

Organized by Prof. Aditya K. Jagannatham, EE Department, IIT Kanpur  
July 27<sup>th</sup> – August 3<sup>rd</sup>, 2020

## Online MATLAB Project Course on Latest MIMO Technologies for 5G Networks and IoT

Massive MIMO, mmWave  
MIMO, NOMA, Cooperative  
Communication, Cognitive Radio  
and IoT



### Important Dates

#### Course Dates

July 27<sup>th</sup> - August 3<sup>rd</sup>, 2020

#### Last Date for Registration

July 10<sup>th</sup>, 2020

### Venue

To be conducted online via  
Zoom.

### Contact

**Prof. Aditya K. Jagannatham**  
Professor

Department of Electrical  
Engineering IIT Kanpur  
Kanpur 208016  
UP, India

### E-mail

mimo5G.iitk@gmail.com

Welcome to this 8-day online course focusing on the key signal processing and optimization strategies for 5G MIMO wireless networks based on the latest **Massive MIMO, mmWave MIMO, NOMA, Cooperative Communication, Cognitive Radio and IoT** technologies. The central goals of 5G networks of the future are to achieve data rates in excess of 10 Gbps, supporting dense connectivity of up to 1 million sensors per square kilometer, and ultra-low latencies lower than a millisecond. These technologies enable the realization of several new applications such as V2V (vehicle-to-vehicle)/ V2X (vehicle to infrastructure) communication, augmented/ virtual reality (AR/ VR), among others. In 5G, mmWave MIMO exploits the previously unused high frequency bands (30 – 300 GHz) for high data rate transmission, Massive MIMO uses a large number of antennas (250 – 500) to spatially multiplex a large number of devices/ users. Finally, non-orthogonal asynchronous transmission in NOMA, cooperative communication using relays and unlicensed access made possible by cognitive radio, can help connect the large number of sensors in the 5G ecosystem toward the realization of smart homes, cities and industries.

This online course will thoroughly cover all the major 5G technologies above, also taking into account results and insights in recently published papers from top journals. The last two days of the course will focus extensively on **MATLAB projects** by all the participants to enable them understand the finer aspects and challenges in translation of research into practical implementation of 5G technologies. Eminent experts from the wireless industry and academia will also deliver invited guest lectures on the latest R&D activities. The course will also comprise of tutorial problem solving sessions, in addition to lectures thoroughly covering the various 5G concepts. Special sessions will also focus on modules to prepare for interviews/ competitive exams in ECE, education opportunities available at IITK and current areas of research activity.

### Target Audience

- Ph.D. scholars pursuing research in 5G technologies
- M.Tech/ B.Tech students undertaking thesis/ projects in 5G technology
- Faculty members of Engineering Institutions/ Universities
- Engineers from Wireless Industry and R&D Organizations