EAST TEXAS A&M

CHEM 541-01W: Advanced Analytical Chemistry

Instructor: **Dr. Laurence Angel** Office: Science 341
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Phone: 903-886-5391 Office Hours**:** Mon-Fri 4:00 – 5:00 pm
This is a web-based class delivered through the MyLeo online platform D2L, with recorded online lectures, weekly reading and homework assignments, Excel assignments and tests, which will count towards your final grade. Class runs through the 10-weeks of Summer I and Summer II.
Course Book: Quantitative Chemical Analysis, 8th Ed., Daniel C. Harris, W.H. Freeman and Co. ISBN-13: 978-1-4292-5436-6
You will need access to the Excel program.
Student Learning Outcomes: To familiarize the student with the methods and techniques of quantitative chemical analysis for accurately determining the quantities of a chemical species in a sample. The student will be expected to understand the theory and application of these analytical techniques and be able to provide explanations and results to the instructor. Material of the following will be covered.

1) Quality assurance and the validation of analytical procedure.
2) Volumetric analysis, titration calculations, solubility product, titration of a mixture, titration involving silver ion.
3) Equilibrium and thermodynamics, solubility product and complex formation.
4) Protic acids and bases, pH, strength of acids and bases, weak acid and base equilibrium.
5) Activity and the systematic treatment of equilibrium, ionic strength and solubility, activity coefficients, charge and mass balance.
6) Acid-base equilibria, buffers, Henderson-Hasselbalch equation, preparing buffers, buffer capacity,
7) Polyprotic acids and bases, amino acids, pH of diprotic systems, principal species, titrations of polyprotic systems, proteins, fractional composition, isoelectric focusing.
8) Acid-base titrations, titration curves, determining the end point, acid-base indicators, Kjeldahl nitrogen analysis, and the levelling effect.
9) Metal-chelate complexes, EDTA, metal ion indicators, EDTA titrations, pH-dependent EDTA equilibrium, auxiliary complexing agents, EDTA titration curves.
10) Advanced topics in equilibrium, general approach to acid-base systems, activity coefficients, dependence on solubility on pH, analyzing acid-base titrations.
11) Fundamentals of electrochemistry, electrode potentials, redox chemistry and electricity, galvanic cells, standard potentials, Nernst equations, reference electrodes.
12) Cells as chemical probes, why biochemists use E^{O}, reference electrodes, silver indicator electrode, junction potentials, ion-selective electrodes, glass electrode, solid state chemical sensors.

Student Learning Outcomes: By the end of the course, the student will be able to select and apply an analytical technique suitable for solving a given quantitative analytical problem. Knowledge of quantitative chemical analysis techniques is essential for a wide range of potential employment positions in industry, government and academia.

Evaluation: Weekly evaluation will include online tests, which are open books/notes and must be completed by the Sunday of that week. You must take the tests individually. Students working together will receive a zero. Tests are made available at the end of the week Friday-Sunday and once entered students have the allotted time to complete. There will also be weekly graded assignments using Excel and advanced equilibrium techniques.

Weekly tests or assignments: (12) tests and/or assignments due at the end of each week, 5.83% each (70% total, ***open books/notes*** *must be taken individually*)
Final exam: 2.0-hour comprehensive exam held at the end of the semester (30% total, ***open books/notes*** *must be taken individually)*

Grading: A: > 90%, B: 80-90%, C: 70-79.9%, D: 60-69.9%, F: <60%

Tentative Class Schedule and Reading Assignments from "Quantitative Chemical Analysis"

Week	Chapter and Topics	
1	Chapter 5: Quality Assurance and Calibration Methods	Test 1
	Chapter 6: Chemical Equilibrium, Solubility and Ion Pairs	Test 2
2	Chapter 7: Activity Coefficients	Test 3
	& Systematic Treatment of Equilibrium	assignment 4
3	Chapter 6: Monoprotic Acid-Bases	Test 5
	Chapter 8: Acid-Base Equilibria	Test 6
4	Chapter 8: Buffers	Test 7
5	Chapter 9: Polyprotic Acid-Base Equilibria	Test 8
6	Chapter 10: Acid-Base Titrations	Test 9
7	Chapter 11: Metal-Chelate Complexes and EDTA Titrations	Test 10
8	Chapter 12: Advanced Equilibrium Topics	assignment 11
9	Chapter 14: Electrodes and Potentiometry	Test 12
10	Finals week**:**	**Final Comprehensive Exam**

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

University Specific Procedures

Coronavirus Protection Measures
East Texas A&M suggests the use of face-coverings in all instructional and research classrooms/laboratories. Exceptions may be made by faculty where warranted. Faculty have management over their classrooms. Students should not attend class when ill or after exposure to anyone with a communicable illness. Communicate such instances directly with your instructor. Faculty will work to support the student getting access to missed content or completing missed assignments.

Student Conduct
All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook .
http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx
Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: Netiquette
http://www.albion.com/netiquette/corerules.html

TAMUC Attendance
For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01.
http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf

Academic Integrity
Students at East Texas A&M University are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:
Undergraduate Academic Dishonesty 13.99.99.R0.03
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf
Graduate Student Academic Dishonesty 13.99.99.R0.10
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf

ADA Statement
Students with Disabilities
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 have a disability requiring an accommodation, please contact:
Office of Student Disability Resources and Services
East Texas A&M University
Gee Library- Room 162
Phone (903) 886-5150 or (903) 886-5835

Fax (903) 468-8148
Email: studentdisabilityservices@tamuc.edu
Website: Office of Student Disability Resources and Services
http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

Nondiscrimination Notice
East Texas A&M University will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

The Counseling Center at East Texas A&M, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit www.tamuc.edu/counsel

Campus Concealed Carry Statement
Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in East Texas A&M University buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and East Texas A&M Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.
For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.
Web url:
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf
Pursuant to PC 46.035, the open carrying of handguns is prohibited on all East Texas A&M campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

TECHNOLOGY REQUIREMENTS

LMS

All course sections offered by East Texas A&M University have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements
LMS Requirements:
https://community.brightspace.com/s/article/Brightspace-Platform-Requirements
LMS Browser Support:
https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

YouSeeU Virtual Classroom Requirements:
https://support.youseeu.com/hc/en-us/articles/115007031107-Basic-System-Requirements

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu**.**

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:
https://community.brightspace.com/support/s/contactsupport