

SPECIAL TOPICS IN PHYSICS: MATERIALS RESEARCH METHODS AND FINE MEASUREMENTS

Fall 2019

Instructor:	Hari Nair	Time:	TR 17:00 to 18:20
Email:	hnair@utep.edu	Place:	PSCI 321
CRN:	18804	Credits:	3

Office Hours: After class, or by appointment.

Textbooks/Resources: This is a restricted list of various interesting and useful books that will be touched during the course. You might need to consult some of them frequently; some others not so.

- A. R. West, *Solid state chemistry and its applications*, Wiley
- D. S. Sivia, *Elementary scattering theory for X ray and neutron users*, Oxford
- Heitmann and Montfrooij, *Practical neutron scattering*, MURR publishing
- Stephen Blundell, *Magnetism in condensed matter*, Oxford
- Online resources on X ray diffraction and neutron scattering. Some might be shared during the classes.

Objectives: This course is primarily designed for graduate students to obtain an introduction to research methods and experimental tools used in materials science or condensed matter physics. In Fall 2019, this course will focus mostly on materials synthesis, X-ray methods and magnetism. This is intended to be a predominantly hands-on course. So please bring your laptops everyday to the class. Be prepared to learn and use LaTeX, Matlab, Fullprof and related softwares/utilities.

Prerequisites: An undergraduate-level understanding of modern physics, atomic theory, basic chemistry might help. Proficiency in using scientific software is certainly an advantage for this course.

Tentative Topics:

- | X-ray diffraction and preliminary analysis
- | Phase identification of a compound from X-ray data
- | X ray diffractometers/ components
- | Magnetic measurements (VSM and SQUID magnetometers)
- | Preliminary analysis of magnetic data
- | Neutron diffraction

Grading Policy: There are no homeworks for credit. You will be given assignments to do outside of class but I won't grade them and they don't carry points. Grades will be purely based on (a) performance in the class = 20% (b) two surprise exams = 30% each and (c) seminars = 20%.

Academic Honesty: Lack of knowledge of the UTEP academic honesty policy is not a reasonable explanation for a violation. Details might be here: <https://www.utep.edu/student-affairs/>