



UTTyler

DEPARTMENT OF
CHEMISTRY & BIOCHEMISTRY

INSTRUMENTAL ANALYSIS LABORATORY

SYLLABUS

SPRING 2023

THE UNIVERSITY OF TEXAS AT TYLER

3900 UNIVERSITY BLVD.
TYLER, TX 75799

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MEETING TIMES AND DATES

SEMESTER RUNS FROM JAN 9 TO APR 29

SEC.	TIME	ROOM	INSTRUCTOR
001	MON 1:30 PM—5:30 PM	RBS 4014	MR. JASON DISTEFANO

INSTRUCTOR CONTACT INFORMATION

Instructor of Record	Office	Office Hours	Email	Phone
Mr. Jason DiStefano Lecturer	RBS 3006	Tues 9:300—10:30am Wed 1:30—5:30pm	jdistefano@uttyler.edu	903.566.7185
Dr. Tanya Shtoyko Professor	RBS 3003	By Appointment	tshtoyko@uttyler.edu	903.565.5641

COURSE DESCRIPTION

Chemistry is an experimental science. Chemical knowledge has resulted from experimental observations and studies made by thousands of scientists over many centuries. In this course, students will examine, test, and establish for themselves advanced principles in standard quantitative methods of analysis and method validation. This course will expand the student's fundamental techniques in chemical analysis, scientific recordkeeping, writing, and communication. The course will also apply theories and concepts learned from the lecture to solve real-world problems.

Prerequisite: Credit for Analytical Chemistry lecture and lab (CHEM 3311 and 3111). Credit for or concurrent enrollment in Instrumental Analysis lecture (CHEM 4313).

COURSE OVERVIEW

Chemistry is the study of matter and its' interactions. Analytical chemistry is one of the five main branches of chemistry that is responsible for characterizing the composition of matter and/or chemical systems. Analysis through instrumentation plays a role in analytical chemistry, which affects all areas of chemistry and other disciplines. Advancement in instrumentation has facilitated the characterization of complex chemical systems, both qualitatively and quantitatively. Furthermore, instrumental analysis has become more commonplace and user friendly. This allows benchtop chemists with little training the ability to perform complex methods and analysis. Because of its strong and apparent overlap into all branches of chemistry, instrumental analysis is vital for progressing scientific knowledge. In this course, students will learn about several instrumentation techniques and develop methods to measure and characterize samples.

STUDENT LEARNING OUTCOMES (CORE OBJECTIVE ASSESSED):

- Students will develop knowledge of instrumental techniques that are commonly used in established methods of analysis. (critical thinking, empirical and quantitative, communication, and teamwork skills)
- Students will investigate and apply the principles upon which many chemical analyses are based. (critical thinking, empirical and quantitative skills)
- Students will make scientific observations and assess their importance and significance. (critical thinking, communication, empirical, quantitative, and teamwork skills).
- Students will collect and manage data in a scientific notebook in order to express their results in a precise and reliable quantitative form on laboratory reports. (empirical and quantitative, and communication skills)
- Students will apply statistical analysis to draw logical conclusions about the applicability and validity of observed data. (critical thinking skills)
- Students will use collected data to calculate physical or chemical quantities germane to the experiment being performed. (empirical and quantitative skills)
- Students will develop teamwork skills that include not only the efficient acquisition of experimental data, but also the awareness of safety in the laboratory setting. (Teamwork)

In addition to the core objectives being assessed students will also be expected to:

- Use more advanced apparatus and apply experimental methodologies in the chemistry laboratory setting.
- Demonstrate safe and proper handling of laboratory equipment and chemicals.

MATERIALS REQUIRED FOR LAB WORK:

Laboratory Notebook: Each student must purchase and maintain a bound laboratory notebook in which to generate a *permanent* record of experimental observations, notes, calculations, etc. The lab record book you purchase must provide:

- a label for your name and contact information (phone, email, or other), course prefix (CHEM), course and section number (e.g. 3111.001), semester, and the instructor's name;
- a table of contents page
- pages consecutively *pre-numbered*;
- *preprinted* page headings for entering title, date, name, and *specific* lab section (e.g., CHEM 3111.001); and
- a *perforated*, carbonless duplicate for each page.

Lab Manual: The experiments and procedures will come from a variety of sources. Students are provided with a lab procedure through Canvas for each experiment.

Scientific Calculator

Instrumental Analysis Lecture Textbook: This item may not be essential during class, but may be needed for reference purposes to complete laboratory assignments.

Computer Access: with Microsoft Excel, PowerPoint, Word, Zoom, and LoggerPro (free for students through course).

Personal Protect Equipment (PPE):

1. **Splash-Proof Goggles** must be worn in the laboratory whenever you or your neighbors are performing experiments. (Time during your initial lab period will be allotted for purchasing goggles from your American Chemical Society Student Affiliates on campus to ensure that you will be prepared to comply with this requirement.) **Warning:** students will not be admitted into the lab without splash-proof goggles!
2. **Appropriate clothing** suitable for laboratory work must be worn by students. **Warning:** students will not be allowed to work in the lab without an effective coverage from chest to toes! (**This means no open-toed shoes or extensive areas of exposed skin on your torso!**) If you do not meet these requirements, you cannot work in the lab until the requirements are met.

LABORATORY REQUIREMENTS:

Students who perform unauthorized experiments or who remove chemicals or equipment from the lab may be dropped from the course or have their grades lowered.

Arrive on time and be prepared for each laboratory session. The laboratory experiments are such that the average student can complete the work during the assigned time. This can be accomplished only if a reasonable amount of study and preparation has been done before coming to the laboratory. Plan what is to be done in each experiment before coming to the lab. It will save time and will aid in avoiding serious mistakes.

Students are responsible for laboratory equipment furnished by the Department of Chemistry & Biochemistry and students may be required to purchase any missing or damaged equipment.

The grading of experiments will be based on the evaluations of each student's laboratory performance, experimental results, and the quality of their laboratory reports (*i.e.*, analyses and presentations of results.)

Students will be responsible for maintaining cleanliness in the desk areas. Students will be responsible to maintain a clean work area during each lab session. Students will be required to clean/sanitize their area of responsibility which may include cleaning/sanitization of shelves, sinks, hoods, reagent tables, and glassware/equipment. Students who neglect their clean-up responsibilities will have their grades significantly lowered for that day's work. Therefore, it is important that students have their clean-up duties approved by the lab instructor before leaving lab.

Students are required to turn in a lab report for each experiment. Your instructor will explain what is expected in the lab reports.

SAFETY POLICY

Read, comprehend, and follow the laboratory safety guidelines at all times. These rules include, but are not limited to:

Safety goggles must be worn in the laboratory at all times. Students who do not have safety goggles will not be admitted into the laboratory.

You will not be allowed in the lab with open-toed shoes or any clothing exposing extensive areas of your skin to the risks of burns or chemical splashes. Please come to class each day wearing long pants or skirt, an appropriate shirt and closed toe shoes. There is not sufficient time for you to return home to change clothes and we have NO opportunity to make-up missed labs.

Do not consume anything by mouth in the lab, including gum and smokeless tobacco! There is no eating in the lab space.

Do not perform unauthorized experiments or remove chemicals or equipment.

Note: we take safety infractions very seriously. Depending on the seriousness of such infractions, you may lose points on your lab work habits grade, be dismissed and receive a zero on any work missed, or even be dropped from the course.

ATTENDANCE POLICY

Lab attendance is essential. *One* make up lab is allowed (for one excused absence only).

An unexcused absence results in a grade of zero for any lab work or exam missed.

Normally, an excused absence includes medical emergencies, a death in your family or required travel for a UT Tyler's event (*e.g.*, athletic team travel). All supporting documentation should be presented to the lab instructor.

Students who anticipate being absent from class due to a religious observance are *required* to inform their instructors of such absences as soon as possible (at least one week before the religious holiday).

Students who anticipate being absent from class due to a required travel for a UT Tyler's event (*e.g.*, athletic team travel) are *required* to inform their instructor(s) of such absences at least one week before the absence.

COURSE GRADING

The grading of all assignments are up to the instructor; however the average weighting for the assignments will be uniform across all lab sections (see below). The overall course grade will tentatively be based on the 90/80/70/60 percentage scale, but it may be adjusted based upon the instructor's judgment of the overall class performance.

LABORATORY NOTEBOOK:

Maintaining detailed records of your laboratory work is vital for producing quality scientific reports or publications. A scientific investigator cannot prove their work is valid without a properly maintained notebook. By far, this record is one of the most important aspects of experimentation or research, and therefore will be an important part of your overall grade in this course. Your laboratory instructor will guide you in maintaining a laboratory notebook over the course of the class.

LAB REPORTS:

Formal laboratory reports will be completed and submitted electronically via Canvas. All reports must be typed and should follow ACS style guidelines. It is important that you can properly write, format and communicate a scientific document effectively. Each experiment is different, therefore, the lab report and the items required within may change for each experiment. Each report must include an abstract, detailed introduction of the experiment, experimental procedure, data/observations and/or results collected during the experiment, and a discussion. To accomplish this, you may need to generate tables and graph to properly communicate the information. Experiments will rely heavily on the use of Microsoft Word & Excel (or equivalent). Your instructor will provide you with details for each experiment.

DROPPING THE COURSE:

The last day to withdraw from the course with an automatic grade of "W" is listed on the laboratory schedule. Before dropping the course, you should consult with your instructor to examine all of your options. Dropping this course does not obligate you to also drop the lecture course because they are two separate courses. However, dropping the lecture course may significantly hinder your progress in this course because you will be expected to learn the chemical theories and concepts on your own.

The grades for this course will be weighted as follows:

20%	Laboratory Notebook
50%	Laboratory Reports
30%	Capstone Project
100%	Total

CAPSTONE PROJECT:

While it is important to be able to communicate scientific information in writing, it is equally important to do the same orally. As a group, you and your teammate(s) will be required to collaborate on a project that will require the analysis of multiple samples. Each sample will have to be assessed to determine the best analysis techniques. You will then have to develop methods for the analysis of each sample. You must submit a formal written report, as well as prepare and present your report in-person as a oral presentation. More specific details for the project will be given to you by your instructor.

LABORATORY SCHEDULE

<u>Day:</u>	<u>Experiment Schedule</u>
Jan 9	Introduction to course, syllabus, schedule, lab notebooks & reports, lab safety, and teamwork project
Jan 16	MLK Day—Lab will not meet this week
Jan 23	Method validation
Jan 30	Chromatography—Gas & Liquid Chromatography
Feb 13	Optical Spectroscopy—Atomic Absorption & UV/Vis Spectroscopy
Feb 27	Vibrational Spectroscopy—IR & Raman Spectroscopy
Mar 13	Spring Break—Lab will not meet this week
Mar 20	Mass Spectrometry—MS/MS
Apr 3	Capstone Analysis Project
Dec 5	Final Exams — Lab will not meet this week

Note: the right to substitute or switch labs, as required by unforeseen circumstances, is reserved.
All lab procedures are provided online via Canvas.

UNIVERSITY POLICIES & IMPORTANT INFORMATION

Important Covid-19 Information for Classrooms and Laboratories:

It is important to take the necessary precautions to ensure a healthy and successful year. UT Tyler continues to urge you to protect yourselves against the flu, COVID and any new threats that may be developing. Be diligent about preventive measures such as washing hands, covering sneezes/coughs, social distancing and vaccinations, which have proven to be successful in slowing the spread of viruses. Encourage those who don't feel well to stay home, and if they show symptoms, ask them to get tested for the flu or COVID. Self-isolation is important to reduce exposure (CDC quarantine/isolation guidelines). Please work with your faculty members to maintain coursework and please consult existing campus resources for support.

Should the Course go Online:

In the scenario that the course goes online during the semester. The instructor reserves the right to adjust assignments and grading scale. Students will still be required to meet during their assigned time unless specifically told by the instructor otherwise. Student will meet via Zoom. Zoom sessions will be recorded. ProctorU will be required for any Exams given online. Please see more information below.

Recording of Class Sessions:

Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.

Using Proctor U Auto or ProctorU Live :

At the discretion of the instructor of the course, online exams may require the use of ProctorU auto or ProctorU Live. The assessments in this course may be proctored using ProctorU. Beyond the cost of initial equipment needed (e.g. a camera for your computer), there will not be any additional cost for proctoring. You will need to create a ProctorU account and install the ProctorU extension before attempting any assessment.

To create a ProctorU account, follow the ProctorU tool within Canvas. Please make sure you are using the current version of Chrome or Firefox and download the ProctorU extension available at <http://bit.ly/proctoruchrome> or <https://www.proctoru.com/firefox>.

In order to use ProctorU, you will need the following:

1. High-speed Internet connection
2. Webcam (internal or external)
3. Windows, Mac, or Chrome Operating System
4. Up-to-date Chrome or Firefox browser and ProctorU extension installed
5. Valid photo ID
6. Quiet environment to take your assessment

You can visit the Test Taker Resource Page for additional information at <https://bit.ly/ProctorMe>



CHEMISTRY IS LIKE KUNG FU. A BUNCH OF FANCY TECHNIQUES THAT TAKES PATIENCE, ENERGY, HARD WORK, PRACTICE, AND TIME TO SEE RESULTS.

— JASON DISTEFANO

“NEVER FORGET THAT, AT THE MOST , THE TEACHER CAN GIVE YOU FIFTEEN PERCENT OF THE ART. THE REST YOU HAVE TO GET FOR YOURSELF THROUGH PRACTICE AND HARD WORK. I CAN SHOW YOU THE PATH BUT I CAN NOT WALK IT FOR YOU.”

— MASTER TAN SOH TIN

UNIVERSITY POLICIES & IMPORTANT INFORMATION

UT Tyler Honor Code

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.uttyler.edu/wellness/rightsresponsibilities.php>

Campus Carry

We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.uttyler.edu/about/campus-carry/index.php>

UT Tyler a Tobacco-Free University

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit www.uttyler.edu/tobacco-free.

Grade Replacement/Forgiveness and Census Date Policies

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. (For Fall, the Census Date is Sept. 12, 2016.) Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttyler.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract. The Census Date (Sept. 12th) is the deadline for many forms and enrollment actions of which students need to be aware. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

State-Mandated Course Drop Policy

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date).

Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

Disability/Accessibility Services

In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including non-visible a diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit <https://hood.accessiblelearning.com/UTTyler> and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at <http://www.uttyler.edu/disabilityservices>, the SAR office located in the University Center, # 3150 or call 903.566.7079.