

# Physics 7050: Survey in Condensed Matter Physics Winter 2015

**Instructor:** Zhixian Zhou

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**Lectures:** Tue and Thu 11:45 am -1:10 pm, Room 219 Physics

**Additional discussion section:** to be determined

## **Text Book**

Lecture Notes for Solid State Physics , Professor Steven H. Simon Oxford University (Available online).

## **Additional References**

J. R. Hook and H.E. Hall, Solid State Physics, Second edition

Steven H. Simon, Lecture Notes for Solid State Physics

Kittel, Introduction to Solid State Physics

Ashcroft and Mermin, Solid State Physics

## **Course Learning outcomes:**

Students will learn the fundamental physics and various physical properties of solid state materials, which will help them understand research papers and interpret the results of their own research.

## **Course Outline:**

1. Introduction: What is Condensed Matter Physics
2. Crystal structures, symmetries and Bonding
3. X-ray diffraction and reciprocal lattice
4. Crystal dynamics
5. Electrons in metals
6. Band theory
7. Semiconductors
8. Semiconductor devices
9. Para- and dia- magnetism
10. Ferromagnetism
11. Dielectrics and ferroelectrics
12. Superconductors

13. Optical properties

14. 2D systems and surfaces

**Homework:**

Homework will be assigned weekly on the first class of the week and are due in a week. It is acceptable (and can be very useful) to discuss homework problems with each other and compare different possible solutions. However, copied homework will not be credited. Late homework will generally not be accepted.

**Grade**

First Exam – 20%

Midterm – 30%

Term paper - 15%

Final presentation– 10%

Quizzes – 20%

Homework – 10%

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Total –105%