

Course Relevance

Deep learning is reshaping cryptography by introducing intelligent security mechanisms that enhance encryption, key management, and threat detection. Unlike traditional cryptographic methods, which rely on fixed mathematical models, deep learning leverages neural networks to identify patterns and detect vulnerabilities in real time. It improves cryptanalysis, optimizes encryption techniques, and strengthens defenses against cyber threats. Additionally, deep learning aids in side-channel attack detection by analyzing power consumption and electromagnetic signals. Techniques like autoencoders and GANs contribute to secure data transmission without conventional key exchange methods. However, challenges remain, including adversarial attacks and high computational costs. Despite these hurdles, deep learning offers a promising future for cryptography, enabling more adaptive and resilient security solutions against evolving digital threats.

Course Objectives

Here are the key objectives of learning Deep Learning for Cryptography:

Understand Cryptographic Fundamentals – Gain knowledge of encryption, decryption, key management, and cryptographic protocols.

Explore Deep Learning Techniques – Learn neural networks, autoencoders, GANs, and adversarial learning for security applications.

Apply Deep Learning in Cryptanalysis – Use deep learning to analyze and break cryptographic systems, identifying vulnerabilities.

Detect and Prevent Cyber Threats – Utilize deep learning for anomaly detection, side-channel attack prevention, and security reinforcement.



Topics to be Covered

Fundamentals of Cryptography- Cryptography secures data using encryption, ensuring confidentiality, integrity, authentication, and non-repudiation in communication and transactions.

Steganography- Steganography hides secret data within media, ensuring covert communication, used in security, watermarking, and sometimes cyber threats.

Public and Private Key Cryptography- Asymmetric encryption uses public-private keys for secure communication, authentication, and digital signatures in online transactions and blockchain.

Standard Hash Functions- Hash functions generate fixed-length outputs, ensuring data integrity, commonly used in passwords, digital signatures, and blockchain.

Key Management - Key management secures cryptographic keys, ensuring safe storage, distribution, and revocation to maintain encryption security.

Entity Authentication- Entity authentication verifies identities using passwords, biometrics, or certificates, preventing unauthorized system access.

Signature Schemes- Digital signatures authenticate data, ensuring integrity, non-repudiation, and security in transactions and legal documents.

Network Security- Network security safeguards communication using firewalls, encryption, and protocols to prevent unauthorized access and cyber threats.

Intrusion Detection System- IDS monitors networks for suspicious activity, detecting and mitigating security breaches using anomaly or signature-based detection.

Blockchain Fundamentals and Its Application- Blockchain secures decentralized records using cryptography, applied in finance, identity management, and secure transactions.

Deep Learning Fundamentals- Deep learning models data using neural networks, excelling in AI applications like vision, language processing, and automation.

Deep Learning for Cryptography - Deep learning enhances cryptography by automating encryption, detecting threats, and strengthening security protocols against cyberattacks.



DEPARTMENT OF COMPUTER SCIENCE
& ENGINEERING,
NATIONAL INSTITUTE OF TECHNOLOGY
ROURKELA
Organizing

Short Term Course
on



Deep Learning for Cryptography

Hybrid Mode
(Online and Offline)

09th - 13th June 2025

Chairperson

Prof. Bibhudutta Sahoo

Convenor/Coordinator

Dr. Ramesh Kumar Mohapatra

Co-coordinator

Dr. Devnarayan Yadav

About NIT Rourkela



National Institute of Technology (NIT) Rourkela is an institution of national importance funded by the Ministry of Education. NIT Rourkela was established as Regional Engineering College (REC) on August 15, 1961. In India, it was ranked 19th among engineering colleges by the National Institutional Ranking Framework (NIRF) in 2024. For details about the institute, please visit us at www.nitrkl.ac.in

About Department of Computer Science and Engineering

The department was established with the vision to prepare its students for professional employment and graduate education through study and implementation of the fundamental principles of theory, abstraction, and software design, while at the same time presenting the ethical and social issues associated with computer science.

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 advanced 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. Please visit <https://website.nitrkl.ac.in/CS/> to know more about the department of CSE.

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 Intelligent Transportation Systems for Smart Cities. The participants having Computer Science and Engineering, Electronics and Communication Engineering, and Electrical Engineering background will be benefitted with this short-term course.

Important Dates

Registration starts	6th March 2025
Registration Ends	10th May 2025
Confirmation to participants by email	15th May 2025
Maximum offline participants (on First Come First Serve basis)	90
Commencement of Course	9th June 2025

Tourist Places Nearby



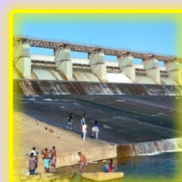
Khandadhar Waterfall



Pitamahal Dam



Vedvyas Temple



Mandira Dam



Hanuman Vatika

Registration Details

- The registration fee (GST 18% inclusive) for various participants for attending the short-term course is given below:
- Lodging, boarding, lunch and dinner facility can be availed on separate payment basis and based on availability).

Registration Details (Fees Non-Refundable)	
Registration Type	Fees
Students	Rs 1180/- (Online) Rs. 2360/- (Offline)
Faculty Members and Delegates from Industry	Rs. 2360/- (Online) Rs. 3000 (Offline)

Bank Account Details for Registration

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

Registration Details

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

<https://forms.gle/5AUN6acZya2krgcd8>

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

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

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