Chemistry 5390
Fall 2021

Lecture: TTh 8:00 a.m. – 9:20 p.m. CHEM 253 and CHEM 271. Also special speakers and XRD companies will be invited for the course.

Instructor: Dr. Teresa D. Golden

Office hours: 10:30 - 11:30 a.m. MW, CHEM 279, 565-2888, tgolden@unt.edu

Reading: *X-ray Diffraction Procedures for Polycrystalline and Amorphous Materials,* H.P. Klug and L.E. Alexander, Wiley, 1974, ISBN 0-471-49369-4

Elements of X-ray Diffraction, B.D. Cullity and S.R. Stock, Prentice Hall, 3rd edition, 2001, ISBN 0-201-61091-4

X-ray Diffraction, C. Suryanarayana and M. Norton, 1998, ISBN 0-306-45744-X

Introduction to X-ray Powder Diffractometry, R. Jenkins and R. Synder, John Wiley & Sons, 1996, 0-471-51339-3

The reading assignments are on hold at the Eagle Commons library under the instructor and course name. Passcode CHEM5390.

Exams: There will be several exams, homework assignments, a research project and a final exam. Dates for each exam will be announced in class.
The final will be Tuesday, December 7th, 8:00 a.m. - 10:00 a.m.

Project: The research project can include the student's graduate research related to x-ray analysis or an assigned topic. Abstract for research topic is due September 30th. Outline due October 26th. Research Paper due December 2nd, 2021.

Grading: A – 90% B – 80% C – 70% D – 60% F < 60%

Additional Information:

(a) No Makeups or Late Assignments accepted.

(b) *The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to*

be delivered to faculty to begin a private discussion regarding your specific needs in a course. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the Office of Disability Accommodation website at http://www.unt.edu/oda.

(c) *Students are expected to attend classes regularly and to abide by the attendance policy established for each class. If you are experiencing any symptoms of COVID-19 (https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider PRIOR to coming to campus. UNT also requires you to contact the UNT COVID Hotline at COVID@unt.edu for guidance on actions to take due to symptoms, pending or positive test results, or potential exposure.*

Lecture Topics: CHEM 253

I. Production and Properties of X-rays
II. Basic Crystallography
III. Diffraction Theory
IV. Instrumentation for X-ray Diffraction
V. Crystallographic Databases
VI. Qualitative Analysis
VII. Quantitative Analysis

Lab Topics: CHEM 271

Lab 1: Safety, Sample Prep and Instrument Operation (Powder)
Lab 2: Crystal Structure Determination - Cubic (Powder)
Lab 3a: Crystal Structure Determination - Hexagonal (Powder)
Lab 3b: Basic Instrument Operation (Single-Crystal)
Lab 4: Determination of Precise Lattice Parameters (Powder)
Lab 5: Determination of Crystallite Size and Strain (Powder)
Lab 6a: Intro to Software, ICDD JCPDS jPowd, Rietveld (Powder)
Lab 6b: Intro to Software, Databases (Single Crystal)
Lab 7: Open Research Project