COURSE RELEVANCE

The proliferation of smartphones and tablets has led to a tremendous increase in mobile data traffic. Further, the large number of devices and appliance are expected to connect wirelessly to the internet in the emerging Internet of Things (IoT) applications and machine-to-machine (M2M) communication. In order to support the exponential growth of existing mobile traffic and the emergence of new wireless applications and services, researchers and worldwide standardization bodies are proposing with new wireless standards almost every decade. Fifth-generation (5G) wireless network is about to be launched with new state-of-the-art technologies like Massive MIMO, mmWave communication, FBMC and NB-IoT with the intent of "Everyone, Everywhere, Always Connected". Hence it is necessary for communication engineers, students and researchers to understand the fundamentals of emerging wireless technologies to be employed in the rapidly growing wireless industry. Aim of the course is to introduce various mobile technologies from 2G to 4G and beyond and different wireless channel modeling and their performance analysis. Additionally, provide hands-on practical experience using MATLAB to analyze the various digital wireless communication sub-modules.

COURSE OBJECTIVES

- To present comprehensive overview of modern wireless communication from 2G to 4G and beyond and related wireless technologies.
- To understand the performance analysis of wireless systems in different channel impairments.
- To understand the various state-of-the-art technologies on 5G like Massive MIMO, mmWave communication, GFDM, OFDM,OTFS, FBMC, Cognitive Radio and NB-IoT.
- To provide practical hands on lab exercises using MATLAB for illustrating wireless channel modelling and various sub modules of wireless communication system.
- To provide useful tips for research paper writing and typesetting using Latex from invited speakers.

Invited Expert Speakers
Prof. Sarat Kumar Patra, Director, IIIT Vadodara
Prof. Himansu Mishra, IIT, Dhanbad
Prof. Tony Jacob. IIT, Guwahati
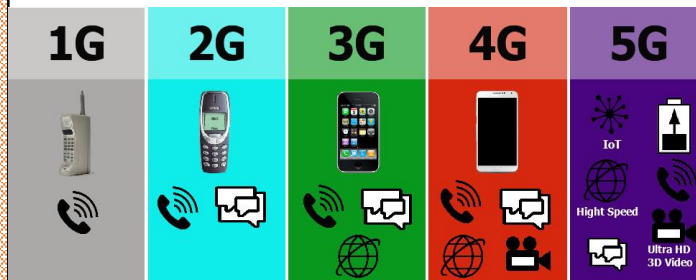
This course sponsored by TEQIP-III under twinning program with GEC, Bilaspur

TEQIP-III sponsored Short Term Course on "Modern Wireless Communication: Towards 5G"
25th SEP-29th SEP 2019

Co-ordinators:
Prof. S.M.Hiremath
Department of Electronics & Communication Engineering.
National Institute of Technology Rourkela – 769008.
Email: hiremaths@nitrkl.ac.in
Mobile:9438503621
Office no:0661-2462459
and
Prof. Vinay Kumar Singh
Government Engineering College Bilaspur-495009
Email: vinay.rewa@gmail.com
Mobile:7999311361

ABOUT NIT ROURKELA:

National Institute of Technology (NIT), Rourkela was founded as Regional Engineering College, Rourkela in 1961. It is a prestigious Institute with a reputation for excellence at both undergraduate and postgraduate levels, fostering the spirit of national integration among the students, a close interaction with industry and a strong emphasis on research, both basic and applied. Its been consistently ranked within TOP 20 engineering institutes for 4 consecutive years as per MHRD's NIRF, Govt. of India.

The city of Rourkela is a bustling industrial town, cosmopolitan by nature and is well connected to all parts of the country by road and rail. It is en-route Howrah-Mumbai main line of South-Eastern Railway. Nesting amidst greenery on all sides, NIT campus is approximately 7km from Rourkela railway station. The nearest airports are Jharsguda, Ranchi, Kolkata and Bhubaneswar.

About Department:

The Department of Electronics and Communication Engineering at NIT Rourkela covers a host of subjects inclusive of electronic circuits, microprocessors, digital signal processing, image processing and computer vision, soft computing, analog communication, digital communication, mobile communication, VLSI, embedded Systems, electronic instrumentation, analytical instrumentation and many more. Faculty members of the department are working in different specializations under the groups: Communication engineering, VLSI & embedded systems, Signal & image Processing, microwave & radar engineering and Electronics & Instrumentation engineering. Many research projects are being pursued by faculty members with funding from organizations like IMPRINT, SERB, ISRO, DST, DRDO and BRFST.

INTENDED AUDIENCE:

- ➤ B.Tech/M.Tech students undertaking projects and career option in wireless communication industry
- ➤ Ph.D. scholars pursuing research in next generation wireless technologies
- ➤ Faculties of Electronics, Electrical and Computer Science & Engineering departments
- ➤ Engineers from Wireless Industry and R&D Organizations

REGISTRATION AND FEES:

Registration Type	Fees
Student (UG/PG/Ph.D.)	₹ 1000
Faculty member	₹ 1500
Industry participants	₹ 2000

MODE OF PAYMENT:

Interested participants can pay the registration fee via online banking followed by sending an email to the co-ordinator and filling the online registration link. The banking details are given below. Alternatively, they could also pay via Demand Draft drawn in favour of **Director, NIT Rourkela** and send it by post to the coordinator.

Account Name: **Director NIT Rourkela**
Account number: **37537622247**
IFSC Code : **SBIN0002109**
Bank name : **SBI, NIT Campus.**
Registration link:
https://forms.gle/WvNCGpYqJGhQNJTB6

Registration includes Accommodation, Course kit, study material, breakfast and lunch on all five days. Accommodation will be provided in student hostels.
Special request for accommodation in the institute guest house will be charged as per actual.

MAILING ADDRESS:

The Coordinator, "Modern Wireless Communication: Towards 5G", Dept. of Electronics & Comm. Engineering, National Institute of Technology, Rourkela-769008, Odisha, INDIA. Phone: +91-661-2462459 (O)

Mail: hiremaths@nitrkl.ac.in

COURSE OUTLINE:

25th SEP 2019:
- Introduction to wireless communication : Covering 1G to 5G evolution and Technical Challenges in wireless communication
- Cellular concept in 2G, 3G and 4G
- MATLAB based simulation on cellular concepts

26th SEP 2019 :
- Wireless Propagation: Propagation mechanisms, large scale and small scale channel impairments
- channel modelling for large scale and small scale fading
- Channel equalization
- Capacity of wireless Channels
- MATLAB based simulation on small scale and large scale impairments

27th SEP 2019 :
- 5G system overview : New Radio concept
- NOMA and NB-IoT
- Cognitive radio and application of machine learning to wireless communication
- Invited talk
- MATLAB tutorial Lab session

28th SEP 2019 :
- Diversity
- Multicarrier communication : OFDM
- OFDM in LTE , WLAN,
- MIMO wireless communication
- OTFS vs OFDM in 5G
- Invited talk
- MATLAB tutorial Lab session

29th SEP 2019 :
- Massive MIMO
- Millimeter wave Communication,
- FDD, D2D and Visible Light Communications
- Invited talk
- MATLAB tutorial Lab session