This course will be a study of Local Cohomology introduced by Grothendieck with various applications. The main topics will include: Cohen-Macaulay Rings and Modules, Injective Modules over noetherian rings, Gorenstein rings, local cohomology - connection with dimension and depth, local duality theorem of Grothendieck, Cohomology of quasi-coherent and coherent sheaves, Serre’s Theorem on coherent sheaves on projective spaces, classification of Line-bundles on P^n, Hartshorne - Lichtenbaum Theorem and Faltings Connectedness Theorem.

**Prerequisite:** Math 502

**Text:** Local Cohomology by Brodmann and Sharp, Cambridge University Press. Text is recommended.