

CHEM 4415-110, 10465, INSTRUMENTAL ANALYSIS

Spring 2023

Texas A&M University-Central Texas

COURSE DATES, MODALITY, AND LOCATION

This course meets face-to-face with supplemental materials made available online through the A&M-Central Texas Canvas Learning Management System [https://tamuct.instructure.com/].

Time/Day:

Lecture: Tuesday and Thursday (8:00 am – 9:15 am, Heritage Hall 315)

Lab: Tuesday (9:30 am – 12:30 pm, Heritage Hall 310)

Contingency Plan: In case the campus closes the course will be moved to 100% online.

- Lectures will be conducted via WebEx Meeting synchronously on Tuesday and Thursday (8:00 am – 9:15 am)
- Instructor will provide laboratory manuals with instructions and data. Students will write laboratory reports based on the provided data.

INSTRUCTOR AND CONTACT INFORMATION

Instructor: Dr. Linh Pham, Associate Professor of Chemistry

Office: 302 F Heritage Hall

Phone: 254-519-8012

Email: All communication should be conducted through Canvas “Inbox”. No exceptions!

Office Hours

Tuesday and Thursday: 1:00 pm – 2:00 pm through Canvas Inbox

I am also available for students on an appointment-basis. If you need a WebEx meeting or in-person meeting, please contact me by Canvas Inbox to set up an appointment 24 hours in advance.

Student-instructor interaction

*In this course, interaction with the instructor is one of the most effective ways to learn. Therefore; I encourage my students to attend my office hours whenever you have questions. If students cannot make it to my office hours, do not hesitate to contact me at **Canvas “Inbox”** for an appointment. I will reply within 24 hours, usually within couples of hours on weekdays.*

Emergency Warning System for Texas A&M University-Central Texas

SAFEZONE. SafeZone provides a public safety application that gives you the ability to call for help with the push of a button. It also provides Texas A&M University-Central Texas the ability to communicate emergency information quickly via push notifications, email, and text messages. All students automatically receive email and text messages via their myCT accounts.

Downloading SafeZone allows access to push notifications and enables you to connect directly for help through the app.

You can download SafeZone from the app store and use your myCT credentials to log in. If you would like more information, you can visit the [SafeZone](http://www.safezoneapp.com) website [www.safezoneapp.com].

To register SafeZone on your phone, please follow these 3 easy steps:

1. Download the SafeZone App from your phone store using the link below:
 - o [iPhone/iPad](https://apps.apple.com/app/safezone/id533054756): [https://apps.apple.com/app/safezone/id533054756]
 - o [Android Phone / Tablet](https://play.google.com/store/apps/details?id=com.criticalarc.safezoneapp) [https://play.google.com/store/apps/details?id=com.criticalarc.safezoneapp]
2. Launch the app and enter your myCT email address (e.g. {name}@tamuct.edu)
3. Complete your profile and accept the terms of service

For updates on COVID information, please monitor the University [website](https://www.tamuct.edu/covid19/) [https://www.tamuct.edu/covid19/]

COURSE INFORMATION

Course Overview and description

CHEM 4415 is the survey of the broad range of instruments available to the chemist, including function, application, calibration, and limitation. Three hours of lecture and three hours of laboratory per week.

Prerequisite: CHEM 3415 or equivalent.

Course Objective or Goal

The course examines chemical analysis utilizing spectroscopy techniques such as UV/VIS, molecular fluorescence, infrared, atomic emission, atomic absorption, atomic fluorescence, and mass spectrometry. The course also explores chromatographic and electrochemical techniques, such as gas and liquid chromatography, ion selective electrodes, coulometry, and cyclic voltammetry.

Student Learning Outcomes

Students will:

1. demonstrate knowledge of calibration and standardization methodology as well as assess sources of error in chemical and instrumental analysis
2. integrate a fundamental understanding of the underlying principles as they relate to specific instrumentation used in chemical analysis
3. demonstrate acquisition of instrumentation laboratory skills
4. demonstrate ability to write scientific lab reports.

Required Reading and Textbook(s)

1. Harris, D.C. 2011. Quantitative Chemical Analysis, 9th ed. Macmillian Publishing. ISBN-10: 1-4641-3538-X; ISBN-13: 978-1-4641-3538-5
2. Lab manuals will be provided by the instructor and available on Canvas.

- *I expect you to read the corresponding chapters in your textbook before coming to class.*

COURSE REQUIREMENTS

Course Requirements: (include point values for each- not just a percentage)

Requirements	Percentage	Points	SLOs
Assignments	12%	120	1, 2
Lab Reports	30%	300	3, 4
Exam 1	18%	180	1, 2
Exam 2	15%	150	1, 2
Final Exam	25%	250	1, 2
Total	100%	1000	

- Assignments: There will be ten assignments to be submitted on Canvas.
- Exams: Exams may be take-home or in-class or both, as determined by the instructor. Exams 1 & 2 are non-cumulative. Final exam is cumulative. No make-up exams will be given without prior notification and approval.
- Lab Reports: There will be three formal lab reports and six informal lab reports. Your grade will be determined primarily by the contents of the report and the accuracy of the results. However, the neatness and overall presentation of the report are also important. Detailed rubric of the lab reports is attached to the end of this syllabus. More details regarding the lab reports will be provided later.

Grading Criteria Rubric and Conversion

Percentage	Course Grades
90% or higher	A
80-80.99%	B
70-79.99%	C
60-69.99%	D
59.99% or lower	F

A 4.00 (90 +) Achievement that is outstanding relative to the level necessary to meet course requirements.

B 3.00 (80-89%) Achievement that is significantly above the level necessary to meet course requirements.

C 2.00 (70–79%) Achievement that meets the course requirements in every respect.

D 1.00 (60–69%) Achievement that is worthy of credit even though it fails to meet fully course requirements.

F 0.00 (<60%) Represents failure and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an “I”

(incomplete).

I (Incomplete) The “I” shall be assigned at the discretion of the instructor when, due to extraordinary circumstances, the student was prevented from completing the work of the course on time. The assignment of an “I” requires a written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements. In no event may any such written agreement allow a period of longer than one year to complete the course requirements. For graduate and professional students, an “I” is to remain on the transcript until changed by the instructor or department. For all other students, work to make up an I must be submitted within one year of the last day of final examinations of the term in which the “I” was given; if not submitted by that time, then the “I” will automatically change to an F. *To obtain an incomplete you must have been doing passing work in the course*

Posting of Grades

- Grades will be posted on the Canvas Grade book where students can monitor their status.
- The turn-around time for grades is as follows:
 - For exams, short assignments such as paper critiques, informal lab report and homework: 5-8 business days.
 - For formal lab reports, technical and term papers: 10-12 business days.

Grading Policies

Read these carefully as I am strict with my policies.

Grading Policy. Grades will not be curved and anyone achieving a 90% or above will receive an A in this course.

Grade Dispute Policy. Grading disputes must be put in writing (with justification such as supporting statements from the text or another credible source) and given to me no earlier than 24 hours after the assignment has been returned. I will consider your request carefully, but reserve the right to adjust your grade up or down.

Late Assignments. I expect all assignments to be turned in on time. Late assignments interfere with my ability to provide timely, detailed feedback, as well as with your ability to learn and process new material. Accordingly, any unauthorized late assignment will receive a **5% reduction in grade for each day it is late.** No assignments will be accepted after the closing date on Canvas.

COURSE OUTLINE AND CALENDAR

Complete Course Calendar

The following schedule may be subjected to modification and corrections during the course of the semester.

Week	Lecture Topics	Lab Topics/Deadlines
Week 1 (Jan 16-22)	Chapter 5: Calibration Methods	No Lab. Students complete the Lab Safety training and submit the signed "Safety Agreement Form"
Week 2 (Jan 23-29)	Chapter 3: Error and noise	<u>Lab 1:</u> Direct Calibration, Method of Standard Additions, And Internal Standard Method
Week 3 (Jan 30-Feb5)	Chapter 19&20: Spectrophotometers: Instrumentation	<u>Lab 2:</u> Spectrophotometric Determination of Equilibrium Constants of pH Indicator
Week 4 (Feb 6-12)	Molecular Luminescence Spectrometry (Reading provided by instructor)	<u>Lab 3:</u> Determination of Chloride in Drinking Water by Fluorescence Quenching
Week 5 (Feb 13-19)	Vibrational Spectroscopy: IR and Raman (Reading provided by instructor)	<u>Lab 4:</u> Quantitative IR Analysis of Xylene Mixture
Week 6 (Feb 20-26)	Chapter 21: Atomic Spectroscopy Exam 1 (covers weeks 1-5)	<u>Lab 5:</u> Determination of sodium and potassium in water with Atomic Absorption Spectroscopy – Part 1 Due: Lab 3 Formal Report
Week 7 (Feb 27-Mar 5)	Chapter 17: Electroanalytical Technique	<u>Lab 5:</u> Determination of sodium and potassium in water with Atomic Absorption Spectroscopy – Part 2
Week 8 (Mar 6-12)	Chapter 22: Mass Spectrometry	<u>Lab 6:</u> Cyclic voltammetry of $\text{Fe(III)(CN)}_6^{3-}/\text{Fe(II)(CN)}_6^{4-}$
Mar 13-19 Spring Break – No class		
Week 9 (Mar 20-26)	Chapter 22: Mass Spectrometry (continued) Chapter 24: Gas Chromatography	<u>Lab 7-Part 1:</u> Analysis of methanol content in commercial liquor using Gas Chromatography Due: Lab 5 Formal Report

Week	Lecture Topics	Lab Topics/Deadlines
Week 10 (Mar 27 – Apr 2)	Chapter 24: Gas Chromatography (continued)	<u>Lab 7-Part 2</u> : Analysis of methanol content in commercial liquor using Gas Chromatography
Week 11 (Apr 3-9)	Chapter 25: High-Performance Liquid Chromatography Exam 2 (covers weeks 6-10)	<u>Lab 8-Part 1</u> : Identification and Quantification of BTEX in Gasoline by GC/MS
Week 12 (Apr 10-16)	Chapter 25: High-Performance Liquid Chromatography (Continued)	<u>Lab 8-Part 2</u> : Identification and Quantification of BTEX in Gasoline by GC/MS
Week 13 (Apr 17-23)	Chapter 26: Chromatographic Methods and Capillary Electrophoresis	<u>Lab 9-Part 1</u> : Determination of Caffeine in Beverage with High Performance Liquid Chromatography
Week 14 (Apr 24-30)	Electron Microscopy (Reading provided by instructor)	<u>Lab 9-Part 2</u> : Determination of Caffeine in Beverage with High Performance Liquid Chromatography Due: Lab 8 Formal Report
Week 15 (May 1-7)	Nuclear Magnetic Resonance (Reading provided by instructor)	Instrumentation Practice
Week 16 (May 8-14)	Final Exam (Cumulative) Tuesday, May 9, 2023	- All instrument and some calculations selected by instructor - All the chapters covered after exam 2 - GC, GC-MS, and AA chapters

Important University Dates

Link to the current Academic Calendar:

<https://www.tamuct.edu/registrar/academic-calendar.html>

TECHNOLOGY REQUIREMENTS AND SUPPORT

Technology Requirements

This course will use the A&M-Central Texas Instructure Canvas learning management system.

We strongly recommend the latest versions of Chrome or Firefox browsers. Canvas no longer supports any version of Internet Explorer.

Logon to A&M-Central Texas Canvas [https://tamuct.instructure.com/] or access Canvas through the TAMUCT Online link in myCT [https://tamuct.onecampus.com/]. You will log in

through our Microsoft portal.

Username: Your MyCT email address. Password: Your MyCT password

Software Requirements

This course requires Office 365 (Word, Excel, and PowerPoint). Refworks citation tool is recommended for scientific writing. These software are available to current TAMUCT students free of charge.

To download Office 365: <https://tamuct.onecampus.com/task/all/office365-software>

To sign in Refworks: <https://tamuct.libguides.com/c.php?q=166317>

Canvas Support

Use the Canvas Help link, located at the bottom of the left-hand menu, for issues with Canvas. You can select “Chat with Canvas Support,” submit a support request through “Report a Problem,” or call the Canvas support line: 1-844-757-0953.

For issues related to course content and requirements, contact your instructor.

Online Proctored Testing

A&M-Central Texas uses Proctorio for online identity verification and proctored testing. This service is provided at no direct cost to students. If the course requires identity verification or proctored testing, the technology requirements are: Any computer meeting the minimum computing requirements, plus web camera, speaker, and microphone (or headset). Proctorio also requires the Chrome web browser with their custom plug in.

Other Technology Support

For log-in problems, students should contact Help Desk Central, 24 hours a day, 7 days a week

Email: helpdesk@tamu.edu

Phone: (254) 519-5466

[Web Chat](http://hdc.tamu.edu): [http://hdc.tamu.edu]

Please let the support technician know you are an A&M-Central Texas student.

UNIVERSITY RESOURCES, PROCEDURES, AND GUIDELINES

Academic Accommodations

At Texas A&M University-Central Texas, we value an inclusive learning environment where every student has an equal chance to succeed and has the right to a barrier-free education. The Warrior Center for Student Success, Equity and Inclusion is responsible for ensuring that students with a disability receive equal access to the university’s programs, services and activities. If you believe you have a disability requiring reasonable accommodations, please contact the Office of Access and Inclusion, WH-212; or call (254) 501-5836. Any information you provide is private and confidential and will be treated as such.

For more information, please visit our [Access & Inclusion](https://tamuct.instructure.com/courses/717) Canvas page (log-in required) [https://tamuct.instructure.com/courses/717]

Academic Integrity

Texas A&M University-Central Texas values the integrity of the academic enterprise and strives for the highest standards of academic conduct. A&M-Central Texas expects its students, faculty, and staff to support the adherence to high standards of personal and scholarly conduct to preserve the honor and integrity of the creative community. Any deviation by students from this expectation may result in a failing grade for the assignment and potentially a failing grade for the course. All academic misconduct concerns will be referred to the Office of Student Conduct. When in doubt on collaboration, citation, or any issue, please contact your instructor before taking a course of action.

For more [information regarding the student conduct process](https://www.tamuct.edu/student-affairs/student-conduct.html),
[https://www.tamuct.edu/student-affairs/student-conduct.html].

If you know of potential honor violations by other students, you may [submit a referral](https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=0),
[https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=0].

Drop Policy

If you discover that you need to drop this class, you must complete the [Drop Request](#) Dynamic Form through Warrior Web.

[https://federation.ngwebsolutions.com/sp/startSSO.ping?PartnerIdId=https://eis-prod.ec.tamuct.edu:443/samlSso&SpSessionAuthnAdapterId=tamuctDF&TargetResource=https%3a%2f%2fdynamicforms.ngwebsolutions.com%2fSubmit%2fStart%2f53b8369e-0502-4f36-be43-f02a4202f612].

Faculty cannot drop students; this is always the responsibility of the student. The Registrar's Office will provide a deadline on the Academic Calendar for which the form must be completed. Once you submit the completed form to the Registrar's Office, you must go into Warrior Web and confirm that you are no longer enrolled. If you still show as enrolled, FOLLOW-UP with the Registrar's Office immediately. You are to attend class until the procedure is complete to avoid penalty for absence. Should you miss the drop deadline or fail to follow the procedure, you will receive an F in the course, which may affect your financial aid and/or VA educational benefits.

Important information for Pregnant and/or Parenting Students

Texas A&M University-Central Texas supports students who are pregnant, experiencing pregnancy-related conditions, and/or parenting. In accordance with requirements of Title IX and related guidance from US Department of Education's Office of Civil Rights, the Dean of Student Affairs' Office can assist students who are pregnant and/or parenting in seeking accommodations related to pregnancy and/or parenting. Students should seek out assistance as early in the pregnancy as possible. For more information, please visit [Student Affairs](https://www.tamuct.edu/student-affairs/pregnant-and-parenting-students.html) [https://www.tamuct.edu/student-affairs/pregnant-and-parenting-students.html]. Students may also contact the institution's Title IX Coordinator. If you would like to read more about these [requirements and guidelines](http://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.pdf) online, please visit the website [http://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.pdf].

Title IX of the Education Amendments Act of 1972 prohibits discrimination on the basis of sex

and gender—including pregnancy, parenting, and all related conditions. A&M-Central Texas is able to provide flexible and individualized reasonable accommodation to pregnant and parenting students. All pregnant and parenting students should contact the Associate Dean in the Division of Student Affairs at (254) 501-5909 to seek out assistance. Students may also contact the University’s Title IX Coordinator.

Tutoring

Tutoring is available to all A&M-Central Texas students, both virtually and in-person. Student success coaching is available online upon request.

If you have a question, are interested in becoming a tutor, or in need of success coaching contact the Warrior Center for Student Success, Equity and Inclusion at (254) 501-5836, visit the Warrior Center at 212 Warrior Hall, or by emailing WarriorCenter@tamuct.edu.

To schedule tutoring sessions and view tutor availability, please visit [Tutor Matching Services](https://tutormatchingservice.com/TAMUCT) [https://tutormatchingservice.com/TAMUCT] or visit the Tutoring Center in 111 Warrior Hall.

Chat live with a remote tutor 24/7 for almost any subject from on your computer! Tutor.com is an online tutoring platform that enables A&M-Central Texas students to log in and receive online tutoring support at no additional cost. This tool provides tutoring in over 40 subject areas except writing support. Access Tutor.com through Canvas.

University Library & Archives

The University Library & Archives provides many services in support of research across campus and at a distance. We offer over 350 electronic databases containing approximately 631,525 eBooks and 75,149 journals, in addition to the 97,443 items in our print collection, which can be mailed to students who live more than 50 miles from campus. Research guides for each subject taught at A&M-Central Texas are available through our website to help students navigate these resources. On campus, the library offers technology including cameras, laptops, microphones, webcams, and digital sound recorders.

Research assistance from a librarian is also available 24 hours a day through our online chat service, and at the reference desk when the library is open. Research sessions can be scheduled for more comprehensive assistance, and may take place virtually through WebEx, Microsoft Teams or in-person at the library. [Schedule an appointment here](https://tamuct.libcal.com/appointments) [https://tamuct.libcal.com/appointments]. Assistance may cover many topics, including how to find articles in peer-reviewed journals, how to cite resources, and how to piece together research for written assignments.

Our 27,000-square-foot facility on the A&M-Central Texas main campus includes student lounges, private study rooms, group work spaces, computer labs, family areas suitable for all ages, and many other features. Services such as interlibrary loan, TexShare, binding, and laminating are available. The library frequently offers workshops, tours, readings, and other events. For more information, please visit our [Library website](https://tamuct.libguides.com/index) [https://tamuct.libguides.com/index]

University Writing Center

University Writing Center: Located in Warrior Hall 416, the University Writing Center (UWC) at Texas A&M University–Central Texas (A&M–Central Texas) is a free service open to all A&M–Central Texas students. The hours of operation are from 10:00 a.m.-5:00 p.m. Monday thru Thursday in Warrior Hall 416 (with online tutoring available every hour as well) with satellite hours available online only Monday thru Thursday from 6:00-9:00 p.m. and Saturday 12:00-3:00 p.m.

Tutors are prepared to help writers of all levels and abilities at any stage of the writing process. While tutors will not write, edit, or grade papers, they will assist students in developing more effective composing practices. By providing a practice audience for students' ideas and writing, our tutors highlight the ways in which they read and interpret students' texts, offering guidance and support throughout the various stages of the writing process. In addition, students may work independently in the UWC by checking out a laptop that runs the Microsoft Office suite and connects to WIFI, or by consulting our resources on writing, including all of the relevant style guides. Whether you need help brainstorming ideas, organizing an essay, proofreading, understanding proper citation practices, or just want a quiet place to work, the UWC is here to help!

Students may arrange a one-to-one session with a trained and experienced writing tutor by making an appointment via [WCOonline](https://tamuct.mywconline.com/) [https://tamuct.mywconline.com/]. In addition, you can email Dr. Bruce Bowles Jr. at bruce.bowles@tamuct.edu if you have any questions about the UWC, need any assistance with scheduling, or would like to schedule a recurring appointment with your favorite tutor.

OTHER POLICY STATEMENTS

A Note about Sexual Violence at A&M-Central Texas

Sexual violence is a serious safety, social justice, and public health issue. The university offers support for anyone struggling with these issues. University faculty are mandated reporters, so if someone discloses that they were sexually assaulted (or a victim of Domestic/Dating Violence or Stalking) while a student at TAMUCT, faculty members are required to inform the Title IX Office. If you want to discuss any of these issues confidentially, you can do so through Student Wellness and Counseling (254-501-5955) located on the second floor of Warrior Hall (207L).

Sexual violence can occur on our campus because predators often feel emboldened, and victims often feel silenced or shamed. It is incumbent on ALL of us to find ways to actively create environments that tell predators we don't agree with their behaviors and tell survivors we will support them. Your actions matter. Don't be a bystander; be an agent of change. For additional information on campus policy and resources visit the [Title IX webpage](https://www.tamuct.edu/compliance/titleix.html) [https://www.tamuct.edu/compliance/titleix.html].

Behavioral Intervention

Texas A&M University-Central Texas cares about the safety, health, and well-being of its

students, faculty, staff, and community. If you are aware of individuals for whom you have a concern, please make a referral to the Behavioral Intervention Team. Referring your concern shows you care. You can complete the [referral](#) online

[https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=2].

Anonymous referrals are accepted. Please see the [Behavioral Intervention Team](#) website for more information [<https://www.tamuct.edu/bit>]. If a person's behavior poses an imminent threat to you or another, contact 911 or A&M-Central Texas University Police at 254-501-5805.

SCIENCE POLICIES

Lecture courses

1. There will be no bathroom breaks allowed during any exam. Be sure that you address this issue before beginning an exam.
2. Any student needing to take an exam at a **different time** as rest of students due to sickness or other accommodations will receive a **different version of exam**. This includes sickness, special accommodations, etc....
3. All students needing special accommodations must submit an accommodation form from the Office of Access and Inclusion listing the specific accommodations needed. Students are responsible for scheduling their own exam times with the TAMUCT Testing Center.
4. Any student missing an exam in class for any other reason (i.e. illness, death in family, etc....) must provide documentation for missing the exam (e.g. doctor's note, obituary notice, etc....). Exams must be made up within one week of original scheduled date, no exceptions.
5. All backpacks and materials as well as cell phones, smart watches and other electronic devices, must be turned off and placed at the front of the room on test day.
6. Jackets, sweaters, etc must be placed in the front of the room on test day, unless otherwise indicated by teacher.

Laboratory courses

1. Attendance policy: A maximum of 3 absences will be allowed; additional absences in lab will result in an "F" for the entire course, regardless of excuse.
2. Laboratory Safety training: All students are **required** to take the mandatory Laboratory Safety Training Module - found on in your Modules tab in CANVAS. You must take the training and **bring the signed "Safety Agreement Form"** to your instructor **before you are allowed in lab!!!** This is **YOUR RESPONSIBILITY** - any lab absences because you have not taken the training will be considered **unexcused!**
3. Laboratory Coats: Students who have laboratories are required to purchase a laboratory coat from the TAMUCT Bookstore in Founder's Hall. Students must keep their laboratory coat in the laboratory room (you will be provided a storage bag); you cannot transport coats from lab to lab or bring outside the laboratory.

INSTRUCTOR POLICIES.

Read these carefully as I am strict with my policies.

Canvas Assignment Submissions. Please keep in mind that it is your responsibility to submit your work on time to the correct location and ensure that the correct document is submitted to Canvas properly. Failure to do so will result in a late penalty or zero. Also, please be aware that technical errors in Canvas are very rare and tech support has sophisticated tools to determine if students have submitted assignments or posted to discussion boards.

Grading Policy. Grades will not be curved and anyone achieving a 90% or above will receive an A in this course.

Grade Dispute Policy. Grading disputes must be put in writing (with justification such as supporting statements from the text or another credible source) and given to me no earlier than 24 hours after the assignment has been returned. I will consider your request carefully, but reserve the right to adjust your grade up or down.

Late Assignments. I expect all assignments to be turned in on time. Late assignments interfere with my ability to provide timely, detailed feedback, as well as with your ability to learn and process new material. Accordingly, any unauthorized late assignment will receive a **5% reduction in grade for each day it is late**. No assignments will be accepted after it has been graded and returned.

Exams. The exams will be a mixture of multiple choices and short answers, designed to provoke reflection, critical thought, and application of knowledge. You are encouraged to prepare for the exam by reviewing reading materials, outlining a draft of a response, and discussing these thoughts with your peers. You will then demonstrate your individual, integrated thoughts on the topic in a closed-book exam during the class period.

Missed exams. If you know you will miss an exam, please contact me BEFORE the exam. I will gladly give make-up exams if the student has an unavoidable reason for missing the exam (i.e. death in the family, severe illness). Keep in mind that I will expect documentation of your reason for missing the exam (e.g. doctor's note, obituary notice). Exams must be made up within a week of the original scheduled date, no exceptions regardless of excuse.

What I expect of you. To get the most out of this class, you are expected to conduct yourself in a professional manner, which includes contributing to class discussions, being punctual, and notifying me of absences in advance.

Class Attendance. I expect that you attend each class session and arrive on time. If an unavoidable situation arises that prevents you from attending class, I expect that you also promptly contact me to discuss the missed material and get the notes from a classmate. I will not distribute my notes to students as they are often abbreviated and do not contain the detail needed to sufficiently understand the material.

What you can expect of me. You can expect me to start and end class on time, be available through office hours, e-mail, and by appointment, be responsive to student suggestions for course improvement, answer questions to the fullest extent possible and/or direct you to appropriate resources, return graded assignments and exams within a reasonable time frame, and treat you with respect as future colleagues.

Discussion. The topics in this class encompass a diversity of issues that merit in-depth thought and discussion. Since individuals will be expressing their opinions, I expect that you will respect others' contributions, as you would want them to do for you.

Credits and Workload expectations. For undergraduate courses, one credit is defined as

equivalent to an average of two hours of learning effort per week (over a full semester) necessary for an average student to receive an average grade for the course. A student taking a four-credit class that meets for four hours a week should expect to spend an additional eight hours a week outside the classroom in order to earn an average grade.

Class Structure. Classes will involve a balance of active lecture and engaging learning activities. I believe that students learn the theories and concepts much better when they have an active role. I know that this may be new to some of you, but please keep an open mind and I know that you will get more out of this class because of it.

Copyright Notice

Students should assume that all course material is copyrighted by the respective author(s). Reproduction of course material is prohibited without consent by the author and/or course instructor. Violation of copyright is against the law and Texas A&M University-Central Texas' Code of Academic Honesty. All alleged violations will be reported to the Office of Student Conduct.

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Laboratory Report Rubric					
Category	Exceeds expectations	Meets expectations	Below expectations	Does not meet expectations	Score
Title	One sentence fragment clearly and concisely states the purpose of the lab.	One sentence fragment states the purpose of the lab.	One sentence fragment does not fully state the purpose of the lab.	One sentence fragment incompletely states the purpose of the lab.	2%
Abstract	Clearly and concisely states: the purpose of the lab, the relative background, the way the lab was conducted, and the main result. Engaging and thought provoking.	Clearly and concisely states: the purpose of the lab, the relative background, the way the lab was conducted, and the main result.	States the purpose of the lab, the relative background, the way the lab was conducted, and the main result. Some minor mistakes.	Incomplete statement or confusing	5%
Introduction	Thoroughly addresses the topic Engages reader. Logical progression from broad to narrow topic. Clearly states main topic and previews structure of paper.	The introduction states the main topic and previews the structure of the paper.	The introduction states the main topic but does not adequately preview the structure of the paper.	There is no clear introduction or main topic and the structure of the paper is missing.	10%
Materials and Methods	Consists of two or three paragraphs of the basic theory that are used to design the experiment and achieve the results (maximum 200 words in one paragraph). Each paragraph has thoughtful supporting detail sentences that develop the main idea.	The section consists of two or three paragraphs of the basic theory that are used to design the experiment and achieve the results (maximum 200 words in one paragraph). Each paragraph has sufficient supporting detail sentences that develop the main idea.	The section consists of two or three paragraphs of the basic theory that are used to design the experiment and achieve the results. Each paragraph lacks supporting detail sentences.	Each paragraph fails to develop the main idea.	10%
Result	Summarizes the results of the experiment. The necessary raw data, chemical equations and calculated results for each experiment are presented here in concise text and tabular form (figures and tables). Each paragraph has thoughtful supporting detail sentences that develop the main idea.	Summarizes the results of the experiment. The necessary raw data, chemical equations and calculated results for each experiment are presented here in concise text and tabular form (figures and tables). Each paragraph has sufficient supporting detail sentences that develop the main idea.	Summarizes the results of the experiment. Each paragraph lacks supporting detail sentences.	Summarizes the results of the experiment. Each paragraph fails to develop the main idea.	15%
Discussion	In-depth discussion & elaboration in all sections of the paper	In-depth discussion & elaboration in most sections of the paper	Omission of pertinent content or content runs on excessively. Quotations from others outweigh the writer's own ideas.	Cursory discussion in all the sections of the paper or brief discussion in only a few sections.	30%
Conclusion	The conclusion is engaging and restates the thesis. Relates topic back to 'real world' applications	The conclusion restates the thesis.	The conclusion does not adequately restate the thesis.	Incomplete statement or confusing.	5%
References	Done in the correct format with no errors. Includes more than 5 major references (e.g. peer reviewed science journal articles, books, and no more than professional two internet sites. No encyclopedic type references)	Done in the correct format with few errors. Includes more than 3 major references (e.g. peer reviewed science journal articles, books, and no more than professional two internet sites. No encyclopedic type references)	Done in the correct format with some errors. Includes more 1-2 major references (e.g. peer reviewed science journal articles, books, and no more than professional two internet sites. No encyclopedic type references)	No reference section.	5%
In-text citations	All facts are cited using primary literature or peer sources. Correct format with no errors	Some facts are cited. Correct format, very few errors.	Few facts are cited Correct format, few errors.	No in-text citations.	5%
End-of-lab Questions	Exemplary work. No mistakes. Well-organized. Excellent understanding.	Adequate level of work. Organized. Good level of understanding.	Minimum acceptable work. Some minor mistakes. Some understanding.	Several major mistakes. Unorganized. Limited understanding.	10%
Grammar	No errors sentence structure and word usage.	Almost no errors in sentence structure and word usage.	Many errors in sentence structure and word usage.	Numerous and distracting errors in sentence structure and word usage.	5%
Figures and tables	Tables and figures are numbered consecutively in separate series. The title is complete enough to be understood without referring to any other text. Legend, headings, and units of measure are included. Footnotes are used as necessary to provide clarity with respect to: • Units of measure that do not fit in the heading. • Explanations of abbreviations and symbols. • Statistical significance of entries.	Tables and figures are numbered consecutively in separate series. The title is complete. Legend, headings, and units of measure are included. Footnotes are used to provide clarity.	Tables and figures are numbered, but not sequentially. The title is incomplete. Legend, headings, and units of measure are not fully included. Footnotes are used but do not provide enough clarity.	Tables and figures are not numbered. There is no title. Legend, headings, and units of measure are not included. Footnotes are not used although they should have been.	5%