters</i>	<i>Lectures</i>	<i>Labs</i>
Jan. 8	0	The Analytical Process	No labs.
Jan. 12	1	Measurements	Check in/ safety in the laboratory.
Jan.19	2-3	Tools, Errors	A1. Analytical Balance; A2. Quantitative Transfer; A3. Delivering an Aliquot; A4. Reading Buret.
Jan. 19	3-5	Statistics, Quality Assurance	B-1 and 2: The Gravimetric Determination of Chloride in Soluble Samples.
Jan. 26	6	Chemical Equilibrium,	C-1 Preparation of Dilute Hydrochloric Acid Solutions; C-2 Preparation of Carbonate-Free Sodium Hydroxide.
Feb.2	7	Exam1, Titration	C-3 The Determination of the Acid/Base Ratio; C-4 Standardization of Hydrochloric Acid against Sodium Carbonate; C-5 Determining the acid Content of Vinegar; C-6 Determining the Sodium Carbonate in an impure sample.
Feb.9	8	Activity and Systematic Treatment of Equilibrium	D. The Determination of Chloride by Titration with an Adsorption Indicator; E: Complex-Formation Titration: Determination of Hardness of Water.
Feb.16	9-10	Acid-Base Equilibria	Problem-Solving Session
Feb.23	11	Acid-Base Titrations,	G. Iodometric Titrations: How Much Copper is there

			in a Penny?
Mar. 2	9-11 Midterm Exam	Neutralization Titrations	H. Nutritional Chemistry: Vitamin C Determination by Titration
Mar.9	Midterm Break	Midterm Break	
Mar.16	12	EDTA Titration	Problem-Solving Session
Mar.23	14	Electrochemistry	N. Determination of iron in a Natural Water
Mar.30	15	Electrodes	Problem-Solving Session
April 6	16	Redox Titrations, Exam 3	Presentations
April 13	18	Spectrophotometry	Presentations
April 20	19	Application of Spectrophotometry	Check-out
April 27	23	Chromatography	
May 8	Final Exam	10:00 am-11:50 am	

IX. Teaching Strategies

A variety of formats will be used in this class. Typically, the class will begin with answering your questions about the homework or a ten-minute quiz, then new material in a lecture format and then in-class exercises, with discussion in an interactive format.

- a. **Hour exams** are in the short-essay format. Questions may consist of either a numerical problem to work out or a concept to explain in a few sentences. To receive full credit for numerical problems, make sure your thought process is written out clearly.
- b. **Laboratory reports.** This is to have a title, author(s), abstract, introduction, experimental, results and discussion, and reference(s). **Laboratory report** has to be typed. Further details will be given.
- c. You will be trained in the use of Microsoft Excel and will be expected to use it for calculations.

X. Bibliography

Gary D. Christian, *Analytical Chemistry, 6th ed.*, John Wiley & Sons, Inc. ISBN 0-471-45162-2.

Skoog et al. *Fundamentals of Analytical Chemistry, 8th ed.* Thomson Learning, Brooks/Cole, ISBN 0-03-035523-0