

Short Term Course
on
"Emerging
Technologies for 5G"
under the aegis of
Teerthanker Mahaveer
University, Moradabad



11 July-04 August 2022

Faculty Of Engineering



Certificates to all participants

Class will be delivered through
offline platform

Why 5G?

Over the years there has been tremendous growth of data traffic, with increasing data rate requirements. To meet the above demand various techniques are being developed to meet the demand of enhanced network capacity. The above demand has developed keen interest among academia and industry to adopt various methods for increasing the spectrum efficiency and spectrum utilization. The Fifth Generation (5G) wireless systems, is a promising technology to meet the demand of higher data rate and greater traffic volume.

Objective of the Course

- Study on 5G technologies
- Practical information on methods used in 5G
- To enhance teaching ability with respect to content delivery in the area of wireless communication

Benefits and Outcomes of the Course

- Comprehensive study on 5G technology
- Laboratory sessions to get hands on experience in simulating theoretical concepts
- Analyzing and interpreting the results to enhance teaching ability with respect to content and deliver in the area of 5G

Focus Areas

- ✦ Wireless and Cellular Communications Overview
- ✦ What is 5G and Why Do We Need It
- ✦ Evolution of Wireless Technologies
- ✦ 5G Network and Features

Program Features

- ♦ The program is split into lectures and labs/hands-on sessions.
- ♦ Hands-on experience on basic and advanced-level topics.
- ♦ The course includes quiz and assignment
- ♦ Certificates by FOE TMU Moradabad

Online Registration Link

<https://forms.gle/S71HQViuefopxHbM6>



Registration Fee

2000/- (TMU student)

2500/- (outside TMU)



Coordinator

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About the course

Over the years there has been tremendous growth of data traffic, with increasing data rate requirements. The above demand has developed keen interest among academia and industry to adopt various methods for increasing the spectrum efficiency and spectrum utilization. The Fifth Generation (5G) wireless systems, is a promising technology to meet the demand of higher data rate and greater traffic volume. The department of electronics and communication at TMU propose to conduct a summer short-term course on 5Th generation mobile cellular system. It is a four-week course from which one can learn about the introduction and necessity of 5G wireless and cellular communications, its features, spectrum, mm-Wave, and many more.

Course Module

Module1: Wireless and Cellular Communications Overview

- Wireless Communication Basics
- Radio Signal Properties, Carrier Waves and modulation, What Happens
- During a Phone Conversation: Wireless Transmission and Reception
- Noise and Interference, Radio Spectrum, Radio Channel and Bandwidth, Sharing the Radio Channel

- Two Ways of Sharing the Spectrum: FDD & TDD, Factors Affecting Data Rate, The Cellular Concept, What Is A Cellular Network?

Module2: What is 5G and Why Do We Need It?

- Evolution of Wireless Technologies
- Why Do We Need Something Beyond 4G?
- 5G NR: New Levels of Capability and Efficiency
- 5G NR Service Classes Overview Enhanced Mobile Broadband (eMBB)
- Massive Machine-Type Communications (m-MTC)
- Ultra-Reliable Low Latency Communications (URLLC).

Module 3: 5G Network and Features

- 5G Network Terminology & Concepts
- Network Architecture Options for 5G NR
- 5G Techniques Overview, Flexible Slot-Based Framework
- Scalable OFDM-Based Air Interface, Advanced Channel Coding, Massive MIMO
- Mobile mm-Wave (Millimeter Wave), 5G Network Principles & Features
- Overview, Network Slicing, SDN and NFV
- Mobile Edge Computing (MEC)

Module4: 5G Spectrum and mmWave

- The 5G NR Spectrum, Motivation & Challenges Behind mm-Wave Deployments
- Advantages of mm-Wave, mm-Wave Deployment Opportunities
- Overview, mm-Wave for Urban & Suburban Deployments
- mm-Wave for Rural Deployment mm-Wave for Fixed Wireless Access, Indoor & Venue Deployments of mm-Wave, Real-life mm-Wave Case Studies.

Course Schedule

Timing: Session1: 09:30 AM -11:30 Noon, Session 12:00-2:00 PM

S.No.	Date	Topic Covered	Instructor
1	11/07/2022	Wireless Communication Basics	Dr Rahul Sharma
2	12/07/2022	Radio Signal Properties, Carrier Waves and modulation, What Happens	Dr Alka Verma
3	13/07/2022	During a Phone Conversation: Wireless Transmission and Reception	Dr Rahul Sharma
4	14/07/2022	Noise and Interference, Radio Spectrum, Radio Channel and Bandwidth, Sharing the Radio Channel	Dr Alka Verma
5	15/07/2022	Two Ways of Sharing the Spectrum: FDD & TDD, Factors Affecting Data Rate, The Cellular Concept, What Is A Cellular Network?	Dr Pankaj Goswami
6	16/07/2022	Evolution of Wireless Technologies	Mr Neeraj Kaushik
7	18/07/2022	Why Do We Need Something Beyond 4G?	Dr Pankaj Goswami
8	19/07/2022	5G NR: New Levels of Capability and Efficiency	Mr Neeraj Kaushik
9	20/07/2022	5G NR Service Classes Overview Enhanced Mobile Broadband (eMBB)	Dr Rahul Sharma
10	21/07/2022	Massive Machine-Type Communications (m-MTC)	Dr Alka Verma
11	22/07/2022	Ultra-Reliable Low Latency Communications (URLLC).	Dr Rahul Sharma
12	23/07/2022	5G Network Terminology & Concepts	Dr Alka Verma
13	25/07/2022	Network Architecture Options for 5G NR	Mr Prashant Kumar
14	26/07/2022	5G Techniques Overview, Flexible Slot-Based Framework	Mr Rahul Vishnoi
15	27/07/2022	Scalable OFDM-Based Air Interface, Advanced Channel Coding, Massive MIMO	Mr Prashant Kumar
16	28/07/2022	Mobile mm-Wave (Millimeter Wave), 5G Network Principles & Features	Mr Rahul Vishnoi
17	29/07/2022	Overview, Network Slicing, SDN and NFV	Dr Pankaj Goswami
18	30/07/2022	Mobile Edge Computing (MEC)	Mr Neeraj Kaushik
19	01/08/2022	The 5G NR Spectrum, Motivation & Challenges Behind mm-Wave Deployments	Dr Pankaj Goswami
20	02/08/2022	Advantages of mm-Wave, mm-Wave Deployment Opportunities	Mr Neeraj Kaushik
21	03/08/2022	Overview, mm-Wave for Urban & Suburban Deployments	Mr Rahul Vishnoi
22	04/08/2022	mm-Wave for Rural Deployment mm-Wave for Fixed Wireless Access, Indoor & Venue Deployments of mm-Wave, Real-life mm-Wave Case Studies.	Mr Prashant Kumar