

**Lecture Title:** Deep Learning-Aided Physical Layer Security: Towards Intelligent Security and Resiliency for 6G

**Lecture Abstract (250 words):** Despite the development of different protocols to secure the core network of modern communication systems, the wireless edge of 5G and 6G systems is still vulnerable to security and privacy risks, due to the inherent broadcast nature of wireless medium. To overcome this issue, physical layer security (PLS) solutions have been envisioned to be leveraged for 6G networks, thanks to their capability of being adapted to the communication medium, providing agile security for different scenarios. As the 6G is envisioned to bring device-level intelligence, the capabilities of deep learning (DL) algorithms can be incorporated into PLS protocols, resulting in novel context-aware learning-based secure frameworks. In this talk, we provide a comprehensive overview on learning-based PLS techniques as one of the key enablers to provide secrecy and resiliency for 6G systems. We first introduce the PLS framework and review two main classes of PLS solutions, i.e., key-less and key-based PLS. Then we take into account the context of communicated data and focus on learning-based PLS to realize context-aware intelligent solutions against passive and active adversarial attacks. For key-less PLS, learning-based approaches for designing wiretap codes and enhancing the quality of security (QoSec) are introduced. We also study an end-to-end learning-based framework that privatizes sensitive data against adversarial networks. For the key-based PLS, recurrent-based neural networks and reservoir learning approaches are addressed for wireless secret key generation. Finally, we provide future directions to provide interested attendees with useful insights.