
MWF 9-10
Room 38 Physics

This course will consist of lectures given by members of the Ames Lab and ISU CMP program and it is meant to codify many of the “details” that are never covered in more formal, theoretical reviews of these topics.

Lectures will primarily be power point presentations, which we plan to post on the Canfield group web site, augmented by black board work.

Grades will be based on attendance, participation and final, oral exam.

August 24 – 28: Introduction, basic measurement, example of “why this is so necessary”
P. Canfield

Aug. 31 - Sept. 4: Cryogens / measurement of temperature    M. Tanatar, R. Prozorov

Sept. 9-11: Low Pressure -- Vacuum generation, gauging and use.  A. Kaminski

Sept. 14 – 18: High Pressure generation, gauging and use for synthesis and measurements.  S. Bud’ko


Sept. 28 – Oct. 2: V, I, R measurements: how to generate and measure quantities and then how to get data (resistivity, magnetoresistance, Hall). M. Tanatar

Oct. 5 – 9: Other transport measurements (thermal conductivity and thermopower)
M. Tanatar

Oct. 12 – 16: Calorimetry and scanning thermal measurements    R. W. McCallum

Oct. 19 - 23: Specific heat and thermal expansion  S. Bud’ko

Oct. 26 - 30: Magnetization (d.c. and a.c.) PART 1: Measurement techniques and basic use.  R. Prozorov

Nov. 2 - 6: Magnetization (d.c. and a.c.) PART 2: Field and dependent measurements Phase diagrams, etc.  R. Prozorov

Nov. 9 - 13: Elastic scattering of X-rays and neutrons PART 1: basics technique, lab sources versus user facilities.  A. Goldman, A. Kreyssig, R. McQueeney
Nov. 16 – 20: Elastic scattering of X-rays and neutrons PART 2: More advanced discussions about specific measurements, comparisons of strengths and weaknesses, etc. A. Goldman, A. Kreyssig, R. McQueeney

Assignment of oral exam topics

Nov. 23 – 27: NO CLASSES

Nov. 30 – Dec. 4: Prepare for oral exams and start exams

Dec. 7 – 11: Oral exams

Dec. 14 – 18: Oral exams

For the second semester we plan to cover topics such as:

Growth of samples and phase diagrams
Quantitative powder X-ray diffraction
NMR Introduction and basics and examples
Band structure calculations: intro and basics
Angle resolved Photo-Emission Spectroscopy (ARPES)
Quantum oscillations and positron annihilation
Scanning Tunneling Microscopy
ODMR, OLED, OMG
Inelastic neutron scattering
Advanced synchrotron measurements/ Mossbauer Spectroscopy

Other suggestions for topics are welcome