PHY 667 - Physics of Low-Dimensional Systems

Course Code & Number	Course Name	C.H.	Lec.	Lab.	Tut.
PHY 667	Physics of Low-Dimensional Systems	4	4	0	0

Syllabus

Generalities: *Introduction into the basics of two, one and zero dimensional nanostructures.*
Technological applications: *The importance of such systems for modern physics and present day technology (e.g. micro-electronics, nano-electronics and opto-electronics) will be explained.*
Synthesis: *Especially lithography of low dimensional systems like two dimensional systems, Quantum wires and quantum dots and Nanocomposites.*
Quantum size effect: *Electronic configuration, Size effect in metal and semiconductor, required size for size effect.*
Electrical and optical properties: *Theory of carrier transport in semiconductors, Boltzmann equation, ballistic transport, Diffusion theory and tunneling effect and mesoscopic physics of light.*
Modern heterostructures at low dimensions: *The modern heterostructures at low dimensions, including quantum wells, quantum wires, and quantum dots, together with their applications will be discussed. From this course, the students will appreciate how the fundamental courses of Quantum Mechanics and Solid State Physics are applied to the technologically important semiconductor materials, which leads to today's information revolution.*

References

- M.J. Kelly, Low-dimensional semiconductors: Materials, Physics, Technology, Devices, Clarendon Press, Oxford, 1995.
- J.L. Morán-López, Physics of Low Dimensional Systems. Springer, 2001.
- Y. Imry, Introduction to Mesoscopic Physics, Oxford University Press, 1997.
- T. Ando, Mesoscopic Physics and Electronics, Springer-Verlag, Berlin, 1998.