Physics Department **IIT Kanpur**

31st july, 2017

Course Title: **Condensed Matter Physics I** (PHY543A)
Units : 3-1-0-11
Schedule: Lecture: Mon, Tue, Thu: 10:00-11:00, Tutorial/Discussion: Fri 12:00-13:00.
Venue: FB482
Instructor: Arijit Kundu (kundua@iitk.ac.in)

Course Description: This will be an introductory course on Condensed Matter Physics. This should make the students familiar with basic concepts of condensed matter physics: structures of matter, transport and natural phenomena like magnetism and superconductivity.

Outline of course content:

- Basic notions of statistical mechanics.
- Free electron theory of metals, specific heat of solid.
- Lattice vibrations, phonons.
- Crystal structure, reciprocal lattice.
- Electrons in periodic potential.
- Magnetism.
- Superconductivity.
- Contemporary topics: quantum Hall effect and topological systems.*

(* if time permits)

Home Assignments:
Home Assignments (HA) will be given regularly. The students are strongly advised to solve the questions. The submission of HA for correction is optional.

Exams and Quizzes :
There will be one mid-semester examination of two hours and, an end-semester examination of three hours. These will be held during the prescribed examination period.

Three to five quizzes of about fifteen minutes each will be held regularly. These quizzes will be held either in the lecture hour or in the tutorial section.

Tentative weightage of marks are following: **Quizzes: 20, Mid-sem exam: 30, End-sem exam: 50**.

A student is expected to do well if she/he follows regular classes, assignments and tutorials.

References: (publisher in bracket)

I recommend the student to take regular class notes, as it is difficult to find a single book that cover all the chapter in the way the course will follow. Below are general references:

1. “Solid State Physics” by Ashcroft and Mermin (Brooks/Cole).
2. “Introduction to Solid State Physics” by Charles Kittel (John Wiley & Sons Inc.)
3. “Solid-State Physics” by Ibach and Luth (Springer)
4. “Statistical Mechanics” by Pathria (Elsevier)