Syllabus for

CH315 Quantitative Analysis

4.0 Credit Hours

Spring 2009

Instructor: Dr. Ghada Rabah
317 Dabney / 246 Fox  Tel: 515-4207
garabah@ncsu.edu (Email is my preferred tool of communication. When you choose to communicate with me via email, please include "CH315" in the subject line of your email.)

Important URLs: The course website is http://moodlepilot.ncsu.edu/. You are responsible for regularly checking class announcements and course material on the class website.
All graded homework assignments will be posted on WebAssign.
http://www.webassign.net/ncsu/

Location: Lecture - Dab 124 for section 001 and online posting for section 601
Lab - Dab 316 for all sections

Office Hours: TTh 11:00am-12:00pm (Fox 246) or by appointment.

Texts: Daniel C. Harris, Quantitative Chemical Analysis, Seventh Edition; W. H. Freeman & Company, New York (2006) (Fifth or Sixth Editions are ok)
Quantitative Analysis Laboratory Experiments-CH 315 (at NCSU Bookstore)
Go to the NC State Bookstores’ website (http://www7.acs.ncsu.edu/ncsubookstores/) for information concerning the cost of textbooks.
Webassign access is required and can be purchased online at http://webassign.ncsu.edu.

Other Course Materials: Print Quota is required for the lab. For print quota purchasing information go to http://www.ncsu.edu/cc/essentials/managing_files/printing/lpquota.html

COURSE DESCRIPTION:
Fundamental principles and modern techniques of chemical analyses: spectrochemical, electrochemical, volumetric and chromatographic methods of analysis, modern chemical instrumentation, and interpretation of data. Credit is not allowed for both CH 211 and CH 315.
Pre-requisite CH201.

COURSE OVERVIEW:

CH315 is an Analytical Chemistry course with an integrated laboratory component. Its main purpose is to introduce you to the basic skills and methods associated with chemical analysis. The lecture part of the course begins with a review of quantitative problem-solving skills introduced in CH201 presented within the context of chemical analysis problems. Different sources of error, how error propagates, and the statistical and calibration methods that aim to evaluate and minimize error are then explored. Common chemical and instrumental methods used in analytical chemistry are also introduced.
Through analysis of everyday products, the laboratory part of the course will allow you to practice correct usage of analytical tools and safe laboratory practices and will give you the
opportunity to gain hands on experience in the chemical and instrumental analytical techniques introduced in lecture and in proper data reporting. All CH315 assignments, and especially the laboratory assignments, will rely heavily on excel tools to solve and report quantitative analytical problems. The required spreadsheet skills will be introduced during the lab briefings and will be practiced in lab.

A tentative schedule for the semester is posted on the class website. While exam dates are firm, topics may be shortened or lengthened to provide adequate understanding.

STUDENT LEARNING OUTCOMES FOR THIS COURSE:

Student should be able to:
1. Solve stoichiometric and solution calculations problems.
2. Perform error analysis using the rule of propagation of error.
3. Analyze an unknown quantitatively, using appropriate laboratory equipment and instrumentation.
4. Evaluate and present data using statistical analysis.
5. Analyze chemical samples using the principles of volumetric analysis.
6. Define components and underlying principles of operation of modern instrumentation of potentiometry, molecular and atomic spectroscopy and chromatographic separation.
7. Describe and perform appropriate calibration methods.
8. Operate at a level of good laboratory practice
9. Master the use of Excel spreadsheet

POLICIES AND PROCEDURES:

1. Course Withdrawal Deadline:
   Friday October 16 is the last day to withdraw or drop the course without a grade.

2. Attendance:
   There are 2 sections of CH315. Lecture attendance in person is expected for students in sections 001 in Dab 124 at 10:15AM MWF. Students enrolled in section 601 are expected to go over the lecture notes after the live lecture and before the next class period and submit lecture quizzes and homework assignments by the specified due dates. Lectures may cover more or less material on any given topic than the corresponding textbook chapter as deemed necessary. Lab briefing will be done in lecture, generally, on the Friday preceding the related lab experiment.
   Lab attendance is required. Missing more than two lab sessions will lead to a grade of incomplete (IN) for the course if the absence is due to a university valid excuse (http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.3.php), otherwise, a grade of Fail (F) will be assigned. If you have a university valid excuse, you must come and see me prior to the date of the lab that you will miss or immediately upon your return (if it was an unforeseen absence), if you want to arrange to make-up the missed lab, otherwise a grade of zero will be assessed to the corresponding lab assignment. I usually will arrange for the lab to be made up during another lab section on the same week.

3. Examinations and Grading:
   a. Exams: Three examinations will be given during the semester on the dates listed in the course schedule. There will be no make up exams during the semester. If an exam is missed, the final exam score will replace the missed exam score. Only one exam grade can be replaced. Students in section 601, please arrange to take
all hour exams and the final exam in person with the regular section. If doing so is not possible, please make arrangements with me as soon as possible.

b. **Final:** A fourth, cumulative final examination will be given on the date listed in the course schedule. The final exam will automatically replace the lower test score if the final exam score is higher. Only one grade can be replaced, however.

c. **Homework:** Homework will be assigned via WebAssign (http://webassign.ncsu.edu). Generally, a homework assignment will be posted after every lecture. You are responsible for regularly checking for posted assignments and their due dates. Homework assignments are typically due at midnight (11:59 pm) within 4 days from posting. The due date for every assignment is specified within WebAssign. WebAssign access is required for labs. Lecture assignments will be made in the lab, which means that you need only one access card. Extensions may be requested, but must be requested through WebAssign, using the link at the bottom of each past due assignment. Extensions will be granted up to the night before the date of the test that covers the material on the assignment (11:59pm). A penalty of 50% of the unearned credit will be assessed. Recommended Harris end of chapter exercises will be listed in the lecture notes for most covered chapter. These will not be graded assignments but are meant to be a study aid. The solutions to the end of chapter exercises will be posted to the class website.

d. **Clickers:** For the live lecture section, clickers will be used as a learning tool in class. The clickers will be provided to you in Dabney 124 so you do not need to purchase any equipment. Please remember to return the clicker to its designated location at the end of every lecture because this is shared equipment with other courses in Dabney124. Also, please use the same clicker during every class unless your clicker is missing. I will keep track of clicker participation. If your clicker does not work for some reason, please see me at the end of class. Also, I will post clicker grade on WebAssign after every lecture, if you were in class and your login id doesn’t post please see me before the next class. Clicker participation will be used to give bonus points added to the final exam grade (1/150). The way the bonus points will be handled will be explained in class/posted to the class website. The final exam grade will be compared to the three exam grades prior to adding the bonus points for the purpose of dropping the lowest exam grade. The online students will have similar quiz opportunities to earn bonus points too: quizzes will be posted to the class website and will be visible to the group of students enrolled in the online class.

e. **Laboratory:** The laboratory is a required part of CH315 for all sections and counts 25% of the final grade. Lab Safety rules and regulations are detailed on the class website and in the introductory pages of the lab manual. If you are claiming credit for the lab, please see me immediately. Labs will have a prelab part related to the week's experiment as well as a results part. All of the lab work will be submitted through WebAssign. You will be able to login to the computers in Dabney 315 and start entering and processing your data at the end of every lab. Whenever you are using a public computer, remember to logout of WebAssign or quit the browser application to protect your answers after completing an assignment. Check with your instructor if you encounter any questions on the
assignment that has not been covered in class. The due dates and times for laboratory assignments are synchronized with the lab schedule and, therefore, late lab assignments are handled differently from late lecture assignments. You are required to stay the full lab period or until you have full credit for all assignments due at the end of lab. Extension must be requested in person at the end of lab. It will be lab period four before prelab assignments will really be due before lab; therefore the extension rules and penalties change beginning with lab period four. Extension rules and penalties are detailed on the class website (Laboratory link) and in the introductory pages of the lab manual. Most problem sets and all laboratories require using a spreadsheet. Using a spreadsheet to formulate equations, to graph data and to perform linear regression is required. As soon as possible, try logging into one of the workstations in either DAB 315 or DAB 120. Check that you can access both Excel and a browser. Also see if you can save files from Excel to your Unity file space. If you have trouble with the log in, click on the advanced link in the login window and type the 2nd letter of your unity id, period (.), first letter, period, remainder of your unity id. For example, if you unity id were jddoe for John D. Doe, then type d.j.doe and proceed with the log in. If you still have trouble with any of these operations, send email to help@ncsu.edu or call 515-2517 and describe the problem.

f. Grade distribution:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>15%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>15%</td>
</tr>
<tr>
<td>Exam 3</td>
<td>15%</td>
</tr>
<tr>
<td>Homework/Webassign</td>
<td>15%</td>
</tr>
<tr>
<td>Final</td>
<td>15%</td>
</tr>
<tr>
<td>Lab</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

g. Grade Calculation:

\[
T_i = \text{test scores} \quad L = \min(T_1, T_2, T_3) \quad B = \text{Lab average} \\
F = \text{final exam score} \quad M = \max(F, L) \\
H = \text{homework average} \\
\text{Course average} = 0.15 \times (T_1 + T_2 + T_3 + F - L + M) + 0.15 \times H + 0.25 \times B
\]

Grades will then be assigned with the following approximate cutoffs.

- A+ ~ 99
- B+ ~ 87
- C+ ~ 77
- D+ ~ 67
- A ~ 93
- B ~ 83
- C ~ 73
- D ~ 63
- A– ~ 90
- B– ~ 80
- C– ~ 70
- D– ~ 60

Credit only: Each student electing the course for credit-only should meet with his or her advisor to find out which S/U courses may count toward graduation. In order to receive a grade of S, students are required to take all exams and quizzes, complete all assignments, and earn a grade of C or better.

Incomplete: The burden of fulfilling an incomplete grade is the responsibility of the student. Please check the university policy on incomplete grades at http://www.ncsu.edu/policies/academic_affairs/grades_undergrad/REG02.50.3.php
I do not give points at the end of the semester to give a student a desired grade. If you want a certain grade, make sure you acquire the requisite points. I will not respond to emails or phone calls made by students or parents at the end of the semester asking me to give the student more points, to give opportunity for more extra credit, to change a grade to an IN (incomplete), or to allow a student to drop the course. Nor will I honor those requests. There is a deadline for dropping the course. If you do not perform well on the first exam, you should seriously consider dropping this course and taking it later.

4. University Disability Policy:
Reasonable accommodations will be made for students with verifiable disabilities. Students are required to first register with Disability Services Office (http://www.ncsu.edu/dso/) and to then contact the instructor to discuss options for accommodation. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.1.php.

5. University Anti-discrimination policy:
NC State University provides equality of opportunity in education and employment for all students and employees. NC State’s policies and regulations covering discrimination, harassment, and retaliation may be accessed at http://www.ncsu.edu/policies/campus_environ or http://www.ncsu.edu/equal_op.

6. University Code of Student Conduct:
There is zero tolerance for cheating in this class. You are expected to be familiar with the NCSU code of student conduct which can be found at http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php and you are required to uphold academic honesty in all aspects of this course (lab & lecture). I too will uphold the NCSU code of conduct and will impose the appropriate grade penalty and file a report of academic integrity violation for all cases of academic dishonesty. A student's name on any test or assignment indicates the student’s pledge to have neither given nor received unauthorized aid on the submission.
Where relevant to the course, students may be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-posting. Examples include online discussions of class topics, and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.