

Chemistry 455
Chemical Nanotechnology
4 units

Prof. Richard Brutchey, Fall 2014
(Lecture = 12:00–12:50 pm MWF)

CHEM 455 is an upper-division undergraduate course in Chemical Nanotechnology. The intent of this course is to describe how properties change when reducing the size of solids to the nanoscale, and explain, using concepts of solid state chemistry and physics, why these changes occur. Representative properties that may be covered include optoelectronic properties, magnetic properties, dielectric properties, and superconductivity. *Prerequisite: CHEM 453 Advanced Inorganic Chemistry.*

Required Texts: Owens & Poole, *The Physics and Chemistry of Nanosolids*

Supplemental Texts: Smart & Moore, *Solid State Chemistry: An Introduction*
Kittel, *Introduction to Solid State Physics*

Office/Contact: RLB LJS 260 (brutchey@usc.edu) Office Hour = 11:00 am W.

Grading:

Final Exam:	50% (December 12, 11 am-1 pm)
Critical Review:	30% (due November 25, presentations December 1-5)
Problem Sets:	10% (tentatively due September 19, October 17, November 14)
Pop Quizzes:	10% (given periodically throughout semester)

*** There will be absolutely no make ups, extra time, or special arrangements given for any exams, problem sets, or projects.**

Outline:

- I. Introduction, Feynman Lecture
- II. Solid-State Structures (1.1-1.2, 3.2)
- III. Ionic Bonding (6.1)
- IV. Defects in Ionic Solids (6.2)
- V. Phase Transitions (7.12)
- VI. Synthesis
- VII. Electronic Properties (8, 9)
- VIII. Magnetism (13)
- IV. Superconductivity (15)

Statement for Students with Disabilities:

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on Academic Integrity:

General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *Scampus*, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: <http://www.usc.edu/dept/publications/SCAMPUS/gov/>. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: <http://www.usc.edu/student-affairs/SJACS/>.