

## **JC220 (Jan) 1:0 Topics in Physical Metallurgy – I**

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### **Description**

**Structure** : Pure metals and alloys; Hume-Rothery rules for solid solutions; Intermetallics (electrochemical compounds, electron compounds, size factor compounds); quasicrystals; metallic glasses; Pettifor maps

**Phase Diagrams:** Free- energy-composition diagrams; Phase rule: binary phase diagrams( isomorphous, eutectic and peritectic systems); Case studies: Fe-C and Cu-Sn diagrams; Ternary diagrams

**Phase Transformations:** Nucleation and growth in diffusive and diffusionless transformations; Eutectoid, martensitic, massive and spinodal transformations; microstructural evolution; Case studies: Steels and Zr alloys

**Computational physical metallurgy:** All the three topics above

### **Books:**

1. R.E. Reed-Hill and R. Abbaschian, Physical Metallurgy Principles, 3rd Edition, Boston, PWS-Kent, 1991.
2. MIT OpenCourseware