

**CHEM 340-01E: Quantitative and Instrumental Analysis****Instructor: Dr. Laurence Angel****Office:** Science 341**Email:** Laurence.Angel@tamuc.edu **Phone:** 903-886-5391**Office Hours:** Mon-Fri 4:00 – 5:00 pm**Class Meetings:** Tues/Thurs 9:30 – 10:20 am, enhanced with D2L online material**Laboratory Meetings:** Tues/Thurs 2.00 – 5.50 pm, Science 313

This is an enhanced class with face-to-face lectures delivered with additional material on the online platform D2L. There will be weekly reading and homework assignments, which will be evaluated by 4 midterm exams and a final comprehensive exam. The class material will closely align with the experimentation portion that will be conducted in the Chemistry Department's labs. The schedule can be found below.

Student Learning Outcomes: The course will familiarize the student with a range of quantitative chemical analysis techniques for accurately determining the quantities of an element or a chemical species in a sample. The student will be expected to understand the theory and applications of these chemical analyses techniques and be able to explain the concepts to their peers. Analysis techniques covered will include statistical analysis, acid-base equilibrium, redox titrations, EDTA titrations, ultraviolet-visible spectrophotometry, and electroanalytical techniques. By the end of the course, the student will be able to select an analytical technique best suited to solve a given quantitative analytical problem. During the course students will be required to keep organized and well written laboratory books and hand in weekly reports that clearly convey the experimental details and results of their work. Knowledge of quantitative chemical analysis techniques including instrumental analysis is essential in a wide range of potential employment positions in industry, government and academia.

Course Materials: *Exploring Chemical Analysis, 4th Ed., Daniel C. Harris, Freeman.* ISBN 9781429201476 and a **non-programmable calculator**.

Credits: 4 Course Credits: 2 credit hours for class and 2 credit hours for laboratory.

Laboratory Experiments: You will find the handouts for the laboratory procedures in the CHEM 340-01L course site during the semester. You will also need a *proper laboratory notebook, safety goggles, and a hand non-programmable calculator*. Proper attire is needed for the labs including full length pants and shoes. Long hair must be tied back. Laboratory coats are recommended.

Prerequisite: The student must have completed CHEM 1312 and CHEM 1112 in order to enroll in CHEM 340. Having completed CHEM 2323 and CHEM 2324 is also desirable but not a requirement.

Tips for Success in the CHEM 340 Course: The lectures in this course will cover topics from Chapters 1 through 19 of the assigned textbook. This material will be covered at the rate indicated by the *Tentative Class Schedule*. *Be sure to read the textbook before coming to the lectures.* The lectures will focus on important chemistry concepts but will not serve as a substitute for reading the textbook. The textbook is a more detailed presentation with a more extensive set of example problems. Chemistry is a physical science and it is imperative to master calculations to pass the course. *Finish your homework promptly.*

GRADING

Mid-semester exams: 4 exams held during semester (10% each, 40% total)

Laboratory reports: 10 graded laboratory reports (4% each, 40% total)

Final ACS exam: Comprehensive ACS exam held at the end of the semester (20%)

Grading: General grade range of A: > 86%, B: 75-86%, C: 64-74%, D: 50-63%, F: <50

Laboratory Procedures and Requirements: We shall go over laboratory safety, procedures and reports in the first session of the laboratory schedule in Science 313. Each experiment will be graded out of 100% based on your lab performance (15%), the accuracy of your final result using the relative error shown below and whether it includes the “true” value (40%), presentation of the report and the correct conversion of the raw data into final data (30%), and the quality of the presented data in the report including any computer analysis (15%).

Relative Error Grade /80

0-5 ppt 80

5-15 72

15-25 64

25-40 56

40-70 48

70-100 40

100-150 32

>200ppt 16

$$\text{relative error} = \frac{\text{exp. value} - \text{known value}}{\text{known value}} \times 1000$$

Preparation for the lab is required: 5 points of the grade will be deducted if the pre-lab assignments are not finished before the lab. Writing on scraps of paper during lab will result in 5 points deducted from your grade. All the experimental results should be written in your **lab book** and this should be well organized and clearly presented. See the lab report handout for details on proper presentation and recording of your experiments. Unsafe or poor conduct during the lab will also result in 5 points deduction. Late work will not be accepted, and makeup exams or labs will not be given unless the instructor considers it is for a valid reason. If you miss an exam the points for the missed exam will be placed on your final exam, making your final exam count for a greater percentage of your grade. The final exam will be comprehensive. Laboratory

Portion: 40% of course grade. Ten laboratory reports will be required. Any additional missed labs will result in a zero for that lab.

COURSE OUTLINE / CALENDAR

Tentative class schedule and reading assignments: chapters from **Exploring Chemical Analysis**, 4th Edition, Daniel C. Harris, W.H. Freeman and Company.

Week Starting	Chapters and Topics
Aug 28	1 and 2 Chemical Measurements, Tools of the Trade
Sept 4	3 and 4 Math and Statistics
Sept 11	6 Good Titrations
Sept 18	8 Acids and Bases Exam 1
Sept 25	9 Buffers
Oct 2	10 Acid-Base Titrations
Oct 9	11 Polyprotic Acids and Bases
Oct 16	13 EDTA Titrations Exam 2
Oct 23	13 EDTA/14 Electrode Potentials
Oct 30	15 Electrode Measurements
Nov 6	16 Titrations Involving Iodine or Bromine
Nov 13	16 Redox Titrations
Nov 20	(Thanksgiving) Exam 3
Nov 27	18 Let There Be Light /19 Spectrophotometry
Dec 4	Review Exam 4
Dec 11	Final Comprehensive Exam

Tentative laboratory schedule

Week Start	Laboratory
Aug 28	Laboratory Safety, Introduction to Laboratory Reports.
Sept 4	Excel Software Lab
Sept 11	Check in, Calibration of Buret
Sept 18	Preparing and Standardizing of Carbonate-Free 0.1 M NaOH
Sept 25	Determination of the Composition of a KCl – NaCl Mixture
Oct 2	pH Titration of Soda Ash
Oct 9	Equilibrium Constants of a Weak Diprotic Acid and Equivalence Point pH
Oct 16	EDTA Titration of Ca ²⁺ and Mg ²⁺
Oct 23	Spectrophotometric Titration of Copper(II) with EDTA
Oct 30	Potentiometric Halide Titration with Ag ⁺
Nov 6	Determination of Ascorbic Acid in Vitamin C Tablets
Nov 13	ACS SWRM meeting Nov 15-18
Nov 20	Thanksgiving
Nov 27	Spectrometric Determination of Iron in Vitamin Tablets
Dec 4	Check-out

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

A&M-Commerce 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 Texas A&M University-Commerce 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

Texas A&M University-Commerce

Velma K Waters 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/)

<http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/>

Nondiscrimination Notice

Texas A&M University-Commerce 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 A&M-Commerce, 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 Texas A&M University-Commerce 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 A&M-Commerce 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 A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

AI Use Policy

Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors' guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty

13.99.99.R0.10 Graduate Student Academic Dishonesty

TECHNOLOGY REQUIREMENTS

LMS

All course sections offered by Texas A&M University-Commerce 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>