

CHEM 571: Solid State Chemistry

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This course emphasizes four areas relevant to the field of solid state chemistry: (a) Structural principles; (b) Synthetic strategies and approaches; (c) Characterization methods; and (d) Chemical bonding and electronic structure. Throughout the course, various physical and chemical properties will be mentioned. Students are expected to have some exposure to fundamentals of inorganic and physical chemistry.

Webpage: All course resources are found on *Canvas* under *Modules* divided into the four areas. Each module includes (i) lecture preview slides (PDF format) for downloading/printing and using to take notes; (ii) lecture slides (PPS format) for reviewing after lectures; (iii) lecture notes (PDF format) to accompany the slides; and (iv) problem sets (answer keys posted after respective due dates).

Class Meeting Times: Monday & Wednesday 1:10-2:00pm, 1222 Hach Hall. There may be occasions to extend the meeting time by an additional 20-30 minutes during the semester.

CDC COVID-19 Recommendations: Universal indoor masking for all teachers, staff, students, and visitors, regardless of vaccination status.

Office Hours: Preferably by appointment. I keep an open-door policy and you are welcome to visit my office any time, but you may have to wait a few minutes.

Grading: The final grade will be based on completion of four problem sets, each of which covers the four major emphases, and a subjective assessment of in-class participation. Each problem set is due approximately one week after the final lecture period for that emphasis.

Tentative Syllabus:

Approximate Dates	Topic	Problem Set DUE
Jan. 19-Feb. 14	Structural Principles	~Feb. 18
Feb. 16-Mar. 9	Synthetic Aspects	~Mar. 11
Mar. 21-Apr. 11	Characterization Methods	~Apr. 15
Apr. 13-May 4	Electronic Structure and Bonding	~May 6

Texts: There are no required textbooks for this course. Solid state chemistry is an interdisciplinary field, and, in my opinion, there is no single textbook that covers all topics well. The notes I have prepared for this course are as close to a “textbook” that I am willing to commit. Nevertheless, the following resources are excellent resources for further reading and study:

Primary Resources for Class Materials:

- J. K. Burdett, *Chemical Bonding in Solids*, Oxford University Press: Oxford, 1995.
- A. K. Cheetham and P. Day, *Solid State Chemistry*, Oxford University Press, Vol. 1, “Techniques,” 1987.
- H. F. Franzen, *Physical Chemistry of Solids*, World Scientific, 1994.
- A. F. Wells, *Structural Inorganic Chemistry*; 5th Edition; Clarendon Press: Oxford, 1984.

Secondary Resources for Class Materials:

- A. K. Cheetham and P. Day, *Solid State Chemistry*, Oxford University Press, Vol. 2 “Compounds,” 1992.
- P. A. Cox, *The Electronic Structure and Chemistry of Solids*; Oxford University Press: Oxford, 1987.
- R. Hoffman, *Solids and Surfaces: A Chemist's View of Bonding in Extended Structures*; VCH: New York, 1988.
- B. G. Hyde, S. Andersson, *Inorganic Crystal Structures*; Wiley: New York, 1989.
- D. G. Pettifor, *Bonding and Structure of Molecules and Solids*, Oxford, 1995.
- A. R. West, *Solid State Chemistry and its Applications*; Wiley: New York, 1984.
- A. R. West, *Basic Solid State Chemistry*; Wiley: New York, 1988.