

CHEM 3405 – Instrumental Analysis Lecture Spring 2023 (MWF 10:00 – 10:50 am)

Instructor: Dr. J. SHAO

Phone, Office, Email: (940) 397-4463
Bolin Science Hall, 307E
jianguo.shao@mwsu.edu

Office Hours: 1:30 – 4:30 pm (TR)

Textbook: Skoog, D. A.; Holler, F. J.; Crouch, S. R. *Principles of Instrumental Analysis*, 7th Ed., Cengage Learning, **2018**.

Prerequisites: CHEM 3305 and concurrent enrollment of CHEM3405-21A

Grading Procedure:

| | |
|---------------------------------|-------------|
| 4 One-hour Exams @ 100 pts each | 400 (57.1%) |
| 4 Pop Quizzes @ 25 pts each | 100 (14.3%) |
| 4 Paper Reviews @ 25 pts each | 100 (14.3%) |
| Final ACS Test @ 100 pts | 100 (14.3%) |

Grading Scale:

Final grade will be given by the combination of lecture (60%) and lab (40%).
Grade will be assigned as follows: **A: $\geq 90\%$; B: 80 – 89%; C: 70 – 79%; D: 55 – 69% and F: $< 55\%$.**

General Education Statement:

Students in this course must demonstrate their competency in reading, writing, and some fundamental math skills through satisfactory completion of all assignments.

Course Content:

This class provides the basic knowledge of instrumental analysis. You will learn these techniques: Separation (GC, HPLC, SFC and CE), spectroscopy (AAS, AES, UV-visible, FT-IR and MS) and electrochemistry (Potentiometry, Coulometry and Voltammetry). Four research papers related with the instrumental analysis will be assigned and reviewed by students using the knowledge learned in the course.

Academic Dishonesty:

Cheating on any exam, quiz or lab report will be regarded as academic dishonesty and will be subject to a final course grade of “F”.

Tentative Lecture Schedule (changes may be made)

| Date(s) | Chapter | Topic |
|---------------------|-----------------|---|
| Jan. 18 – 20 | 26 | An Introduction to Chromatographic Separations |
| Jan. 23 | 27 | Gas Chromatography |
| Jan. 25 – 30 | 28 | High-Performance Liquid Chromatography |
| Feb. 01 – 03 | 30 | Capillary Electrophoresis and Capillary Electrochromatography |
| Feb. 06 | TEST 1 | Chapters 26 – 28, 30 |
| Feb. 08 – 15 | 6 | An Introduction to Spectrometric Methods |
| Feb. 17 – 22 | 7 | Components of Optical Instruments |
| Feb. 24 – 27 | 8 | An Introduction to Optical Atomic Spectrometry |
| Mar. 01 – 06 | 9 | Atomic Absorption and Atomic Fluorescence Spectrometry |
| Mar. 08 – 10 | 10 | Atomic Emission Spectrometry |
| <i>Mar. 13 – 17</i> | <i>No Class</i> | <i>Spring Break</i> |
| Mar. 20 | TEST 2 | Chapters 6 - 10 |
| Mar. 22 – 24 | 13 | An Introduction to UV-visible Molecular Absorption Spectrometry |
| Mar. 27 – 29 | 14 | Applications of UV-visible Molecular Absorption Spectrometry |
| Mar. 31 – Apr. 03 | 15 | Molecular Luminescence |
| Apr. 05 – 10 | 16 | An Introduction to Infrared Spectrometry |
| <i>Apr. 06 – 07</i> | <i>No Class</i> | <i>Easter Break Holiday</i> |
| Apr. 12 – 14 | 17 | Application of Infrared Spectrometry |
| Apr. 17 | TEST 3 | Chapters 13, 14, 15, 16, 17 |
| Apr. 19 – 24 | 20 | Molecular Mass Spectrometry |
| Apr. 26 – 28 | 22 | Introduction to Electroanalytical Chemistry |
| May 01 – 03 | 23 - 25 | Potentiometry, Coulometry and Voltammetry |
| May 05 | TEST 4 | Chapters 20, 22-25 |
| May 10 | FINAL | 10:30 am – 12:30 pm; Bolin-304 |

| | |
|--|---------------------|
| Martin Luther King's Birthday Observed..... | January 16, 2023 |
| Classes begin..... | January 17, 2023 |
| Change of Schedule or Late Registration..... | January 17-20, 2023 |
| Deadline for May graduates to file for graduation..... | February 20, 2023 |
| Spring break..... | March 13-18, 2023 |
| Last day of drop for "W", 4:00 pm | March 27, 2023 |
| Holiday break | April 06-07, 2023 |
| Last day of classes..... | May 05, 2023 |
| Final examinations..... | May 08-11, 2023 |
| Commencement..... | May 13, 2023 |

Student Resources:

https://msutexas.edu/academics/scienceandmath/student_resources.php

Campus-Carry Rules:

Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Area excluded from concealed carry are appropriately marked, in accordance with state law. For more information regarding campus carry, please refer to the University's webpage at <http://mwsu.edu/campus-carry/rules-policies>.