



College of Arts & Sciences

CHEM 4331: Instrumental Analysis

Instructor: Dr. Raj (Rajashekhar

Kanchanapally)

Email: rkanchanapa@tamus.edu**Class Location:** STEM 179**Office:** STEM Suite 311 M**Class Hours:** MWF 10:00 - 10:50 AM**Office Hours:** RF 2:00 – 4:00 PM

Course Materials

Textbook: Quantitative Chemical Analysis, 10th edition, Daniel Harris. A personal laptop with the latest version of Excel is highly recommended. Use the following link to get online access to Achieve platform for e-textbook and homework. [Register for Achieve](#).

Homework: Homework will be assigned from end-of-the-chapter problems in the textbook and/or from online homework associated with your textbook.

Calculators: Scientific calculators are required for this course. Examples of acceptable calculators include TI30Xa and TI36X. Using programming mode during exams is prohibited.

Course Description: This is a one-semester course designed to introduce students to many chemical concepts, problems, and calculations used by analytical chemists. Principles and quantitative relationships in chemistry that may be introduced include chemical measurements, experimental error, statistics, quality assurance and calibration methods, electrical components, signal-to-noise, molecular spectroscopy, and separation methods.

Prerequisite: CHEM 3331 with a grade of “C” or better

Corequisite: CHEM 4131

Learning Objectives

By the end of this course students will be able to:

1. Explain how light interacts with matter and how absorption and emission are used in chemical analysis.
2. Use Beer’s Law to determine concentrations and evaluate the accuracy of spectrophotometric data.
3. Describe the key components and operation of spectroscopic instruments, including sources, monochromators, and detectors.
4. Distinguish between molecular and atomic spectroscopy techniques and select

appropriate analytical methods.

5. Interpret mass spectra to identify compounds, fragments, and molecular weights.
6. Explain the principles of chromatographic separations and factors affecting resolution and efficiency.
7. Compare GC, HPLC, and other chromatographic techniques for different analytical applications.

Student Responsibilities

Communication: The best way to contact instructors is via email. All correspondence between professors and students must occur via Texas A&M University San Antonio email accounts. Students are expected to access Blackboard regularly for updates on the course, announcements, and other course materials. All students are strongly encouraged to come to office hours or make appointments at other times to discuss course material and ask questions.

Attendance Policy: All students are expected to attend all lectures and actively engage in class discussions, activities, and assignments. Attendance may be monitored. If you are absent, you are responsible for the material covered and are expected to get notes, announcements, and any other material from another student in the class. Absences are excused if due to illness (medical excuse), death of an immediate family member, religious holiday (please inform instructor), official University activity, cancellation of classes, military duties, pregnancy & related conditions, or participation in legal proceedings. Excessive unexcused absences (more than 3) and tardiness may be penalized. **Accumulation of more than three unexcused absences may result in a one letter grade reduction.**

Late Work Policy: Homework due dates are listed on the syllabus for physical turn into the instructor. 20% will be deducted for late submission every day up to 3 days after the due date. No work will be accepted 3 days after the due date.

AI policy: This class assumes that all work submitted by students will be generated by the students themselves, working individually or in groups. Students should not have another person/entity do the writing of any portion of an assignment for them, which includes hiring a person or a company to write assignments and/or using artificial intelligence (AI) tools like ChatGPT. Use of any AI-generated content in this course qualifies as academic dishonesty and violates Texas A&M-San Antonio's standards of academic integrity.

Conduct and Behavior: As an instructor, my goal is to create a safe and engaging learning environment. Class disruptions are unacceptable, asking questions to clarify material during class does not qualify as a disruption and is encouraged. If you disrupt the class, you will be asked to leave for the day. Technology in the classroom may be a great resource, but it can also hinder the learning process. Therefore, students are not allowed to wear ear buds and headphones and/or use cellphones during class. All cellphones must be on vibrate or turned off for the entirety of the class/lab period. In case of an emergency call, leave the room before answering the call.

Texting/Tweeting/etc. during class is absolutely prohibited. The use of laptops, tablets, or other devices for non-class related activities is not allowed.

Electronic Devices during Exams: All electronic devices must be completely stored during exams and quizzes; this does not include approved scientific calculators (see course materials). Academic misconduct and attempts to cheat during the exam will be pursued according to Texas A&M-San Antonio code of conduct policy. You are discouraged from leaving the room during an exam. If you need to use the restroom, ask and leave all electronic devices with the instructor.

Aggressive Behavior: The academic environment is meant for discussing ideas in a respectful manner. Tolerance, empathy, respect, and courtesy help us create a safe environment. Abusive and aggressive behavior will result in contacting the University Police Department and immediate removal of the student from the classroom.

Visitors: Only students enrolled in the course are allowed in the classroom. No visitors are allowed.

IMPORTANT: Each student receives this information during the first lecture. It is your responsibility to read this material and be familiar with the course content, procedures, and grading.

Grading: Your grade for the course is based on: Four 100-point exams and homework assignments (approximately 12) worth 25 points each. These are the only opportunities for you to earn points throughout the semester. There are **no opportunities for extra credit**.

Exams: 3×100 points each = 300 (Least exam grade will be dropped)

Final exam: 100 points

Homework: 9×30 points each = 270

To calculate your grade, use the following equation: $\frac{\text{Points earned}}{\text{Total points}} \times 100$

All homework/exam grades will be posted to Blackboard. However, Blackboard course percentages are **not** considered as official, and students should use caution when using those to evaluate overall course grades. To calculate your grade, use the equation above. Letter grades are determined as follows:

Letter Grade:	A	B	C	D	F
% of Total Points:	90.0 - 100%	80.0 - 89.9%	70.0 - 79.9%	60.0 - 69.9%	0 - 59.9%

Academic Calendar: The complete academic calendar is available online at [Academic Calendar](#). Please be familiar with important dates.

Exams: There are no makeup examinations for unexcused absences! Contact me soonest if you have an issue.

Homework: Homework will be assigned from problems at the end of the chapter in your textbook and/or from other related sources including MacMillan Achieve.

Tentative lecture schedule: (Subject to change) Dates, topics and exam coverage is **tentative**. The instructor reserves the right to make changes as deemed necessary.

- **Jan 21–30:** Chapter 18–19
- **Feb 2–6:** Chapter 19 (HW 1)
- **Feb 9–13:** Chapter 20 (HW 2, **Exam I**)
- **Feb 16–20:** Chapter 20–21 (HW 3)
- **Feb 23–27:** Chapter 21–22
- **Mar 2–6:** Chapter 22 (HW 4, **Exam II**)
- **Mar 16–20:** Chapter 22–23
- **Mar 23–27:** Chapter 23–24 (HW 5)
- **Mar 30–Apr 1:** Chapter 24 (HW 6)
- **Apr 6–10:** Chapter 24–25 (**Exam III**)
- **Apr 13–17:** Chapter 25 (HW 7)
- **Apr 20–24:** Chapter 25–26
- **Apr 27–May 1:** Chapter 26 (HW 8, reserve day)
- **May 4:** reserve day (HW 9)
- **May 8: Final Exam**

[®]These are the tentative topics. Instructor reserves the right to make changes as deemed necessary.

IMPORTANT POLICIES AND RESOURCES

University Email Policy and Course Communications: All correspondence between professors and students must occur via University email accounts. You must have your Jaguar email account ready and working. If it is not working, contact the help desk at helpdesk@tamusa.edu or at 210-784-HELP (4357). If you don't hear back within 48 hours, contact them again. They have many requests during the first part of the semester, so you may need to follow up with them.

Academic Accommodations for Individuals with Disabilities: Texas A&M University-San Antonio is committed to providing all students with reasonable access to learning opportunities and accommodations in accordance with The Americans with Disabilities Act, as amended, and Section 504 of the Rehabilitation Act. If you experience barriers to your education due to a disability or think you may have a disability, Disability Support Services is located in the Central Academic Building, Suite 210. You can also contact us via phone at (210) 784-1335, visit us at the [website](#) or email us at dss@tamusa.edu. Disabilities may include, but are not limited to, attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their

academic accommodations with Disability Support Services and their instructors as soon as possible.

Academic Learning Center: All currently enrolled students at Texas A&M University-San Antonio can utilize the Academic Learning Center for subject-area tutoring. The Academic Learning Center provides free course-based tutoring to all currently enrolled students at Texas A&M University-San Antonio. Students wishing to work with a tutor can make appointments through the Brainfuse online tutoring platform. Brainfuse can be accessed in the *Tools* section of Blackboard. You can contact the Academic Learning Center by emailing tutoring@tamusa.edu, calling (210) 784-1307, or visiting the Central Academic Building, room 202. Online tutoring is also available for after hours and weekend assistance.

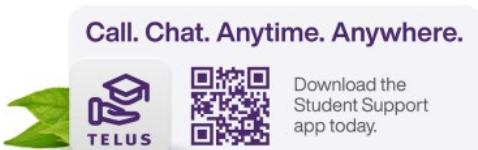
While tutoring hours may change based on tutor schedules and availability, the current tutoring hours for MATH in the ALC are as follows:

	Appointments available	Walk in Tutoring – No appointment needed
MONDAY	8 am – 6 pm	9 am – 5 pm
TUESDAY	8 am – 6 pm	9 am – 5 pm
WEDNESDAY	8 am – 6 pm	9 am – 5 pm
THURSDAY	8 am – 6 pm	9 am – 5 pm
FRIDAY	8 am – 5 pm	11 am – 4 pm

Counseling/Mental Health Resources: As a college student, there may be times when personal stressors interfere with your academic performance and negatively impact your daily functioning. If you are experiencing emotional difficulties or mental health concerns, support is available to you through the Student Counseling Center (SCC). To schedule an appointment, visit our website, call 210-784-1331 or visit Madla 120 between the hours of 8:00 AM and 5:00 PM.

All mental health services provided by the SCC are free and confidential (as the law allows). The Student Counseling Center provides brief individual and group therapy, crisis intervention, consultation, case management, and prevention services. *Crisis support is available 24/7/365 by calling the SCC at 210-784-1331 or through the TELUS student support App.*

The TELUS Student Support App provides a variety of mental health resources to including 24/7/365 support for in the moment distress, crisis support, an anonymous peer-to-peer support network, mental health screenings, podcasts, and articles to improve your mental wellbeing.



Emergency Preparedness: JagE Alert is Texas A&M University-San Antonio's mass notification system. In the event of an emergency, such as inclement weather, students, staff and faculty, who are registered, will have the option to receive a text message, email with instructions and updates. To register or update your information visit: <https://tamusa.bbcportal.com/>. More information about Emergency Operations Plan and the Emergency Action Plan can be found [here](#). Download the SafeZone App (<https://safezoneapp.com/>) for emergencies or call (210) 784-1911. Non-Emergency (210) 784-1900.

Financial Aid and Verification of Attendance: According to the following federal regulation, 34 CFR 668.21: U.S. Department of Education (DoE) Title IV regulation, a student can only receive Title IV funds based on Title IV eligibility criteria which include class attendance. If Title IV funds are disbursed to ineligible students (including students who fail to begin attendance), the institution must return these funds to the U.S. DoE within 30 days of becoming aware that the student will not or has not begun attendance. Faculty will provide the Office of Financial Aid with an electronic notification if a student has not attended by the published Census Date (the first week of class). Any student receiving federal financial aid who does not attend prior to the published Census Date (the first week of class) will have their aid terminated and returned to the DoE. Please note that any student who stops attending at any time during the semester may also need to return a portion of their federal aid.

Jaguar Writing, Language, and Digital Composing Center (WLDCC): The Jaguar Writing Center provides writing support to graduate and undergraduate students in all three colleges as well as faculty and staff. Writing tutors work with students to develop reading skills, prepare oral presentations, and plan, draft, and revise their written assignments. Our language tutors support students enrolled in Spanish courses and students composing in Spanish for any assignment. Our digital studio tutors support students working on digital projects such as eportfolios, class presentations, or other digital multimedia projects. The Writing Center offers face-to-face, synchronous online, and asynchronous digital appointments. Students can schedule appointments with the Writing Center in JagWire under the Student Services tab. Click on “Writing, Language, and Digital Composing Center” to make your appointment. Students wanting to work in realtime with a tutor can schedule an “Online Appointment.” Students wishing to receive asynchronous, written feedback from a tutor can schedule an “eTutoring” appointment. More information about what services we offer, how to make an appointment, and how to access your appointment can be found on our [website](#). The Writing Center can also be reached by emailing writingcenter@tamusa.edu.

Meeting Basic Needs: Any student who has difficulty affording groceries or accessing sufficient food to eat every day or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to submit a [CARE report](#) for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable them to direct you to available resources. A food pantry is available on campus; click [here](#) for hours and contact information.

Military Affairs: Veterans and active-duty military personnel are welcomed and encouraged to visit the Office of Military Affairs for any question involving federal or state VA Education Benefits. Visit the Patriots’ Casa building, room 202, or to contact the Office of Military Affairs with any questions at military.va@tamusa.edu or (210)784-1397.

Religious Observances: Texas A&M University-San Antonio recognizes the wide variety of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or course work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes for regular session classes.

The Six-Drop Rule: Students are subject to the requirements of Senate Bill (SB) 1231 passed by the Texas Legislature in 2007. SB 1231 limits students to a maximum of six (6) non-punitive course drops (i.e., courses a student chooses to drop) during their undergraduate careers. A non-punitive drop

does not affect the student's GPA. However, course drops that exceed the maximum allowed by SB 1231 will be treated as "F" grades and will impact the student's GPA.

Statement of Harassment and Discrimination: Texas A&M University-San Antonio is committed to the fundamental principles of academic freedom, equal opportunity, and human dignity. To fulfill its multiple missions as an institution of higher learning, A&M-San Antonio encourages a climate that values and nurtures collegiality and the uniqueness of the individual on our campus and within our state, nation, and world. All decisions and actions involving students and employees are to be based on applicable law and individual merit. Texas A&M University-San Antonio, in accordance with applicable federal and state law, prohibits discrimination, including harassment, on the basis of race, color, sex, religion, national origin, age, disability, genetic information, veteran status, sexual orientation, or pregnancy/parenting status. Individuals who believe they have experienced harassment or discrimination prohibited by this statement are encouraged to contact the University's Civil Rights Officer at 210-784-2061 or titleix@tamusa.edu.

Texas A&M University-San Antonio faculty are committed to providing a safe learning environment for all students and for the university as a whole. If you have experienced any form of sex discrimination or harassment, including sexual assault, sexual harassment, domestic or dating violence, or stalking based on sex, know that help and support are available. A&M-San Antonio's Title IX Coordinator can support those impacted by such conduct in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. The university strongly encourages all students to report any such incidents to the Title IX Coordinator. Please be aware that all A&M-San Antonio employees (other than those designated as confidential resources such as counselors and trained victim advocates) are required to report information about such discrimination and harassment to the university. This means that if you tell a faculty member about a situation of sexual harassment, sexual violence, or other related sex-based misconduct, the faculty member must share that information with the university's Title IX Coordinator (titleix@tamusa.edu, 210-784-2061, CAB 439K). If you wish to speak to a confidential employee who does not have this reporting requirement, you can contact the Student Counseling Center at (210) 784-1331 or visit them in Madla 120.

Pregnant/Parenting Students: Texas A&M-San Antonio does not require a pregnant or parenting student, solely because of that status or issues related to that status, to (1) take a leave of absence or withdraw from their degree or certificate program; (2) limit the student's studies; (3) participate in an alternative program; (4) change the student's major, degree, or certificate program; or (5) refrain from joining or cease participating in any course, activity, or program at the University. The university will provide such reasonable accommodations to pregnant students as would be provided to a student with a temporary medical condition that are related to the health and safety of the student and the student's unborn child. These could include maintaining a safe distance from substances, areas, and activities known to be hazardous to pregnant individuals and their unborn child; excused absences because of illness or medical appointments; modified due dates for assignments; rescheduled tests/exams; taking a leave of absence; and being provided access to instructional materials and video recordings of lectures for excused absences, if these would be provided to any other student with an excused absence. Pregnant/parenting students are encouraged to contact the

Title IX Coordinator with any questions or concerns related to their status (titleix@tamusa.edu; 210-784-2061; CAB 439K).

Texas A&M-San Antonio has also designated the Title IX Coordinator as the liaison officer for current or incoming students who are the parent or guardian of a child younger than 18 years of age. The Title IX Coordinator can provide students with information regarding support services and other resources. Young Jaguars can support parenting students with daycare if students meet this criteria: (1) must be enrolled in classes at Texas A&M-San Antonio in the current semester, (2) must be Pell eligible or a single parent, (3) child(ren) must be aged 3 to 12-years-old, and (4) child(ren) must be enrolled in Pre-K-3 through 6th grade. For more information, please contact Young Jaguars at youngjaguars@tamusa.edu or call (210) 784-2636.

Students' Rights and Responsibilities: The following statement of students' rights and responsibilities is intended to reflect the philosophical base upon which University Student Rules are built. This philosophy acknowledges the existence of both rights and responsibilities, which is inherent to an individual not only as a student at Texas A&M University-San Antonio but also as a citizen of this country.

Students' Rights:

- A student shall have the right to participate in a free exchange of ideas, and there shall be no University rule or administrative rule that in any way abridges the rights of freedom of speech, expression, petition and peaceful assembly as set forth in the U.S. Constitution.
- Each student shall have the right to participate in all areas and activities of the University, free from any form of discrimination, including harassment, on the basis of race, color, national or ethnic origin, religion, sex, disability, age, and pregnancy/parenting or veteran status in accordance with applicable federal and state laws.
- A student has the right to personal privacy except as otherwise provided by law, and this will be observed by students and University authorities alike.
- Each student subject to disciplinary action arising from violations of university student rules shall be assured a fundamentally fair process.

Students' Responsibilities:

- A student has the responsibility to respect the rights and property of others, including other students, the faculty, and administration.
- A student has the responsibility to be fully acquainted with the published University Student Rules found in the Student Handbook, [Student Code of Conduct](#), on our website, and University Catalog, and to comply with them, as well as with federal, state, and local laws.
- A student has the responsibility to recognize that student actions reflect upon the individuals involved and upon the entire University community.
- A student has the responsibility to recognize the University's obligation to provide a safe environment for learning.
- A student has the responsibility to check their university email for any updates or official university notifications.

We expect that students will behave in a manner that is dignified, respectful, and courteous to all people, regardless of sex, ethnic/racial origin, religious background, or disability. Conduct that infringes on the rights of another individual will not be tolerated.

Students are expected to exhibit a high level of honesty and integrity in their pursuit of higher education. Students engaging in an act that violates the standards of academic integrity will find themselves facing academic and/or disciplinary sanctions. Academic misconduct is any act, or attempt, which gives an unfair advantage to the student. Additionally, any behavior specifically prohibited by a faculty member in the course syllabus or class discussion may be considered as academic misconduct. For more information on academic misconduct policies and procedures please review the [Student Code of Conduct](#) or visit the resources available in the [OSRR website](#)

Important Spring 2026 Dates:

Dates	Event
January 13	Tuition & Fee Payments deadline
January 19	Martin Luther King, Jr. – No Classes
January 20	First day of class
February 4	Census date
February 23-March 6	Midterm grading period
March 9-March 14	Spring Break
April 3	Study Day – No classes
April 17	Last day to drop with an automatic “W”
May 1	Last day to drop a course or withdraw from the University
May 4	Last day of classes
May 5	Study Day – No classes
May 6-May 12	Final exams
May 19	Commencement

The complete [academic calendar](#) is available online

No Use of Generative AI Permitted

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IMPORTANT. Each student receives this information during the first class. It is your responsibility to read this material and be familiar with the course syllabus.