**Condensed Matter Physics / Physics-335**  
**Winter 2011**

**Instructor:** Michel Gingras  
Department of Physics & Astronomy  
Room: Phys-364  
Tel: #35697  
e-mail: gingras@gandalf.uwaterloo.ca

**TA/Marker:** Behnam Javanparast  
Department of Physics & Astronomy  
Room: Phys-402  
e-mail: bjavanpa@sciborg.uwaterloo.ca

**Lectures:** M/W/F, 12:30 – 13:20  
Phys-313

**Marks:**  
Assignments: 25%  
Midterm: 30%  
Final: 45%

**Course Type:**  
- Knowledge & understanding based  
- Not extremely mathematically focused  
- Lectures are largely PowerPoint-based except for lectures which rely on a larger amount of mathematical derivations.

**Textbook:**  
*Introduction to Solid State Physics, 8th Edition*  
Charles Kittel, Univ. of California, Berkeley  
©2005  
704 pages

**Other textbook/material:**

- References:  
  - Ashcroft & Mermin, *Solid State Physics*  
  - Chaikin & Lubensky, *Condensed Matter Physics*  
  - Generally speaking: Consult Section QC 176 in Library  
  - Internet resources

- Notes on phase transitions to be provided later during
Course Content:

- Chapter 1: Crystal Structure (Kittel) and other non-crystalline systems (notes)
- Chapter 2: Wave Diffraction and the Reciprocal Lattice (Kittel)
- Chapter 3: Crystal Binding and Elastic Constants (Kittel)
- Chapter 4: Phonons I: Crystal Vibrations (Kittel)
- Chapter 5: Phonons II: Thermal Properties (Kittel)
- Chapter 6: Free Electron Fermi Gas (Kittel)
- Chapter 7: Energy Bands (Kittel)
- Chapter 12 (p. 323-326) & Chapter 16 (pages 474-478), & notes to be handed out: Elements of phase transitions

Some comments on course & lectures policies:

- Please endeavour to arrive in class on time (i.e. before 12:30PM).
- Students are encouraged to ask questions in class
- If you have a general question of interest to all students, please, please, please – ask at the beginning of the class so that everybody can benefit from the answer.
- Teaching, at least for me, requires a large amount of concentration. For this reason, I would like to ask you to please refrain from chatting during lectures:
  - Very brief questions of clarification quietly asked to a classmate that merely requires a one word answer (e.g. “is that an ‘s’ or a ‘5’ in that equation?) are fine, welcome and encouraged since they benefit almost always all students.
  - More involved questions/discussions should be directed to me so that, again, all students can benefit from the answer.
  - Some years, there are groups of students that systematically embark on loud talking in class (including topics such as previous weekend activities!). Unfortunately, I am unable to allow this to go on in class and students constantly found talking in class will be asked to leave for the rest of the class. If repeated more than twice, students will be asked to refrain from attending the lectures for the whole semester.
- Assignments should be handed on time. Late assignments will be penalized by a 15% mark reduction penalty for each late day.
- VERY IMPORTANT: This course is somewhat different than the typical “on the board” upper-year physics undergrad course in that most material is thought via PowerPoint slides and made available 24-48 hours before each class. This requires a different approach from the students in taking such a class which is perhaps more akin to what one experience from liberal arts classes. That is, the students need to annotate the material already in their hands and “process on the go” the information. This is a very important point and its diligent implementation by the student will optimize the student’s chance for good performance in this course.

I hope you will find the course material interesting, challenging, enriching of your undergraduate Physics education and worthy of your time and energies. I look forward to teaching you and interacting with you over the course of the term.