Course Relevance:

Proliferation of the connected devices, i.e., mobiles, IoT, etc. has led to tremendous increase in the mobile data traffic. In order to support the exponentially growing number of wireless applications and services, the researchers around the globe are looking for new wireless technologies which can offer ultra reliable and high data rate communications. The sixth-generation (6G) of wireless communications would utilize a myriad of emerging technologies, e.g., Massive MIMO, mmWave/TeraHertz communications, Integrated satellite-aerial-terrestrial communications, energy harvesting communications, etc. to enable enhanced mobile broadband (eMBB) and massive machine type communications (mMTC). It is necessary for communication engineers, students and researchers to understand the fundamentals of these emerging wireless technologies to be employed in future wireless systems. Aim of the course is to introduce the evolution of wireless communications towards 6G and to provide overview of related enabling technologies. This course would cover Fundamentals of wireless communications, Stochastic geometry tools for modeling and analyzing the performance of 6G networks, Reinforcement learning for wireless networks, Design principles of broadband MIMO antenna and chipless RFID tags for wireless applications, and Integrated space-aerial-terrestrial networks.

Course Objectives:

- To provide the overview of 6G and beyond communications.
- To introduce 6G enabling technologies, e.g., Massive MIMO, mmWave/TeraHertz, Integrated space-aerial-terrestrial networks, energy harvesting communications, etc.
- To introduce the mathematical tools for modelling and performance analysis of 6G wireless networks.
- To provide practical hands-on lab exercises using MATLAB for simulation of wireless communication systems.

Topics to be Covered:

- Fundamentals of wireless communications, cellular concepts, 6G evolution from EDGE, HSPA, 3GPP, LTE, etc. Technological enablers for 6G: mmWave/ TeraHertz communications, MIMO/massive MIMO, Integrated Space-Aerial-Terrestrial communications, Energy harvesting communications.
- Modeling and analysis of wireless networks: Stochastic concepts, Reinforcement learning techniques.
- Design principles of broadband MIMO antennas, chipless RFID fundamentals.

Speakers:

- Dr. Sarat Kumar Patra, IIIT Vadodara
  - 6G evolution and enabling technologies
- Dr. Vimal Bhatia, IIT Indore
  - Visible light communications
- Dr. Vivek Ashok Bohara, IIIT Delhi
  - Visible light/FSO communications
- Dr. Abhishek Gupta, IIT Kanpur
  - mmWave/Terahertz communications
- Dr. Swaminathan R., IIT Indore
  - Reconfigurable intelligent surfaces
- Dr. Neelakandan R., IIT Goa
  - Massive MIMO communications
- Dr. Siddharth Deshmukh, NIT Rourkela
  - Reinforcement learning for wireless communications
- Dr. Pankaj K. Sharma, NIT Rourkela
  - Integrated space-aerial-terrestrial networks
- Dr. Pawan Kumar, NIT Rourkela
  - Energy harvesting communications
- Dr. Situ Rani Patre, NIT Rourkela
  - Broadband MIMO antennas
- Dr. Shrishail M. Hiremath, NIT Rourkela
  - SDR/GNU implementation of communication systems
- Dr. Satish Tiwari, SRM University, AP
  - Molecular communications

Five-day Online Short-Term Course on

Emerging Wireless Communications: 6G and Beyond

Sponsored by Science and Engineering Research Board (SERB), India

09th - 13th May 2022

Coordinators:

Dr. Pankaj Kumar Sharma
Dr. Pawan Kumar
Dr. Situ Rani Patre

Department of Electronics and Communication Engineering,
National Institute of Technology Rourkela
Rourkela-769008, Odisha, India

Technically Co-sponsored by:

IEEE ROURKELA SUBSECTION

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About National Institute of Technology (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. The city of Rourkela is a bustling industrial city, cosmopolitan by nature and is well connected to all parts of the country by road and rail. The nearest airports are Ranchi, Kolkata and Bhubaneswar, which are well connected by trains. Please visit https://www.nitrkl.ac.in/About.aspx to know more about NIT Rourkela.

About Department of Electronics and Communication Engineering

The department was established with the vision to become a nationally acclaimed department of higher learning that will serve as a source of knowledge and expertise for the society. The department offers various UG and PG programmes with the mission to advance and spread knowledge in the areas of electronics, communication, instrumentation, signal processing and VLSI leading to creation of wealth and welfare of humanity. The department also offers M. Tech in Microwave and Radar Engineering and Ph. D. for regular as well as sponsored candidates. The faculties of EC department are handling several externally funded research projects. Please visit https://www.nitrkl.ac.in/EC/ to know more about the Department of ECE.

Important Dates:

Registration Deadline	06th May 2022
Confirmation to Participants by email	07th May 2022
Commencement of Course	09th May 2022 (Online through MS Teams)

Target Participants:

The short-term course of immense interest for UG/PG students, research scholars/professionals, staff/faculty members and industry professionals working in the area of Wireless Communications and Networking. The student participants from Electronics and Communication Engineering, Electrical Engineering and Computer Science and Engineering branches will be benefitted with this course.

Coordinators:

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Registration Details:

The registration fee (non-refundable) for various participants for attending the short-term course is given below:

Registration Type	Fees
Student	INR 300
Faculty Members	INR 500
Scientist from R&D Organization/Industry Person	INR 800

- The students of NIT Rourkela are exempted from the payment of registration fee.

Bank Account Details for Paying Registration Fee:

The registration fee is to be deposited in the following bank account:

Account Name	CONTINUING EDUCATION NIT ROURKELA
Account No.	10138951784
Bank	State Bank of India
Branch	NIT Campus Rourkela (02109)
IFS Code	SBIN0002109

Registration Form:

To complete online registration, the participants need to fill the following google form:

https://forms.gle/XiAQkKzRHFcd9yks6

E-certificates *will be provided to the registered participants upon successfully completing the course.*

Contact and Queries: *Please send your queries directly to the course coordinators.*