# Course Syllabus for PHYS 7440, Soid State Physics I (Fall 2012)

**Instructor:** Michael Hermele
Duane F-615
(303) 492-7466
michael dot hermele at colorado dot edu

**Office Hours:** Monday & Wednesday, 10:50am-12:00pm, or by appointment

**Grader:** Ke Ke (*email*: Ke.Ke at colorado dot edu)

**Lectures:** Monday, Wednesday, Friday, 10:00 – 10:50am, Duane G2B60

**Homework assignments:** There will be weekly homework assignments, due at the *beginning* of class every Friday. The first homework assignment will be due on September 7.

**Course webpage:** http://www.colorado.edu/physics/phys7440

**Course description:** This is an introductory graduate-level course in solid state physics, focusing on structural and electronic properties of solids. We will begin with structural properties: crystal lattices, phonons, elasticity, x-ray and neutron scattering. Then we will move on to electronic properties, covering band theory, electrical and thermal transport in metals and semiconductors, and other properties of metals, semiconductors and insulators. I also hope to cover integer quantum Hall effect in semiconductor heterostructures and graphene. This is only a rough outline and is not intended to be a complete list of every topic we will cover.

**PHYS 7450:** PHYS7450 is a "Solids II" course, more or less a continuation of PHYS7440, generally offered every other year in the spring. This course typically covers topics such as topological insulators, and collective phenomena in solids (*i.e.* magnetism, superconductivity). I expect PHYS7450 will be offered next during the 2013-14 academic year – keep it in mind if you think you may be interested.

**Required Textbook:** *Solid State Physics*, by N. W. Ashcoft and N. D. Mermin.

**Other Potentially Useful Books (very incomplete list):**

*Principles of Condensed Matter Physics*, P. M. Chaikin and T. C. Lubensky.

*Condensed Matter Physics,* Michael P. Marder.

**Prerequisites:** I will expect that you are comfortable with quantum mechanics and statistical mechanics at the level of the first-year graduate courses taught in the CU Boulder physics department. Please see me if you have not taken these courses, or comparable courses elsewhere. I will *not* assume that you have already taken an undergraduate course on solid state physics.

**Grading, collaboration, final exam:** The course grade will be based 50% on weekly homework assignments and 50% on a final exam. Collaboration is encouraged on the homework (within reasonable limits), but is not allowed on the exam. The final exam will be "take home," and will be assigned during the last week of classes instead of a homework assignment. The exact date the exam will be distributed, and the due date, will be announced later. **If, for any reason, you anticipate a conflict with the exam, you need to inform me during the first week of class.**

**Flu (and other illness):** ***If you are ill with flu-like symptoms, do NOT come to class, and do NOT meet with a study group to work on problem sets.*** You should not come back to class until you have no fever for 24 hours (without taking fever-reducing medication). Class attendance is not required, and I will be happy to arrange extensions to homework assignments in case of illness.

**Some other "fine print" items**

**Disabilities:** If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and http://www.colorado.edu/disabilityservices

**Religious observances:** Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, please let me know as soon as possible if you anticipate a conflict with one of the assignments or the exam.

**Statement from the Office of Discrimination and Harassment:** The University of Colorado at Boulder policy on Discrimination and Harassment, the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships apply to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH, the above referenced policies and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at http://www.colorado.edu/odh