| Phys 4404 | SOLID STATE PHYSICS-III | (CR3) |
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| Preq. | Phys 3402 | |

**Objectives**

*The course will provides some valuable introduction of quantum theory of solids.*

**Syllabus**

Screening of the electron-phonon interaction, ionic crystals, the production and propagation of polarons, mirco-scopic theory of frequency-dependent dielectric constants, band gap sensitive optical properties of semiconductors, interaction of conduction electrons and their impact on conductivity, transport phenomenon, Boltzmann transport equation, relaxation time and conductivity equation in Boltzmann transport equation, solids in external magnetic fields: Free electron approximation in magnetic field and the formation of Landau levels, Landau diamagnetism in free electrons, Optical reflectance spectroscopy, Exitonic transitions, Types of excitons (Frenkel and Mott-Wannier Excitions), Excition Condensation into the Electron-hole drops, Raman measurements of inelastic scattering in crystals, stokes and anti-stokes scattering, X-ray induced emission spectra in crystals, Electron energy loss spectroscopy.

***Recommended Books***

1. *Quantum Theory of the Solid by J. Callaway, 2nd Edition, Elsevier Science, (2013)*
2. *Solid-State Physics: Introduction to the Theory by J. D. Patterson, B. C. Bailey, 3rd Springer International Publishing (2018)*
3. *Introduction to Solid State Physics, 8th Edition, by C. Kittle, (2012).*
4. *Solid State Physics by N. W. Ashcroft and D. Mermin, Cengage, (2011).*
5. *Solid State Physics: An introduction by P. Hofmann, 2nd Edition, Wiley-VCH, (2015)*