

Chemistry 455
Chemical Nanotechnology
4 units

Prof. Richard Brutchey, Dr. Patrick Cottingham (Burg Teaching Fellow)
Fall 2016
(Lecture = 12:00–12:50 pm MWF)
GFS 104

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 322aL or CHEM 325aL.*

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 = by appointment.
PC LJS 270 (pcotting@usc.edu) Office Hour = by appointment.

Grading:

Final Exam:	50% (December 9, 11 am-1 pm)
Critical Review:	30% (due November 23, presentations December 2)
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. Diffraction (2.2)
- VI. Phase Transitions (7.12)
- VII. Optoelectronic Properties (8, 9)

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/>. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct/>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity <http://equity.usc.edu/> or to the Department of Public Safety <http://capsnet.usc.edu/departments/departments-public-safety/online-forms/contact-us>. This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage sarc@usc.edu describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information <http://emergency.usc.edu/> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.