MSCI 406/506 Physical Properties of Solids 2012-Fall

Time/place: Tue Thu 4:00-5:15 pm Mechanical Engineering 128, Prof. Boris I. Yakobson
Text: C. Kittel's *Introduction to Solid State Physics* (Wiley, 7th or 8th edition)
Website: http://www.owlnet.rice.edu/~msci406/
HomeWork is due before class on the date shown
HW solutions become available after class, late-HW accepted after that for half-credit
Final Grade = HW (20%)+Midterm Test (20%)+Project(30%)+Final Exam(30%)

I 8/21 **Org. mtg., introductions**
II-X Crystals Statics. Structural Properties. **Geometry of lattices**
8/23 Chap. 1
Diffraction and **Fourier transform**, review of.
8/28-30 Chap. 2
Reciprocal lattice
8/30 Chap. 2
What holds the lattice together? Crystal binding, elasticity
9/4,6 Chap. 3 +
HW1 due 9/11: P1.1-1.3 P2.1-2.3 + F1,2
Elements of disorder: point defects, dislocations, amorphous solids
9/11,13,18,20 Chap. 17, 18, 20
HW2 due 9/25: P.20.1,2 P21.2,3 and F.3,4

XI-XV Lattice in Motion
Vibrations, phonons, thermal properties
9/25,27 Chap. 4
10/2 Chap. 5
HW3 due 10/9: P.4.3,5 P5.2,4
10/4 Thermal conductivity.
10/9 Midterm test. 2 hrs (tentatively, closed book)

XVI-XXIII Electronic properties
10/16,18 Chap.6 Free Fermi gas
10/23,25 Chap.7 Band structure, *Projects slated*
HW4 due 10/30: P.6.1,2,6 + P7.1,3 + F.5.6
10/30 and 11/1,6,8 Chap.8-9 Semiconductors and Metals
HW5 due 11/13: P.8.1,2 and P9.1,2,4

XXIV-XXV Optical processes and properties
11/13,15 Chap.15 Interband transitions and excitons; Raman effect.

XXVI-XXVIII Magnetism of Materials
11/20,27 and 11/29 Chap.11-12
HW6 due 12/4: P9.7 and 14.4,5,7 + 15.5,6 (Chaps.14-15 correspond to 11-12 of Ed. 8)
Projects written reports due Dec 4, 4:00 pm
Final Exam. As scheduled