We will discuss topology of 4-manifolds, and study the invariants of 4-manifolds coming from their geometry. In particular we will study 4-manifold handlebody constructions, Stein manifolds, Corks, Plugs, PALF’s, BLF’s and Seiberg-Witten invariants and invariants coming from the Floer homologies (e.g. Heegard-Floer). I hope to navigate this course according to students interest and needs, and ask students give talks on the areas of their interest.