Quantitative Analysis

CHEM. 3417.001 (4 sem hrs including lab.)

Time and room:
3417.001 TR 12H30-13H45 CI 108
3417.101 T 14H00 - 16H55 CI 108
3417.102 R 14H00 – 16H55 CI 108

Prerequisite: CHEM 1312, SMTE0091

SYLLABUS

Instructor Information: Dr. Yves Coeckelenbergh
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Office Hours: TR 08H30 - 09H30, 17H00 - 18H00

Course Description:

The course addresses the quantitative aspects of chemical analysis.

As the follow-up to General Chemistry II it assumes a good knowledge of the basic tools of chemistry such as measurement, unit management, mathematics and stoichiometry. Students must be familiar with the properties and structures of atoms and molecules including electron configuration, periodicity and bonding. A good understanding of acid-base chemistry, kinetics and electrochemistry is also required. The concept of energy applied to reactivity must be understood qualitatively and quantitatively.

The course applies a rigorous, quantitative approach to chemistry and emphasizes rational thinking and analysis rather than memory and number crunching. The lectures, assignments, problems and examinations will stress both concepts and context.

The core of the course will be the study of measurements, interpretation of results with the help of statistics, and specific applications in the fields of chemical equilibrium, acid-base chemistry and electrochemistry.
Students Learning Outcome (SLO)

- Understand the analytical process and the different steps
- Understand measuring, units and chemical stoichiometry
- Understand and calculate errors and uncertainties
- Master the fundamentals of statistics for analytical chemistry
- Apply thermodynamic equilibrium to the study of solutions
- Understand acid-base equilibrium involving monoprotic and polyprotic acids
- Understand buffer chemistry
- Solve titration problems.

Laboratory and Review Sessions:

Students are divided in two laboratory groups: CHEM 3417.101 (T 14H00 to 16H55 in CI 208) and CHEM 3417.102 (R 14H00 to 16H55 in CI 208). The laboratory classes are problem solving sessions. There might be some experimental labs. There will be a graded quiz at the end of each lab session.

Graded Activities:

There will be 1 midterm exam and one final exam. Missed exams without a valid excuse will be graded zero. All excuses must be requested in advance with the obvious exception of emergencies.

Final grade will be calculated as follows:

Midterm exam: 100 points
Final exam: 150 points
Laboratory/problem solving: 150 points

The final exam will be comprehensive.

Final letter grading for the course will be as follows:
A> 90%, B>80%, C>70%, D>60 %, F < 60%.

Students must be seated no later than 5 min before the start of the exam. There should be as much distance between each student as the classroom configuration allows. The desk must be empty with the exception of a pencil and a calculator.

Students are not allowed after the start of the exam without the permission of the instructor. In any case no student will be admitted after the first exam-taker has left.

All material including intermediate calculation will be given to the instructor at the end of the exam. A picture ID is required. The use of other electronic device than a calculator limited to mathematical operations will be forbidden and considered cheating.
There are no make-up exams. All excuses must be requested in advance with the obvious exception of emergencies. Students with a university approved scheduled absence (athletics, military duty, etc.) should contact the instructor well in advance of the scheduled absence to request an exception. Exams may be taken early in those specific cases. Students who do not arrange to take exams ahead of time will not be eligible for this special consideration. A written excuse from the university department involved or the Office of the Dean of Students may be requested.

Policies and guidelines:

This is a classroom course. Technology, web assisted learning, textbooks are useful complement but cannot replace attendance to the lecture. Attendance is therefore mandatory.

The course is built in a coherent manner and missing lectures will create knowledge gaps making further learning extremely difficult. If a class is missed, it is the responsibility of the student to obtain all needed information from a classmate. Missed information includes not only lecture notes and handouts, but also any possible information regarding homework, syllabus changes, exam dates, etc. …

Students must be seated in the classroom before the start of the lecture and sit in the front rows. Students entering the classroom after the start of the lecture or leaving before the end will be required to enter their name on the class logbook. There will be neither eating nor chatting. Use of communication devices such as cell-phones and computers is not allowed.

Students must attend the lecture and take notes. Each PowerPoint presentation will be posted on WebCT and does not need to be copied in class. After each lecture the notes should be reviewed and the assignments completed. Reading the relevant chapter in the textbook is a plus.

Notice to Students with Disabilities:

Texas A&M University-Corpus Christi complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. If you suspect that you may have a disability (physical impairment, learning disability, psychiatric disability, etc.), please contact the Services for Students with Disabilities Office, located in Driftwood 101, at 825-5816. If you need disability accommodations in this class, please see me as soon as possible.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance.
Academic Advising:

The College of Science and Technology requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. The College's Academic Advising Center is located in Faculty Center 178, and can be reached at 825-6094.

Grade Appeal Process:

As stated in University Rule 13.02.99.C2, Student Grade Appeals, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules Web site at http://www.tamucc.edu/provost/university_rules/index.html. For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.

Blackboard, Textbook, and supplies:

The Blackboard course shell contains the course syllabus, handouts to read, PowerPoint slides presented in the lecture, useful links, practice exercises, exercise corrections, grades, a mail service and other useful information. Its consultation is mandatory.

The textbook is Quantitative Chemical Analysis, Harris. The latest edition is recommended. However students can use a previous edition for economy purpose as long as they are ready to enter some minor updates.

Non-classroom communication:

Students can stop by the instructor’s office during scheduled office hours or request an appointment at yves.coeckelenbergh@tamucc.edu

Anxiety and Stress:

The University Counseling Center (Driftwood: 825-2703) provides help for test anxiety, stress and study skills.
Conflicting schedules:

All students with conflicting schedules, including athletes, should ask an appointment with the instructor in order to evaluate the possibility to complete the course.

Class Conduct: All students are expected to follow proper classroom behavior and treat the other students and the instructor with respect. If a student’s actions or behavior is deemed disruptive to the class by the instructor, the students will be asked to leave the class until proper sanction is applied.

Academic Integrity and Honesty:

All students are expected to conform to college-level standards of ethics, academic integrity, and academic honesty. By enrolling in this course, you agree to be bound by the Regulations and Procedures published in the TAMU-CC STUDENT HANDBOOK. Group interactions, investigations, and studying are encouraged; however, duplicative work will be treated as cheating and will receive a grade of zero. Anything that is viewed as cheating on an exam will be given the most severe penalty possible, most likely an "F" for the course, but may include more severe punishments.
Lecture Schedule:

The schedule below is a preliminary outline of the lectures susceptible to be modified. It is the student’s responsibility to keep up with changes to this schedule. The reading and problems assignments that will be assigned in class should be completed before the next class meeting. Failure to stay current on reading and problem assignments will greatly affect your ability to keep up during lecture and, therefore, will have an indirect effect on your grade in this course.

- **January 24**: Introduction to chemical analysis
- **January 29**: Measurements, units, math review
- **January 31**: Stoichiometry
- **February 05**: Concentration
- **February 07**: Tools
- **February 12**: Uncertainty
- **February 14**: Distribution, confidence
- **February 19**: Least squares, quality assurance
- **February 21**: Least squares, quality assurance
- **February 26**: Method validation, standards
- **February 28**: Chemical equilibrium
- **March 05**: Chemical equilibrium
- **March 07**: Chemical equilibrium
- **March 12**: Spring Break
- **March 14**: Spring Break
- **March 19**: MIDTERM EXAMINATION
- **March 21**: Titration
- **March 26**: Activity
- **March 28**: Activity
- **April 02**: Systematic treatment of equilibrium
- **April 04**: Systematic treatment of equilibrium
- **April 09**: Monoprotic acid-base equilibria
- **April 11**: Monoprotic acid-base equilibria
- **April 16**: Polyprotic acid-base equilibria
- **April 18**: Polyprotic acid-base equilibria
- **April 23**: Acid-base titration
- **April 25**: Acid-base titration
- **April 30**: EDTA titration
- **May 02**: Review
- **May 07**: General review
- **May 09**: FINAL EXAMINATION 11H00 – 13H30

In choosing to take this course, you are agreeing to abide by the course rules, regulations, and standards. This includes agreeing to be respectful to your instructors and fellow students. Should you have concerns or questions, you are to discuss them with the instructor as soon as possible. However, you are bound by these rules, regulations, and standards from the first day of the class throughout the duration of the course.