Course Relevance:

In the era of rapidly evolving digital transformation, Cyber-Physical Systems (CPS) represent the seamless integration of computation, networking, and physical processes. To enable intelligent, connected, and adaptive systems, there is a growing need for advanced computing and communication technologies that can ensure high performance, reliability, and security. This course is designed to provide participants with in-depth knowledge of next-generation communication and computing paradigms, focusing on key technologies such as 5G networks, Multipath TCP (MPTCP), Software Defined Networking (SDN), Cloud Computing, and Edge Computing. With the increasing complexity of network environments, congestion control, low-latency communication, and secure data transmission have become critical research and development areas. Through this course, participants will explore the evolution of TCP algorithms under high-speed mobile and wireless networks, analyze the role of SDN in network optimization and DDoS detection, and understand the importance of cybersecurity in interconnected systems. The program also emphasizes data processing, task scheduling, and resource management techniques in edge and cloud environments, which are vital for real-time and scalable CPS applications. By bridging theory with emerging research trends, this course aims to contribute to the design and development of future intelligent systems. This course is highly relevant for researchers, academicians, and professionals who aspire to advance in the domains of computing, communication, and cyber-physical integration.

Course Objectives:

- To provide a comprehensive understanding of the advanced computing and communication technologies with CPS.
- Understand advanced network architectures such as 5G, Multipath TCP (MPTCP), and SDN for achieving high-speed, reliable, and low-latency communication.
- Examine the integration of computing paradigms including Cloud Computing, Edge Computing, and Fog Computing for efficient data processing and distributed resource management.

Topics to be Covered:

- Introduction to Cyber-Physical Systems (CPS)
- Components and Integration of Computation, Communication, and Control
- Applications in Industry 4.0, Smart Cities, Healthcare
- Cloud, Fog, and Edge Computing
- Quantum Computing and Communication for CPS
- 5G/6G and Next-generation Networks
- Software-defined Vehicular Networks
- Artificial Intelligence and Machine Learning for CPS
- Deep Learning and Reinforcement Learning in Control Systems
- Data Hiding for Healthcare System
- Adversarial Attacks in the Image
- Cybersecurity Threats and Risk Assessment in CPS
- Intrusion Detection and Anomaly Detection in IoT and CPS
- Integration of AI and Blockchain in CPS

Speakers:

- Prof. Shalabh Bhatnagar, IISc Bangalore
- Prof. D. P. Vidyarthi, JNU New Delhi
- Prof. Ruchir Gupta, IIT-BHU, Varanasi
- Prof. Ravi Kumar Gangwar, IIT-ISM, Dhanbad
- Prof. Ashok Kumar Turuk, NIT Rourkela
- Prof. Dinesh Kumar Vishwakarma, DTU Delhi
- Prof. B. D. Sahoo, NIT Rourkela
- Prof. Pushpendra Singh, JNU New Delhi
- Prof. Gaurav Baranwal, BHU Varanasi
- Prof. Amit Kumar Singh, NIT Patna
- Prof. Munesh Singh, NIT Delhi
- Prof. Judhistir Mahapatro, NIT Rourkela
- Prof. Sanjeev Patel, NIT Rourkela
- Prof. Arun Kumar, NIT Rourkela

Anusandhan National Research Foundation

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Azadi Ka Amrit Mahotsav

ANRF Sponsored
Five Day Short-Term Course
on

Advanced Computing and Communication Technologies for Cyber-Physical Systems (ACCT-CPS) (Theme-AI)

Hybrid Mode
(Online and Offline)
8th – 12th January 2026

Patron
Prof. K. Umamaheshwar Rao, Director NIT Rourkela
Chairman
Prof. B. D. Sahoo, HoD(CSE)
Convenor
Dr. Sanjeev Patel

Organized By
Department of Computer Science and Engineering,
National Institute of Technology Rourkela
Rourkela-769008, Odisha, India

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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 nearest airports are Rourkela, Jharsuguda, and Ranchi. In India, it was ranked 13 among engineering colleges by NIRF in 2025. Please visit www.nitrkl.ac.in to know more about NIT Rourkela.

About Department of Computer Science and 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 provide high-quality education that prepares the graduates for success in their professional practice and advance studies. The department also offers M. Tech in Computer Science, Information Security and Software Engineering; and Ph. D. for regular as well as sponsored candidates.

The faculties of CS department are handling several externally funded research projects. Please visit www.nitrkl.ac.in/CS to know more about the Department of CSE.

Important Dates:

Registration Deadline	**5th January 2026**
Confirmation to Participants by email	6th January 2026
Commencement of Course	8th January 2026

Target Participants:

The short-term course is of immense interest for UG/ PG students, research scholars/professionals, staff/ faculty members and industry professionals working in the area of computing and communication, 5G/6G networks, Internet traffic, cloud computing, cyber security and cyber-physcial systems, AI/ML applications for these domains. The participants having Computer Science/ Applied Mathematics Background and any stream of Engineering will be benefited with this course.

Convenor

Dr. Sanjeev Patel
Assistant Professor Grade-I
Department of CSE, NIT Rourkela
Email: patels@nitrkl.ac.in
Mobile no.: +91-9873814970

Student Volunteer

Mr. Ranjan Kumar
Email: nmcb.nitrkl@gmail.com
Mobile no.: +91-6200647822

Registration Details:

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

Registration Type	Fees
Student	INR 590
Faculty Members	INR 1180
Scientist from R&D /Industry Person	INR 2360

- The students and staffs 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)
IFSC Code	SBIN0002109
UPI ID	01389517841@sbi

Registration Form:

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

https://forms.gle/XAruNrvzPTiggdJi6

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

Contact and Queries: *Please send your queries directly to the Convenor or Co-convenor.*