IIT Kanpur Department of Physics

PHY 312: Quantum Processes in Low Dimensional Semiconductors 3-0-0-0

Instructor: Sudipta Dubey

Correspondence: via email at sudiptad@iitk.ac.in

Prerequisite:

The course is aimed at undergraduate students who have taken basic quantum mechanics (of the level of PHY 201) and basic electronics/semiconductor course.

Course Content:

Introduction to low dimensional semiconductors
Characteristic length scales for quantum phenomena
Fabrication of nanostructures
MBE, MOCVD
Electronic properties of heterostructures, quantum wells, quantum wires, quantum dots, superlattice
Transport in mesoscopic structures, resonant tunneling
Magneto-transport, Aharonov-Bohm effect, Quantum Hall effect
Optical properties, excitons
Current research in the field

Textbook:

There is no prescribed single textbook. You may refer to the following book:
1. Fundamentals of Nanoelectronics, George W. Hanson
Additional reading:
1. The Physics of Low-dimensional Semiconductors, John. H. Davies
2. Electronic Transport in Mesoscopic Systems, Supriyo Dutta

Class Schedule:

Every Monday, Wednesday from 17:15 – 18:30.

Division of Marks

- Assignments / Quiz: 20 pts
- Mid-Sem exam: 40 pts
- End-Sem exam: 40 pts