

Department of Physics, IIT-Kanpur

PHY642: Condensed Matter Phenomena in Low Dimensional Systems

Instructor: Tarun Kanti Ghosh

Prerequisite: None but good knowledge in quantum mechanics, statistical mechanics and solid state physics would help

Objectives: In this course, various phenomena in low-dimensional condensed matter systems will be discussed from the basic principles to an advanced level. We will discuss essential theoretical formalism at an accessible level with illustrations of experimental results. This course will be useful for PG as well as advanced UG students.

Brief course outline: Electronic, electrical & thermoelectric transport and optical properties of low-dimensional electron/hole systems such as 2D quantum materials, topological insulators, 2D fermionic systems at semiconductor heterojunctions.

References:

- a) Thomas Ihn, *Semiconductor Nanostructures: Quantum States and electronic Transport* (Oxford University Press)
- b) M. I. Katsnelson, *Graphene: Carbon in Two Dimensions* (Cambridge University Press)
- c) Shun-Quing Shen, *Topological Insulators* (Springer series)