

**Objective**

To introduce the basics of AI as applied to Wireless communication and familiarize the 5G technology in that perspective to Ph.D. level students.

**Syllabus**

Introduction to generic wireless channels, databases, feature extraction, classification and decision. Artificial Intelligence (AI) in the digital era and the role of network intelligence in mobile applications (APPs), digital assistants and autonomous vehicles. Introduction to 5G (Network of networks) covering devices, systems, things/machines and big data. Overview of technology enablers in 5G architecture, system Design and framework for the 5G edge supporting massive IoT devices/cyber physical systems. Synthesis of system requirements in 5G to support emerging applications requiring stringent low latency including Augmented Reality (AR) and Virtual Reality (VR). Review of the key Network Resource Management techniques, introduction to the trends in Machine Learning (ML) and Analytics in the 5G network management and evolution to Zero-Touch Networks (ZTN) framework. Application of ML (supervised learning, unsupervised learning and reinforcement learning) in the 5G ZTN including principle of 5G user analytics at the cell site, cell edge and core network. Mathematical modelling to evaluate the network performance using the data sets available for optimization in 5G wireless AI framework. Introduction to AI aided energy efficient beamforming and massive antennas in 5G.

**Text Books/ References:**

- [1] Mazlin Gibert., “Artificial Intelligence for Autonomous Network”, CRC Press 2018.
- [2] Erik Dhalman et al., “5G NR: The next generation wireless access network technology”, 2018
- [3] Devaki Chandramouli et al., “5G for the Connected World”, Wiley, 2019

**Evaluation**

- Class quiz, assignments, computer exercises and case studies
- Internal 2 periodicals, external exam