Quantitative Analysis CHEM 3417
Department of Physical and Environmental Sciences (PENS)

Spring 2016

A. COURSE INFORMATION
Course number/section: 3417.001, 3417.101 and 3417.102
Class meeting time: TR 12H30 – 13H45
Class location: CI-126
Course Website: https://bb9.tamucc.edu

B. INSTRUCTOR INFORMATION
   Instructor: Yves Coeckelenbergh
   Office location: CS211
   Office hours: T 13H45 -15H00, W14H00 -15H00, W 16H15 – 17H30
   Telephone: 825 2987
   e-mail: yves.coeckelenbergh@tamucc.edu
   Appointments: yves.coeckelenbergh@tamucc.edu

C. 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.
D. PREREQUISITES AND COREQUISITES

CHEM 1412

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Textbook: 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.

Supplies: calculator.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors and students to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The seven student learning outcomes (SLO’s) for this course are listed below.

By collecting data, essentially grades on exams, quizzes, laboratory assignments and class discussions, and sharing it through Blackboard with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

In this context the overall learning outcome consists in the ability to analyze a chemistry problem, sort all the available data, design a problem solving strategy, solve the problem, report the work in a clear, concise, logical and comprehensive manner and, most important, develop a work ethic leading to efficient and effective self-learning.

- Apply the analytical method to the investigation of chemical processes.
- Perform chemical metrology and calculate errors and uncertainties.
- Master the fundamentals of statistics for analytical chemistry.
- Apply thermodynamic equilibrium to the study of solutions
- Describe the acid-base equilibrium involving monoprotic and polyprotic acids.
- Design buffers and solve titration problems.
G. INSTRUCTIONAL METHODS AND ACTIVITIES: GUIDELINES.

1- Attend the lectures and the labs

2- Review all the lectures and if you have difficulties with anyone of them be tenacious until you grasp the concepts

3- Repeat the exercises done in class

4- Do the lab exercises and homework. Be tenacious. Don’t worry so much about the answer than the problem solving strategy. All problems are corrected anyway. After correction do them again.

5- If you don’t do well in the first exam catch up the missing lectures, textbook reading and exercises and keep working hard.

6- if you have difficulties with the course, speak to the Professor.

H. MAJOR COURSE REQUIREMENTS AND GRADING

Final grade will be calculated as follows:

First Exam (Take Home): 100 points
Second Exam: 100 points
Final exam (optional): 100 points
Laboratory, quizzes, homework and class participation: 100 points

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

Exams:

Exams will be open questions (no multiple choice).

All exams except the optional final are open notes.

No communication between students is allowed.

No communication devices are allowed.

Students will have two days plus a week-end to complete the take home exam. It will be comprehensive, posted on Blackboard and turned in upon completion on the due date. Consultation between students is allowed but plagiarism will be sanctioned by a zero. A typical proof of plagiarism will be the exact reproduction of a reasoning. The correction will take account of the logic, the clarity of the results and the presentation.
The optional final exam will be comprehensive without any notes allowed.

The presentation is important. The answers must follow a self-explanatory logic. The reading must be clear. All calculations must be presented in detail and absolutely with the proper units. Most of the questions of the exams will consist in problems similar to those seen in class or lab sessions.

Missed exams without a valid excuse will be graded zero.

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 and the desk must be empty with the exception of specifically authorized items.

Students are not allowed in the classroom 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. Student leaving the room will not be allowed to return unless authorized by the instructor. All material including intermediate calculations will be turned to the instructor at the end of the exam. A picture ID is required.

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.

**Homework and quizzes:**

Homework assignments can be given. Quizzes will be given at the end of each lab and can be given during lectures.
I. COURSE CONTENT/SCHEDULE
Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The weekly assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>18JAN</td>
<td>Introduction to chemical analysis</td>
</tr>
<tr>
<td>25JAN</td>
<td>Measurements, units, math review, stoichiometry</td>
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<tr>
<td>01FEB</td>
<td>Concentration, tools</td>
</tr>
<tr>
<td>08FEB</td>
<td>Uncertainty, distribution, confidence</td>
</tr>
<tr>
<td>15FEB</td>
<td>Least square, quality assurance</td>
</tr>
<tr>
<td>22FEB</td>
<td>DI, QI, standard addition, equilibrium</td>
</tr>
<tr>
<td>29FEB</td>
<td>Equilibrium</td>
</tr>
<tr>
<td>07MAR</td>
<td>Review and Take Home Exam</td>
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<tr>
<td>21MAR</td>
<td>Activity</td>
</tr>
<tr>
<td>28MAR</td>
<td>Systematic treatment of equilibrium</td>
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<tr>
<td>04APR</td>
<td>Monoprotic acid-base equilibrium</td>
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<tr>
<td>11APR</td>
<td>Polyprotic acid-base equilibrium</td>
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<tr>
<td>18APR</td>
<td>Acid-base titration</td>
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<tr>
<td>25APR</td>
<td>EDTA titration and review</td>
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<tr>
<td>02MAY</td>
<td>Second Exam</td>
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Final Exam Optional.

J. COURSE POLICIES
Attendance is mandatory. Tardiness must be justified. Late work must be justified. Make up exams only if with valid excuse. No extra credit. No cell phone nor laptop use allowed in the classroom. No food nor drink allowed in class. Missed exams without a valid excuse are graded zero. Class participation is required.

K. COLLEGE AND UNIVERSITY POLICIES

- **Academic Integrity (University)**
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.
• **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

• **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

• **Deadline for Dropping a Course with a Grade of W (University)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course.

• **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, 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 Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html), and the College of
Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**  
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

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 at (361) 825-5816.

http://disabilityservices.tamucc.edu/

- **Statement of Academic Continuity**  
In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

**L. OTHER INFORMATION**

- **Academic Advising**  
The College of Science & Engineering 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. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.