**Mechanical Behavior of materials.** Deformation of single and poly crystals. Temperature and strain rate effects in plastic flow - strain hardening, grain size strengthening, solid solution strengthening, precipitation hardening, dispersion strengthening. Fatigue and fracture.

**Structure and characterization of materials.** Electron diffraction and Electron microscopy. Resolution and Rayleigh criterion, electron optics, electron guns and lenses, probe diameter and probe current, electron-specimen interactions, interaction volume. Principles of scanning electron microscopy, imaging modes and detectors.

**Texture**. Concepts of texture in materials, their representation by pole figure and orientation distribution functions. Texture measurement by different techniques. Origin and development of texture during

material processing stages: solidification, deformation, annealing, phase transformation, coating processes, and thin film deposition. Influence of texture on mechanical and physical properties.

**Physical Metallurgy of Titanium alloys**. Basic properties, crystal structure, deformation modes, phase diagrams, phase transformations, alloy classification, basic hardening mechanisms, effect of processing and composition on microstructure and mechanical properties, high

temperature titanium alloys.