

## CHE 3213 (SECTIONS 001, 002, 003, AND 004H) – GENERAL ANALYTICAL CHEMISTRY

Fall 2010

**INSTRUCTOR:** Dr. Carlos D. Garcia  
**OFFICE:** BSE 1.104B  
**CONTACT:** WebCT e-mail (Instructor will not take/return phone calls)  
**TEXTBOOK:** *Quantitative Chemical Analysis*, 8<sup>th</sup> Ed.  
Daniel C. Harris  
ISBN: 1-4292-1815-0

### MEETING TIMES

Lecture	All sections	SB 2.02.02	MON & WED	01:00 PM – 1:50 PM
Laboratory	Section 001	BSE 0.304	TUE	02:00 PM – 6:00 PM
	Section 002	BSE 0.304	TUE	06:30 PM – 10:30 PM
	Section 003	BSE 0.304	WED	08:00 AM – 12:00 noon
	Section 004	BSE 0.304	THU	08:00 AM – 12:00 noon

*Students arriving 5 min late (or more) will not be allowed to participate in the laboratory (pogil, problem solving, and/or experiment) and will be given the option to take a make-up, if space is available (see make-up policy).*

Office hours	Gisela	BSE 4.204	MON	10:00 AM – 12:00 noon
	Sarah	BSE 4.310	TUE	10:00 AM – 12:00 noon
	CDG	BSE 1.104L	WED	09:00 AM – 10:00 AM
	Gabby (POGIL)	BSE 4.204	FRI	09:00 AM – 10:00 AM

### PRE-REQUIREMENTS FOR THE COURSE:

This course uses intensively all the concepts studied in Basic Chemistry, General Chemistry and Mathematics. **Be aware that only some of those concepts will be reviewed in class and will be specifically evaluated.** If your background is weak or inadequate for the present course, the revision of these topics is highly encouraged.

### OBJECTIVES OF THE COURSE

This course will cover topics in quantitative wet chemical and basic instrumental analysis. The determinations will be combined with an extensive error analysis. The immediate goals of the present course are:

- To apply stoichiometry and equilibrium in order to design efficient analytical protocols
- Perform a critical comparison of different analytical techniques
- Develop the ability to design an analysis of a real sample.

### NATURE OF THE COURSE CONTENT

Analytical Chemistry is the science of identifying and measuring chemical species. As such, analytical chemistry is a key ingredient of environmental, medicinal, biological, and forensic chemistry. In this course we will learn how to use differential chemical properties for determining amounts of chemicals in various samples and why so many fields rely on chemical analysis. The course also requires the intensive use of mathematics (algebra).

### REQUIRED MATERIALS

- **Lab notebook** In the interest of conserving available resources, students may use a regular class-type notebook. However, it must be a separate notebook, not just a section of a course notebook. The pages must be pre-numerated in duplicate, and the student will have to provide the carbon paper. The notebook must be approved by the instructor before use.
- **Proper lab attire.** Long, loose fitting pants, shoes which cover feet, tie-back for long hair.
- **Safety goggles and lab coat** must be used at all times. No excuse will be considered for unsafe lab practices.

### WEBCT CONTENT

- Be sure to **check your browser in advance** and make the proper arrangements to be able to access all the posted material. If you need help, you can also contact the WebCT office (SB 4.03.04 / 458-7376).
- When available, the lecture outlines will be posted on WebCT. These presentations are posted only as a guideline to study and are not intended to replace the book nor the lecture.
- A pre-requisite questionnaire will be posted on WebCT for each of the labs and must be passed (>60% correct answers) in advance in order to attend the lab. Students who do not pass the quiz are encouraged to assist to the seminar portion of the laboratories (see schedule).
- WebCT will be considered the official way to distribute important information (extra problems, notifications, grades, changes, messages, test keys, etc). **All the information posted in WebCT will be considered officially**

**distributed. Be aware of this policy and check the page periodically.** The WebCT e-mail will also be the preferred way to communicate with the instructors.

#### COURSE ORGANIZATION

The course is divided in three parts:

- **Lectures.** This part will cover selected chapters from the main book, examples, and exam-type exercises. Lectures will also explain the chemistry used in the laboratory part of the course. Although attendance will be not monitored, participation is highly recommended. Attendance will be required for each of the partial tests.
- **Seminars / POGIL activities.** This part will include group work (see POGIL activities) and/or cover selected examples and exam-type exercises. The purpose is to develop problem-solving skills as well as critical thinking abilities. Attendance is mandatory (see make-up policy).
- **Laboratory experiments.** This part will cover selected practical applications. Attendance is mandatory (see make-up policy). All laboratory data must be recorded in the lab notebook. After the experimental work is completed, the glassware in the locker must be washed, and the laboratory station cleaned.

**A pre-lab questionnaire will be given on-line before each lab; and must be passed ( $\geq 60\%$  correct answers) in order to be able to perform the experimental section. Th**

This questionnaire will involve procedures, calculations, and the chemical basis of the techniques to be used in the corresponding lab. **If you have any questions or concerns regarding this policy, you can contact Dr. Lawrence Williams (Associate Vice President for Academic Support and Dean of Undergraduate Studies) at 458-5191.**

A **1-page** report for each laboratory will be required. Reports should be prepared using word processing software and should contain the following sections: A) Introduction and Relevant Reactions, B) Materials and Methods, C) Results and Calculations, and D) Conclusions. Grading will be based in a 0-100 points scale. A 10-point deduction will be performed for each late day of the assignment (e.g. 5 days late = 50 points deduction). **Only individual reports will be accepted.**

#### MAKE-UP POLICY

In case of an extraordinary reason that prevents you from attending to the corresponding seminar/lab, you have the opportunity to request permission for attending any of the other sections (only). These requests should be performed in advance and are limited to the maximum number of students per lab. Since a different lab is set-up every week, it is not possible to accommodate further requests for make-up labs.

#### COURSE GRADING

- The final grade will be determined exclusively by your performance in the pre-lab quizzes, POGIL activities, lab reports, and written examinations. The final grade will be calculated as follows:

<i>Average of best 10 pre-lab quizzes</i>	<i>5%</i>	<i>Up to 5 points</i>
<i>Average of best 10 lab reports</i>	<i>25%</i>	<i>Up to 25 points</i>
<i>Average of POGIL activities</i>	<i>10%</i>	<i>Up to 10 points</i>
<i>Average of 3 partial tests</i>	<i>30%</i>	<i>Up to 30 points</i>
<i>Final exam (ACS)</i>	<i>30%</i>	<i>Up to 30 points</i>
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<i>Final grade</i>		<i>Up to 100 points</i>

- Students are responsible for dropping the course if they choose to do so. Specific deadlines are available in the UTSA calendar ([URL](#))

#### GRADING SCALE

The final grade will be translated according to the following scale:

88 – 100	→	A
75 – 87	→	B
63 – 74	→	C
53 – 62	→	D
52 or less	→	F

There will be no “curving” or extra-work for extra-credit.

#### OTHER IMPORTANT POLICIES OF THE COURSE

- Calculators cannot be shared during exams (even if a student has turned in his/her exam); each student must provide its own. **Only non-programmable calculators are allowed during exams.**

- The use of electronic devices (except for your calculator) during exams is strictly prohibited. That includes (but is not limited to) cell phones (not even the calculator on it!), laptops, iPods/CD players, iPhone's/PDA's, Blackberry, etc. Cell phones must be switched off during exams. No headphones can be worn during exams.
- No bathroom breaks are allowed during term exams or the final exam.
- Students will be required to present their UTSA ID when turning in their exams.
- Partial exams are not discussed during the lecture period nor returned to students. Students have **one week** from the date the Scantron 882 is returned to submit questions about their grade or to request corrections.
- Students in this course are expected to abide by the UTSA Student Code of Conduct ([URL](#)). Please keep in mind regulations related to plagiarism when working in groups.
- In case of possible plagiarism, material will be submitted directly to the UTSA Office of Student Judicial Affairs ([URL](#))
- The instructor reserves the right to modify the syllabus, if necessary, during the course of the semester. All the changes will be announced in WebCT.
- UTSA does not discriminate on the basis of disability and special assistance is provided to students with disabilities through disability services. Any students eligible for and needing academic adjustments or accommodations because of a disability are requested to contact the Disability Services Office as soon as possible.
- **E-mail etiquette:** Students are highly encouraged you to use proper manners when communicating with the instructors and/or the professor. Although this is not a topic of the course, it will help you to succeed in your career. Examples of such manners are listed here:
  - [http://nefe.danielsfund.org/manners/section\\_two/ct-telephone.html](http://nefe.danielsfund.org/manners/section_two/ct-telephone.html)
  - [http://www.ehow.com/how\\_4473974\\_communicate-professor.html](http://www.ehow.com/how_4473974_communicate-professor.html)
  - <http://www.lifehack.org/articles/lifehack/how-to-talk-to-a-professor.html>

#### **CONFLICT RESOLUTION**

If a conflict occurs during the course, students are **highly encouraged** to pursue the following procedure (all communications are considered confidential):

- a) Discuss your problem with the TA, preferably by e-mail so there is documented evidence of your complain/issue. In all cases, students are encouraged to provide pertinent documentation that may help understanding the nature of the claim.
- b) If the conflict persists, students should contact Dr. Garcia using the WebCT e-mail. Alternatively, you can use the UTSA e-mail address ([carlos.garcia@utsa.edu](mailto:carlos.garcia@utsa.edu)).
- c) If the conflict persists, students should contact the Undergraduate Advisor of Record (Dr. Martinez-Rivera) at [Lydia.MartinezRivera@utsa.edu](mailto:Lydia.MartinezRivera@utsa.edu).
- d) If the conflict persists, students have the option to contact the Department Chair (Dr. Gorski, [waldemar.gorski@utsa.edu](mailto:waldemar.gorski@utsa.edu)). If the conflict persists, Dr. Gorski will direct you to the following step.

#### **PROCESS ORIENTED GUIDED INQUIRY LEARNING (POGIL)**

This course has been selected to participate in a project to develop a set of Process Oriented Guided Inquiry Learning (POGIL) materials that will impart widely accepted analytical chemistry principles while engaging students as active learners, facilitating their development in the process skills that are key to analytical chemists in particular and valuable to scientists in general. As part of this project, students will not be asked to do anything beyond ordinary educational practices, namely, take the ChemX survey, complete a self-assessment of learning gains survey, answer achievement questions on course exams, take an end of the semester ACS exam, and participate in classroom activities including the use of POGIL worksheets. All collected data will be coded before being sent to the Primary Investigator of this educational study, so your information will remain confidential. If you do not wish to have your data included in the study, you should notify the instructor, in writing as soon as possible. If you do not wish to participate in the research project, you will still experience the POGIL approach and complete the various assessments as part of the course requirements, however, your scores will not be included in the aggregate score nor will you be asked to be interviewed.

Date	Lecture Time (50 minutes)	Laboratory Time	
		Seminar / POGIL (90 minutes)	Lab (150 minutes)
WED 08/25	Welcome / Syllabus / Review	No labs scheduled this week	
Week starting 08/30	General Chemistry Review	Check in – Safety POGIL: Survey / Accuracy, Precision, and Tolerance	
Week starting 09/06	Acid – base titrations	POGIL: Statistics	Lab #01 – Statistics
Week starting 09/13	Acid – base titrations	POGIL: Classical methods, titrations	Lab #02 – Strong acid / bases
Week starting 09/20	Precipitation titrations Complexation titrations	POGIL: pH, Strong acids and bases	Lab #03 – Weak acid / bases
Week starting 09/27	Complexation titrations <b>Partial Test #1</b>	POGIL: ChemX Survey	Lab #04 – Complexation
Week starting 10/04	Redox titrations	Problem solving activity	Lab #05 – Redox Titration
Week starting 10/11	Potentiometry	Problem solving activity	Lab #06 – Potentiometric Titration
Week starting 10/18	Electrochemical methods of analysis	Problem solving activity	Lab #07 – Electrogravimetric Analysis
Week starting 10/25	UV Spectroscopy <b>Partial Test #2</b>	POGIL Beer's Law (CM)	Lab #08 – UV-Spectrophotometry
Week starting 11/01	UV Spectroscopy	Problem solving activity	Lab #09 – Spectrophotometry with Standard Addition
Week starting 11/08	Chromatography	POGIL Quality Control (CM)	Lab #10 – Cyclic Voltammetry
Week starting 11/15	Capillary Electrophoresis and Biosensors	Problem solving activity	Lab #11 – Capillary Electrophoresis
Week starting 11/22	Extraction procedures	Discussion for final lab (attendance non mandatory, Thanksgiving break)	
Week starting 11/29	<b>Partial Test #3</b> Bibliography search	Lab #12 – Real sample analysis	
Week starting 12/06	Study days		
WED 12/08	Final exam (01:30 pm - 04:00 pm)		

