

**PHYSICS 565 – Solid State Physics**  
**SPRING 2012 (TR 9.30-10.30 AM @ Neckers 410)**

**Instructor:** Thushari Jayasekera  
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**Office Hours:** F 1.30-3.30 pm

**Text Book:** *Solid State Physics – ASHCROFT/MERMIN*  
**Other References:** *Introduction to Solid State Physics C. Kittel*  
*Condensed Matter Physics – Michael P. Marder*  
*Elementary Solid State Physics – M. A. Omar*  
*Electronic Structure –Richard Martin*

**Course Content:**

**ATOMIC STRUCTURE:**

- *The idea of crystals*
- *Introduction to crystals -2-D crystal structures and their symmetries*
- *Three Dimensional Crystal Structures*
- *Experimental Determination of Crystal Structures – Introduction to Reciprocal Lattice*
- *Surfaces and Interfaces*
- *Complex Structures (Alloys, Glasses, Polymers etc)*

**ELECTRONIC STRUCTURE:**

- *The single electron model*
- *The Schrodinger Equation and Symmetry – Bloch's Theorem*
- *Nearly Free Electrons and Tight Binding Model*
- *Electron-Electron Interactions: Introduction to Advanced Methods for Electronic Structure Calculations*
- *Calculation of Electron Band Structures - Metals, Semiconductors and Insulators*

**MECHANICAL PROPERTIES:**

- *Introduction to Lattice Vibrations and their Applications*

**SPECIAL TOPICS:**

- *Quantum Confined Structures*
- *Electron Transport Properties*
- *Optical Properties*
- *Magnetism*

<b>Grading:</b>	Homework & Quizzes --- 20%
	Exam 1 --- 20 %
	Exam 2 --- 20 %
	Final Exam --- 20%
	Term Paper (Written and Oral Presentations) --- 20%
	(Term Paper topic due 10 <sup>th</sup> March 2012)
	Total = 100%

<b>Grade Policy:</b>	<b>A</b>	<b>85% -100%</b>
	<b>B</b>	75 % - 84 %
	<b>C</b>	60 % - 74 %
	<b>D</b>	50 % - 59.9 %
	<b>F</b>	<b>Less Than 50%</b>

Emergency Procedures. Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT's website at [www.bert.siu.edu](http://www.bert.siu.edu), Department of Safety's website [www.dps.siu.edu](http://www.dps.siu.edu) (disaster drop down) and in Emergency Response Guideline pamphlet. Know how to respond to each type of emergency.

Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency. The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.