



National Institute of
Technology
Patna

FACULTY DEVELOPMENT PROGRAMME ON

QUANTUM COMPUTING

&

POST-QUANTUM CRYPTOGRAPHY

(Sponsored by Electronics & ICT
Academy Scheme - Phase-II, MeitY,
Govt of India)

February 3 - 9, 2025

[Hybrid Mode]

Organized By
Department of Computer Science,
University of Delhi &
Delhi University Computer Centre
in Collaboration with
National Institute of Technology
Patna

TOPICS (Tentative)

- Introduction to Quantum computing
- Vector Space and Tensor Product
- On Device Independence of Quantum Cryptographic Protocols
- Basic Quantum Gates and Multi-Qubit Gates
- PQC transition and applications
- From Quantum Utility to Quantum Advantage
- Implementing Basic Quantum Circuits in Qiskit
- Quantum Cryptanalysis of Symmetric Ciphers
- Post-quantum Domain Name System and its Security Extensions
- Deutsch & Deutsch-Jozsa Algorithm
- Implementation of quantum attack resistance signatures
- Simon's Algorithm
- Quantum Machine Learning Algorithms
- Grover's Search Algorithm
- Quantum Teleportation Utilizing Classical Bits
- Quantum Fourier Transform (QFT)
- Shor's Algorithm & Quantum Cryptanalysis
- Implementing Shore's Algorithm in Qiskit

REGISTRATION LINK & QR CODE

<https://www.forms.du.ac.in/mac/view.php?id=156197>

REGISTRATION FEE:

Faculty : ₹ 1500/-
Research Scholar (Ph.D) : ₹ 750/-
Industry : ₹ 2500/-
Student UG/PG : ₹ 500/-

PAYMENT by Bank Transfer IMPS / NEFT
Bank Details:
Account Holder Name - E AND ICT Academy
Account No. - 50380476798
IFSC Code - IDIB000B810
UPI ID : eictacademy@indianbk

LAST DATE OF REGISTRATION : January 31, 2025

VENUE:

G-12, Ground Floor
Maharishi Kanad Bhawan
University Road, Faculty of Science
University of Delhi, Delhi - 110007

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ABOUT NIT PATNA

National Institute of Technology Patna is the 18th National Institute of Technology created by the Ministry of H.R.D. Government of India after rechristening the erstwhile Bihar College of Engineering Patna on 28. 01. 2004. NIT Patna marked its humble beginning in 1886 with the establishment of pleaders survey training school which was subsequently promoted of Bihar College of Engineering Patna in 1924. This made this institute the 6th Oldest Engineering Institute of India.

OBJECTIVES OF THE FDP

- Introduce faculty members to the basic principles of quantum computing, including quantum mechanics, qubits, and quantum algorithms.
- Provide an understanding of how quantum computers challenge traditional cryptographic systems.
- Explore the latest advancements in post-quantum cryptographic techniques, which are designed to be secure against quantum attacks.
- Discuss the current state of quantum hardware, quantum algorithms and quantum cryptography.
- Foster research interest in quantum computing and post-quantum cryptography by providing a collaborative platform for knowledge exchange and future exploration.

ABOUT DU

The University of Delhi is a premier university of the country. Established in 1922 as a unitary, teaching and residential University by the Act of the then Central Legislative Assembly, a strong commitment to excellence in teaching, research and social outreach has made the University a role-model and trend setter for other universities.

Universities represent the traditional source of knowledge in society. They provide an environment that generates ideas, skills, and inventions, all components of knowledge.

ABOUT FDP

Quantum computing has emerged as one of the most transformative technologies of the 21st century, promising to revolutionize fields as diverse as cryptography, machine learning, and optimization. As quantum computers evolve, they also pose a significant threat to current cryptographic methods, which underpin the security of digital communications, financial transactions, and data privacy.

To counter this potential disruption, Post-Quantum Cryptography (PQC) has been proposed as a new class of cryptographic algorithms capable of withstanding attacks from quantum computers. These new protocols are designed to secure information even in a world where quantum computers have become mainstream, ensuring the continued safety and privacy of sensitive data.

ADVISORY PANEL

Prof. Neelima Gupta Senior Professor & Head Department of Computer Sc. Dean, Faculty of Mathematical Sc.	Prof. Sanjeev Singh Dean FoT Director DUCC
Prof. Naveen Kumar Senior Professor Department of Computer Sc	Prof. Punam Bedi Senior Professor Department of Computer Sc
Prof. Vasudha Bhatnagar Senior Professor Department of Computer Sc	Prof. Vivek Kumar Singh Professor Department of Computer Sc

COORDINATOR

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Associate Professor
Department of Computer Science

CO-COORDINATOR

Dr. Kuldeep Singh Assistant Professor Department of Computer Sc	Ms. Seema Sirpal DU Computer Centre
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ORGANIZING TEAM MEMBERS

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EXPECTED OUTCOME

- Showcase an extensive understanding of quantum computing and post-quantum cryptography concepts.
- Gain hands-on experience with Qiskit for projects using quantum computing.
- Use cutting-edge cryptography methods to solve real-world problems.
- Collaborate seamlessly on cryptography and quantum security research projects.
- Be ready to incorporate state-of-the-art information into their research and teaching methods.

METHODOLOGY

The FDP will include lectures, and hands-on sessions led by experts in the fields of quantum computing and cryptography. Participants will also have the opportunity to engage in discussions, explore real-world applications, and undertake problem-solving activities related to quantum and post-quantum technologies.

TARGET AUDIENCES

The programme is designed for faculty members, researchers, students and professionals in the fields of computer science, information technology, electronics, mathematics, and physics who are interested in understanding the potential of quantum computing and the need for secure cryptographic solutions in the post-quantum era.