



Chemistry 5310

Advanced Analytical Chemistry

Fall 2017, T 5:30-8:25 PM, CH 104

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Course Description: This course deals with the review of the fundamental concepts of analytical chemistry as well as the theory, principles and applications of selected analytical methods which includes spectroscopy, electrochemistry, elemental analysis, chromatography, surface characterization and thermal techniques.

Recommended Texts:

The course has been developed from several literatures. There is no single textbook that covers it in a manner that is appropriate for this course. Lecture notes from some of the lectures will be made available to students. Here are some books that you can check:

- Skoog, D.A.; West, M.W.; Holler, F.J.; Crouch, S.R., *Fundamentals of Analytical Chemistry*, 9th ed; Thomson Brooks/Cole, 2014.
- Skoog, D.A.; Holler, F.J.; Crouch, S.R., *Principles of Instrumental Analysis*, 7th ed; Thomson Brooks/Cole, 2017.
- Harris, D.C., *Quantitative Chemical Analysis*, 9th ed; W. H. Freeman, 2015.
- Bender, G.T., *Principles of Chemical Instrumentation*; W.B. Saunders Company: 1987.

Course Objectives

Upon completion of the course, the student should be able to:

- Understand and apply chemical principles central to analytical chemistry.
- Understand the principle and analytical capabilities of a number of instrumental methods.
- Developed critical thinking skills that are used to interpret analytical data.
- Improve oral communication skills through oral presentations on various instrumental methods in analytical chemistry.

Topics

1. Introduction to Analytical Chemistry

- Chemicals, Apparatus and Unit Operations
- Chemical Measurements
- Errors and Statistical Analyses
- Sampling, Standardization and Calibration

2. Classical Methods
 - Gravimetric Analysis
 - Titrations
3. Spectroscopy
 - AAS
 - LIBS
 - FTIR
 - Raman
 - XPS
4. Separation Techniques
 - Chromatography
 - Mass Spectrometry
5. Electroanalytical Methods
 - Potentiometry
 - Coulometry
6. Imaging Methods
 - AFM
 - TEM
7. Thermal Analysis
 - DSC
 - TPD

Grading: A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = 0-59%

Chemistry 5301

	Percentage	Tentative Date/Time
1 st Exam	20%	Sept 26 (5:30-7pm)
2 nd Exam	20 %	Oct 31 (5:30-7pm)
Final Exam	30 %	Dec 5 (5-7:30pm)
Grp Presentation	20 %	TBA
Quizzes/Problem Sets	10 %	

Oral Presentation. Each group (group of 2) will be given up to 40 minutes to present and contrast two analytical methods. The talk will be followed by up to 10 minutes of questions from the audience. A quiz about the topics discussed in the talk will be given after each of the presentation meetings.

Exams and Quizzes. All the exams will be traditional, written type exams. Occasional quizzes will be given covering the material from previous class, homework or preparatory material for that particular meeting. No make up for quizzes, tests, however, special accommodations will be made in the event of personal/family emergencies, illness, or required participation in university activities. These events must be documented for accommodations.

Cell phones are prohibited during class. Turn them off and leave them in your bag. Only calculators are permitted during exams. **All other electronic devices such as cell phones, tablets, computers, etc. are not allowed.**

Academic Honesty: All graded material submitted for this course is required to be your own work (or your group) and all references used in developing your graded materials properly cited. Plagiarism in reports or cheating on exams are examples of academic dishonesty. All instances of academic dishonesty will result in a grade of zero for that assignment/paper or examination. Repeated instances of academic dishonesty will result in a course grade of “F” and other possible additional academic penalties. Use of any wireless devices during tests and exams will be treated as an academic dishonesty.

Students with Disabilities:

For students with disabilities, this course will comply with all accommodations prescribed by the Lamar University Office of Services for Students with Disabilities. It is the responsibility of the student to insure that the instructor has been informed of all prescribed accommodations.

Attendance:

Regular class attendance is important to the attainment of the educational objectives of the University. Attendance will be checked daily (see federal policies).

Federal Policies:

Title IV Policy: Each semester, every faculty member will be required to check attendance records, and then indicate any student who is no longer attending the class. The checked rolls will be signed by the faculty member and returned to the Registrar’s office.

FERPA (Family Education Rights Privacy Act of 1972): Due to the privacy laws regarding student grades in FERPA, a student’s grade cannot be discussed with anyone other than student – no one else including parents and/or friends. This includes emails, voice mails, over the phone, answering services, etc. Therefore the student must appear in person to insure identity and can only access their grade.

Emergency Preparedness

As we begin this semester, I want to take a few minutes and discuss emergency preparedness. Lamar is a very safe campus and there is a low probability that a serious incident will occur here. However, we want to emphasize our emergency procedures for evacuation and shelter in place incidents. Our preparedness will be critical IF an unexpected event occurs!

Instructions for specific emergencies, such as severe weather, chemical release, active shooter, or fire can be found at: <http://www.lamar.edu/aboutlu/administration/risk-management/index.html>

Here are some simple things you should do in the event an emergency occurs during our class.

- Always follow the directions of the instructor or emergency personnel
- If told to evacuate, do so immediately.
- If told to shelter-in-place, find a room, in the center of the building with few windows, on the lowest level of the building.
- If told to lockdown, lock and barricade the door if possible. Turn off the lights and wait for police to arrive.

Emergency Procedures

Many types of emergencies can occur on campus; instructions for severe weather or violence/active shooter, fire, or chemical release can be found at: <http://www.lamar.edu/about-lu/administration/risk-management/index.html>

Following are some of the procedures:

Campus Closure:

In the event of an announced campus closure in excess of four days due to a hurricane or other disaster, students are expected to login to Lamar University's website's home page for instructions about continuing courses remotely

Severe Weather:

- Follow the directions of the instructor or emergency personnel.
- Seek shelter in an interior room or hallway on the lowest floor, putting as many walls as possible between you and the outside.
- If you are in a multi-story building, and you cannot get to the lowest floor, pick a hallway in the center of the building.
- Stay in the center of the room, away from exterior walls, windows, and doors.

Violence/Active Shooter (CADD):

- CALL - 8-3-1-1 from a campus phone (880-8311 from a cell phone). Note: Calling 9-1-1 from either a campus phone or cell phone will contact Beaumont City Police Dispatch rather than University Police.
- AVOID- If possible, self-evacuate to a safe area outside the building. Follow directions of police officers.
- DENY- Barricade the door with desks, chairs, bookcases or any other items. Move to a place inside the room where you are not visible. Turn off the lights and remain quiet. Remain there until told by police it is safe.
- DEFEND- Use chairs, desks, cell phones or whatever is immediately available to distract and/or defend yourself and others from attack.