Emerged as an evolution of software-defined radios (SDR), the Cognitive Radio technology is steadily evolving towards becoming the future of wireless communications. While SDR’s can also be intelligent radios, what sets cognitive radios apart from SDR is their ability not only to learn but also to be self-aware.

The role of signal processing and machine learning in achieving self-awareness, subsequent intelligent decision-making and radio reconfiguration cannot be over-emphasized. In fact, one may argue that it is signal processing and machine learning that give rise to cognition and intelligence in a radio.

This special topics course will discuss cognitive radios from the perspectives of signal processing and machine learning, and highlight the potential of future autonomous cognitive radios.

Topics covered will include: spectrum knowledge acquisition, spectrum estimation, compressive sampling, wideband spectrum sensing, signal classification, Bayesian non-parametrics, machine learning, statistical learning theory, support vector machines, artificial neural networks and cognitive cooperative communications.