



भारतीय प्रौद्योगिकी  
संस्थान जम्मू  
INDIAN INSTITUTE OF  
TECHNOLOGY JAMMU

विद्याधनं सर्वधनं प्रधानम्

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TIMESPRO



# Post Graduate Diploma in Cyber Security

12 months | Blended | ₹2,56,000 + Taxes

## Cyber Security: Need of the Hour

The digital world has grown by leaps and bounds. As the business world shifts towards a more digital operational framework, business infrastructure and organisational data face an enhanced risk of cyberattacks and violations. Cyber security has become an important factor for the success of the digital economy. As per KnowBe4's 'Phishing by Industry Benchmarking Report', education, hospitality, and insurance are among the top industries that are at the risk in the small, medium, and large-sized organisations categories, respectively.

### Industries Most at Risk of a Phishing Attack Based on Organisation Size

Small (1-249)	Medium (250-999)	Large (1,000+)
Education 32.7%	Hospitality 39.4%	Insurance 52.3%
Healthcare & Pharmaceuticals 32.5%	Healthcare & Pharmaceuticals 36.6%	Consulting 52.2%
Retail & Wholesale 31.5%	Energy & Utilities 34%	Energy & Utilities 50.9%

Source: [expertinsights.com](https://www.expertinsights.com)

The rapid shift towards cloud computing and IoT is leading to a massive increase in cyber threats, and the need for cybersecurity experts to combat these security breaches is becoming paramount. Professionals need to build a digital fortress that can combat every cyberattack and are unbreachable. The need for skilled cybersecurity professionals to prevent security breaches has increased, now more than ever. It is estimated that the Indian cyber security market will step-up to \$35 billion (NASSCOM) by 2025 and there will be a 150% (Indeed.com) increase in demand for cyber security roles.



## Programme Overview

Defending against cyber heist challenges, eradicating security threats, and developing security architecture for the organisation are the essential responsibilities of a skilful Cyber Security Expert. Explore how Cyber Security, Linux fundamentals, Cryptography, Ethical Hacking, and their applications can be applied to reimagine the goals of an organisation with **IIT Jammu's revolutionary Post Graduate Diploma in Cyber Security (PGDCS)**. Featuring a mix of theory, hands-on learning, and practical projects, this course provides a comprehensive overview of cyber security and the necessary skills to help you establish a benchmark in your cyber security career.

## Programme Highlights



Comprehensive curriculum covering fundamental to advanced topics of Cyber Security



Campus immersion module of five days (Optional)

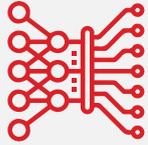


Live online sessions by IIT Jammu faculty and experts



IIT Jammu Executive Education Alumni status

## Learning Outcomes



Understand in-demand cyber security fundamentals, key terms, and technologies



Understand CIA principles, the cyber kill chain, threats, attacks, vulnerabilities, and various security principles



Explore the concepts of Confidentiality, Integrity, and Availability in various Network Security Models, System Security Models, and Frameworks



Learn to identify and investigate data breaches and cyber attacks

## Career Support

**TimesPro in collaboration with IIT Jammu will provide the following career support services**



Access to job postings and job boards



A career session focused on resume, cover letter, and LinkedIn profile development



In-depth training on technical and HR round interviews



Interaction session with industry experts

# Programme Curriculum

## Mathematical Foundations and Cryptography

### Theory

1. Divisibility, Modular Arithmetic, Algorithms for Integer Operations
2. Prime Numbers, Congruence, Solving Congruences, Fermat's Little Theorem
3. Sets, Relations and Mapping, Closure property, Monoid, Group
4. Rings and Fields, Operations on Finite Field, Polynomials Over Finite Field
5. Random Variable and Sample Space, Expectation and Variance
6. Classical Encryption Scheme and their Cryptanalysis: Shift Cipher
7. Block Ciphers and Stream Ciphers: Substitution Permutation Networks, Linear Cryptanalysis
8. Asymmetric Cryptography: RSA, Diffie Hellman, Elliptic Curve
9. Hash Function, Message Authentication, and Digital Signature Schemes

## Computer Networking

### Theory

1. History of Computer Networking, Packet and Circuit Switching, Delays, Protocol Layers
2. Application Layer, Network Application Architecture, Web and HTTP, FTP, SMTP, DNS
3. Transport Layer, Multiplexing and Demultiplexing, UDP, Reliable Data Delivery Principles, TCP
4. Network Layer, Virtual Circuit and Datagram Networks, IP, Routing and Forwarding, Router
5. Link Layer, Error Detection and Correction, Multiple Access Control, Ethernet 802.3
6. Switching, Switches, VLANs
7. Wireless Links, 802.11 Architecture and Protocols, Bluetooth and Zigbee
8. Physical Layer – Wireless Propagation and Performance Analysis

## **Practical**

1. Wireshark and Packet Sniffing, Writing a Packet Sniffer in C and Python
2. Socket Programming in C
3. Networking Commands in Windows and Linux Environment
4. Setting up Networks, CISCO Packet Tracer, Switch, and Router Configurations
5. Setting up Web Servers, DNS, SMTP, POP, and IMAP and hands-on over other Application Layer Protocols
6. Understanding of Physical Layer and WIFI Communication Using SDR

## **Operating System**

### **Theory**

1. Introduction to Operating Systems: OS Evolution, Services, System Calls, Operating System Structure and Architecture, System Programs, OS Booting
2. Process Concepts and Scheduling, Inter-process Communication, Threads, and Multithreading Concepts
3. CPU Scheduling, Scheduling Algorithms, Multiprocessor Scheduling, Process Synchronization, Monitors, Semaphores, Deadlocks
4. Memory Management: Paging, Memory Allocation, Swapping, Virtual Memory, Thrashing
5. Storage Management: File Concepts, Directory Concepts, Allocation Methods, Free Space Management, Disk Management, and Scheduling
6. Access Control and Authentication, Memory Protection Concepts, Program Threats, Malware Analysis

### **Practical**

1. Basic Unix, Linux Administration and Commands
2. Linux System Calls and Understanding, Shell Programming
3. CPU Scheduling Algorithms, IPC Using Shared Memory, Deadlock Avoidance and Detection Algorithms, Semaphores
4. Multithreading and Synchronization, Paging Algorithms, File Allocation

## Introduction to Cyber Security

### Theory

1. Introduction to Cyber Security- What is Cyber Security, Cyber Threats, CIA Principles, OSI Security Architecture
2. Cyber Kill Chain/Hacking methodologies, MITRE Attack Framework
3. Multilevel Security Models: Bell LaPadula Model and Biba Model
4. Security Design Concepts: Principle of Least Privilege, Defense in Depth, Compartmentalization
5. Cyber Attacks Case Study and Discussions, Cyber Security Resources and References

## Technical Seminar

### Theory

1. Identify and choose issues of practical importance in the area of security
2. Learn how to get systematic literature on a technical subject and perform critical thinking, aims and motivation
3. Learn components of a good technical presentation/report, soft skills
4. Learn comparative analysis, how to identify gaps, practical implementation, verification and validation of technical content
5. Final presentation, feedbacks and discussion

## Web Application and Network Security

### Theory

1. Introduction to Web Application Security: OWASP security risks, XSS, CSRF, SSRF Attacks and Countermeasures
2. Symmetric Key Distribution Techniques, Public Key Infrastructure and Applications, HTTPS, TLS, X.509
3. DNS and Email Security: Cache Poisoning, Reflection, Tunneling, Spoofing, DNSSEC
4. Attacks on Transport Layer, Network Layer and Data Link Layer and their countermeasures, Network Programming Concepts
5. Intrusion Detection Systems, Firewalls, Proxies, Caches, Honeypots, Case Studies

## **Practical**

1. Web Application Penetration Testing and Hands On Exercises, Openssl and PKI Realisation
2. Packet Crafting via Popular Tools and Through Raw Socket Programming to realise network attacks
3. Email and DNS Security, ICMP and ARP based Attacks, Phishing
4. Introduction to Popular Packet Filtering Firewall, Intrusion Detection Systems, Web Application Firewalls

## **Multimedia and Digital Forensics**

### **Theory**

1. Fundamentals of Digital Forensics
2. Multimedia Forensics, Format Based Forensics, Pixel-based Forensics, Statistical Based Forensics, Camera Based Forensics, Homomorphic Encryption
3. Framework for Digital Forensics Evidence Collection and Processing, Incident Response
4. Disk and Mobile Forensic techniques, Mobile Device Security Analysis, Incident Response

## **Systems and Software Security**

### **Theory**

1. Fundamentals of Linux and Windows OS
2. Program Binary Formats, Libraries Linkers and Loaders, Process Layout, Stack Layout, Heap Layout and Customisation
3. Programming Language Weakness, Stack Smashing Heap Spray, Return Oriented Programming
4. Principles of Defences, Address Space Randomization, Stack Canaries, Data Execution Prevention
5. Vulnerability Analysis and Standardization, Scanners, Binary Diffing, Malwares and Analysis
6. Reverse Engineering, Use Cases and Examples
7. Software Security Issues and Best Practices

## Special Topics in Cyber Security

### Theory

1. OWASP Cloud Security Risks, Virtualization and related setbacks, Co Residency Attacks and Countermeasures
2. Hyperjacking, Rootkits, Hypervisor Vulnerabilities, XEN, KVM and Related Case Studies, Defenses in Azure, AWS, Data Security
3. IoT and SDN Security Issues and Challenges
4. Machine Learning for Security- Application of Machine Learning in Solving Various Problems in The Domain of Security, Deep Fake Detection
5. Data Security and Privacy issues; Frameworks and Standards, Cyber Security Laws

## Applied Cyber Security Project

### Theory

1. Problem Statement Discussion and Literature Survey
2. Research Gaps Identification, Architecture The Solution
3. Experimentations and Analysis
4. Article or Publication Writing and Demonstrations

## Learn tools like:



TCPDUMP



Burp Suite

WIRESHARK



## Work on projects like:

**01** Design and Development of Intrusion Detection Systems

**02** Develop Security Related Protocols for Low Powered Devices

**03** Design and Development of Intrusion Prevention Systems and Honeypots

**04** Develop Email Security and Anti Phishing Solutions

**05** AI powered Cyber Defense

**06** Homomorphic Encryption Applications

**07** Design and Develop IAM solutions for Infrastructure

**08** Develop Security solutions for Hypervisor and Virtualized Resources in Cloud

**09** VPNS and Proxy Development

**10** PKI and Applications Development



## Pedagogy

The teaching approach will be highly interactive and leverage technology and deploy diverse pedagogical tools and techniques, including lectures, practicals, assignments, quizzes, project work, etc.

## Programme Delivery

Sessions will be conducted via a state-of-the-art Interactive Learning (IL) platform and delivered in Direct-to-Device (D2D) mode that can be accessed by learners on their Desktop, Laptop. Participants will be provided reading materials etc. for each course. They may also interact with the concerned faculty through e-mails/chat mode.

### Duration

12 Months\*  
(350+ hours of live online learning)

100+ hours of self-study  
(recorded videos, assignments, projects, etc.)

*\*The programme duration may be slightly extended due to issues like faculty unavailability and gazetted holidays on the session days.*

### Tentative Class Schedule

The academic sessions will start from September 2023. Sessions will be held on every Saturday and/or Sunday.

Saturday & Sunday: 10.00 am to 2.30 pm  
(2 Sessions)

On some days, the classes may extend beyond the mentioned time. In addition to attending interactive sessions, participants have to undertake offline exams, online quizzes, assignments, and examinations.

### Campus Immersion

There will be an optional 5 days of campus immersion towards the end of the programme.

One or two sessions from some of the courses will become part of the on-campus module. In case the on-campus module is not confirmed due to the COVID-19 situation, the same will be included in the total number of sessions.



## Eligibility Criteria

- Qualifying degree – B.E, B.Tech, MCA, M.Sc./MS in IT, CS, ECE, EE or related fields are eligible
- Minimum 1 year of work experience in IT/CSE/EC/EE or related fields is necessary
- Eligibility criteria for this programme will be 55% or 6 CGPA in qualifying degree
- Persons with more than 10 years of work experience are eligible with an aggregate of 50% or 5.5 CGPA

## Who Should Attend?

The programme is suitable for individuals who are from Software Engineering and IT backgrounds and would like to get skilled in the area of Cyber Security.

The programme will be particularly beneficial for those who have an interest in exploring/working in the domain of Cyber Security and are looking for a domain shift.

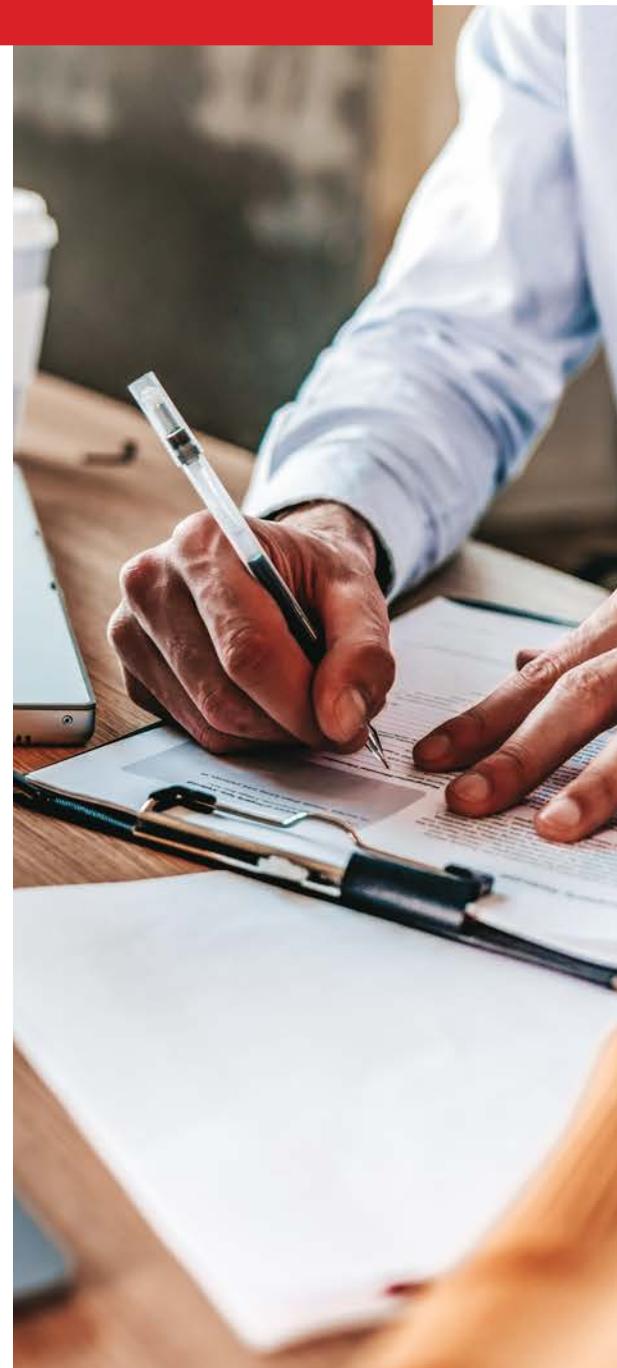
Individuals in various IT & Engineering job roles who wish to acquire the knowledge required to perform secure technology design & development, security analysis of systems, networks, and applications, etc.

## Admission Criteria

Mere fulfilment of the eligibility criteria does not necessarily guarantee selection in the programme.

The selection of candidates will be based on:

- Relevant academic credentials provided by the applicants in the application form
- Virtual interview of 20 minutes conducted by an interview panel



## Attendance Criteria

A minimum of 70% attendance is a prerequisite for the successful completion of the programme.

## Evaluation Criteria

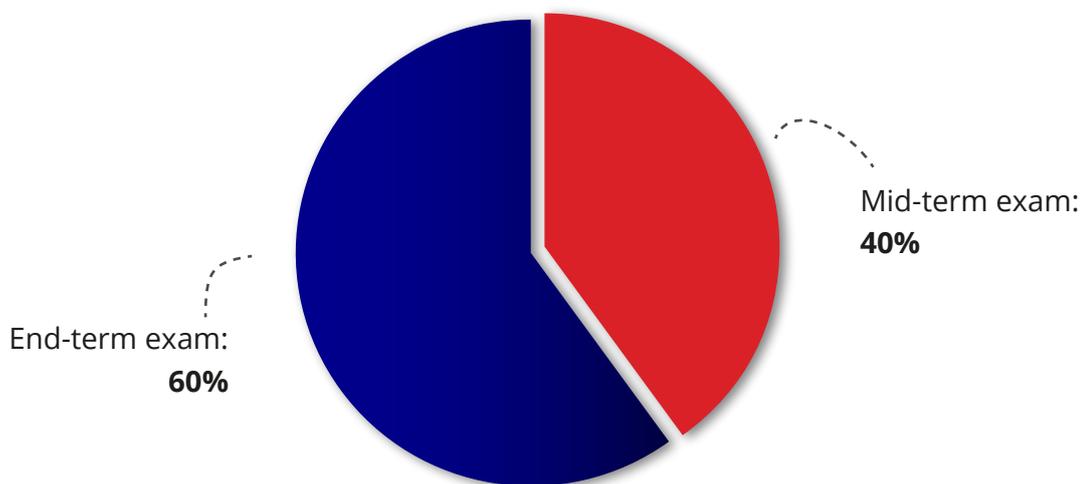
A student must complete all 29 credits to receive the Diploma.

### Technical Seminar

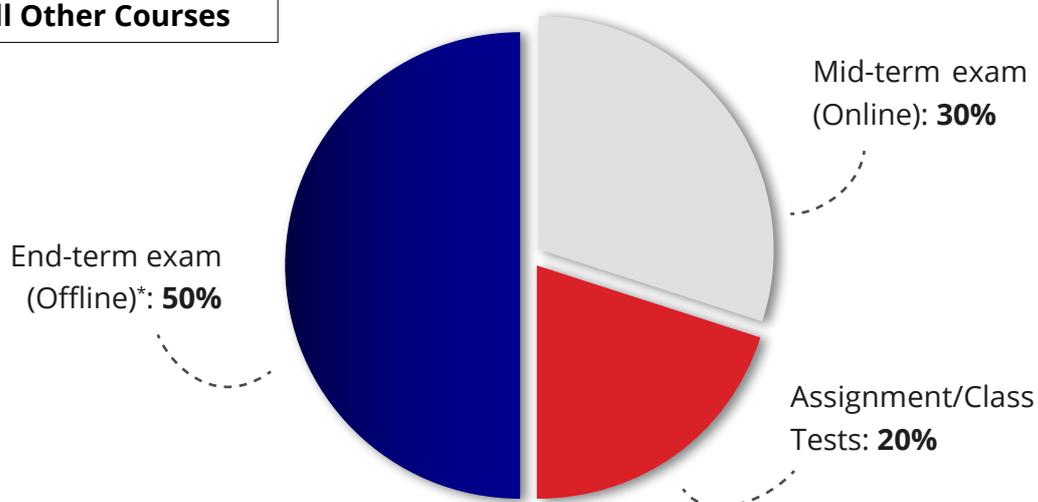
Technical Seminar Presentation: **100%**

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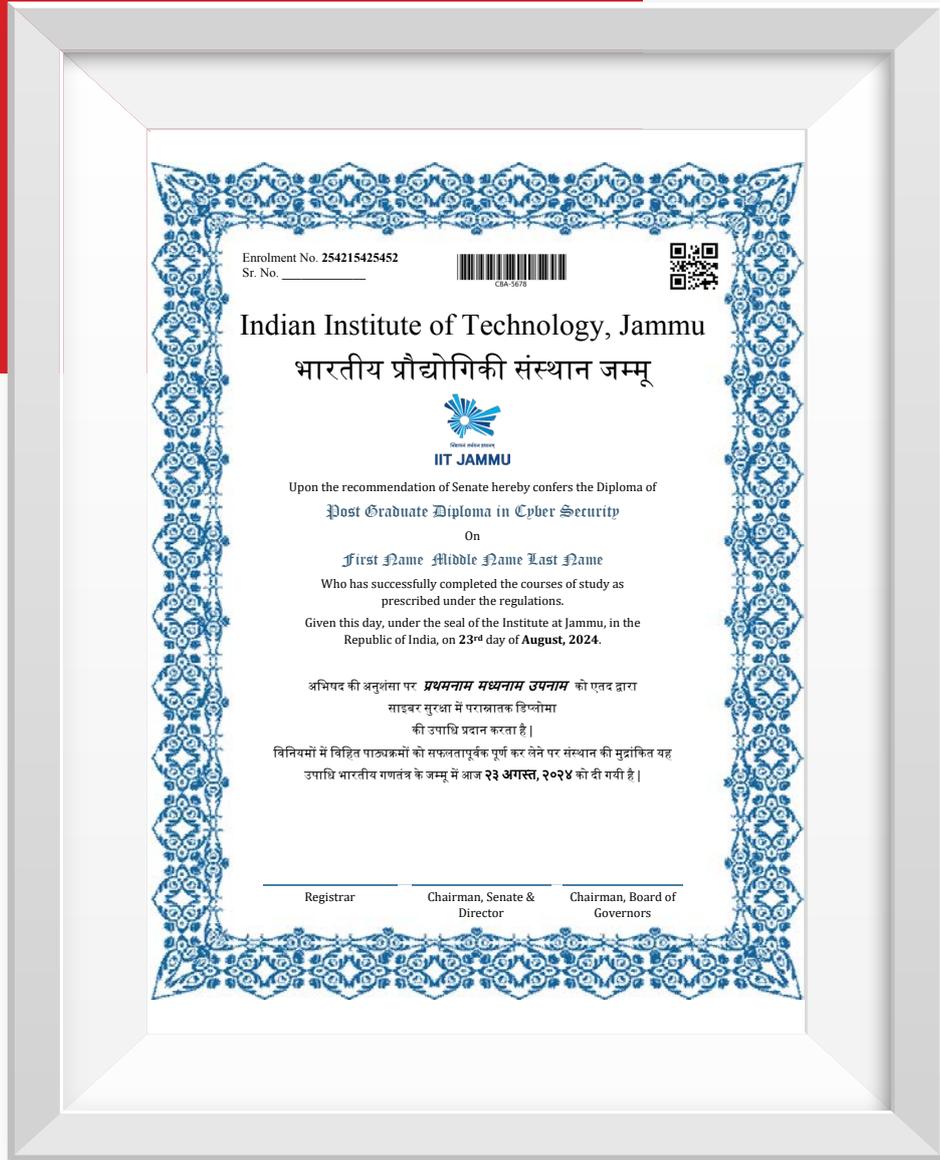
### Applied Security Projects



### All Other Courses



*\*Offline exams will be conducted in Delhi, Bangalore, Kolkata, Mumbai and IIT Jammu campus. This is subject to change as per discretion of the institute.*



## Certification & Alumni Status

Participants who successfully meet the evaluation criteria and satisfy the requisite attendance criteria, will be awarded a Post Graduate Diploma in Cyber Security from IIT Jammu.

Participants who are unable to clear the evaluation criteria but have the requisite attendance will receive only the transcripts and NOT the Diploma.

Successful participants will be eligible for IIT Jammu's Executive Education Alumni status.

## Programme Director's Profile



**Dr. Gaurav Varshney**  
Assistant Professor,  
Department of CSE,  
IIT Jammu

Dr. Gaurav Varshney is an Assistant Professor in the Department of Computer Science and Engineering at Indian Institute of Technology Jammu. He holds 10+ years of experience working in the area of Applied Security. He completed his M.Tech in Information Technology from IIT Roorkee in 2012 and researched in the area of user authentication schemes to prevent spoofing and phishing. He then worked at QUALCOMM as an Engineer and later completed his PhD from IIT Roorkee in the area of Cyber Security where he studied spoofing and phishing in detail and developed solutions for Anti Phishing, Secure Authentication Architectures and Malicious Browser Extensions. He collaborated with several researchers internationally and has worked in various security research labs including Albany Labs for Privacy and Security (Cloud Security and Memory Forensics) at SUNY Albany, New York, USA, Advanced Cyber Security Engineering Research Centre at University of Newcastle (Data Privacy and Security Issues), Australia and SUTD Singapore (PKI and Security). He also worked as a Cyber Security Consultant at NIIT Limited and as an Assistant Professor at NIIT University, Neemrana. His research interests include web security, network security, anti-phishing, secure authentication and digital payments and memory forensics and PKI applications etc. He received various awards including University Gold Medal and C.L Chowksey Gold Medal from RGPV, Bhopal, MP, Qualstar from Qualcomm and Appreciations from various organizations including noticeable one from CEO UIDAI for his contributions to the security of Aadhar QR Codes. He has given invited lectures, panel discussions and seminars to several national and international security events and published 25+ papers in leading conferences and journals in the area of Security. He has received funding from Industry and Government on various research projects for security of digital payments, data encryption, user privacy, cyber testbed to list a few.

## Programme Faculty Profiles



### **Prof. Manoj Singh Gaur**

Professor,  
Department of  
CSE/Director,  
IIT Jammu

Prof. Manoj Singh Gaur is serving as founding Director Indian Institute of Technology, Jammu since June 2017 as well as Professor, CSE. He is now in his second term. Before joining IIT Jammu, he was a Professor and Head of the Department of Computer Science and Engineering at Malaviya National Institute of Technology (MNIT) Jaipur, India. He has been Dean of Students Affairs and Head of Central Computer Centre at MNIT Jaipur. He also served as Professor-In-Charge (Coordinator) of IIIT Kota. In his teaching and research career of almost three decades, he has been an Investigator of several funded research projects in Information Security and Networks on Chip. He has been part of the core group of Project ISEA (Information Security Education and Awareness), which is a major multi-institutional project in the domain of Information Security in India. His current research areas include Computer and Network Security (Network Attack Models and Countermeasures), Mobile Platform Security, and Data Privacy. He has published more than two hundred papers in reputed journals and conferences. He has supervised Twenty Three PhDs to date, and currently, two research scholars with under-graduates and post-graduates are working actively in his research group. Prof. Manoj Singh Gaur is a leading exponent of using technology and automation as an enabler of service delivery at Higher Education Institutes - be it infrastructure, teaching & learning, or eGovernance. Under the leadership of the founding Director. IIT Jammu is achieving new milestones in line with her Vision and Values for a better tomorrow and to create leaders of tomorrow.



**Dr. Shaifu Gupta**  
Assistant Professor,  
Department of CSE,  
IIT Jammu

Dr. Shaifu Gupta is an Assistant Professor in the Department of Computer Science and Engineering in IIT Jammu. She received her Ph.D. degree from IIT Mandi in 2020 and M. Tech from GNDEC, Ludhiana in 2014. She was awarded a gold medal in her M. Tech for academic excellence. Her research interests include cloud computing, federated learning, machine learning, deep learning, time series analysis, and security / privacy aspects associated with cloud, PII leakage from mobile phones, data poisoning attacks etc. She is working on two research projects as PI - one funded by government agency and the other by industry partners. One of the projects deals with development of a cyber testbed for conducting cyber security research and skill development. The other project deals with development of machine learning algorithms for credit risk prediction for a fintech industry. She has over 15 publications in several reputed journals / conferences. She has also served as a program committee member in 28th International Conference on High Performance Computing, Data and Analytics. She is also acting as a reviewer for several reputed journals and conferences.



**Dr. Suman Banerjee**  
Assistant Professor,  
Department of CSE,  
IIT Jammu

Dr. Suman Banerjee is an Assistant Professor in the Department of Computer Science and Engineering at Indian Institute of Technology Jammu. Prior to this, he was a post-doctoral fellow in the department of Computer Science and Engineering at the Indian Institute of Technology Gandhinagar India. Before that, he obtained his Ph.D. from the Indian Institute of Technology Kharagpur. His research interests include Social Network Analysis, Data Management and Mining, Graph Theory and Algorithms, and Parameterized Complexity. Very recently he is interested in studying fairness issues in the automated decision-making process. He has extensively published 40+ research articles in many Algorithms and Database venues such as DEXA, ADMA, WISE, WALCOM, Theoretical Computer Science, Theory of Computing Systems, and many more. He is currently executing a project on Developing Efficient Algorithms of Slot Allocation for Billboard Advertisement.



**Dr. Yamuna Prasad Shukla**

Assistant Professor,  
Department of CSE,  
IIT Jammu

Dr. Yamuna Prasad received the Ph.D. Degree in computer science and Engineering from Indian Institute of Technology Delhi, India. He was a Postdoctoral Fellow of Thompson Rivers University, BC, Canada from 2017 to 2018, and a visiting scholar with University of Cincinnati, OH, USA, in 2018. He is currently assistant professor in the department of Computer Science and Engineering, Indian Institute of Technology Jammu, India. He has authored over dozens of articles in peer reviewed journals and conferences in the area AI, ML and Bioinformatics. He has also delivered talks and webinars in the area of AI/ML in various national and international venues. He has served as a reviewer of many international journals and conferences. He has been awarded various research projects as PI and Co-PI funded by Various National Agencies in the area of securing Machine Learning Models for real-time applications. His research interests include intersection of artificial intelligence, optimization, soft computing, machine learning, deep learning and security.



**Dr. Sumit Kumar Pandey**

Assistant Professor,  
Department of CSE,  
IIT Jammu

Dr. Sumit Kumar Pandey did his Master of Science in Mathematics from IIT Bombay and then did his Master of Technology in Computer Science from ISI Kolkata. After that, he did his PhD from ISI Kolkata and then did his postdoc from NTU Singapore under Prof. Thomas Peyrin of school of physical and mathematical sciences and then under Dr. Anupam Chattopadhyay of school of computer sciences and engineering. He has worked in CRRAO AIMSCS, Hyderabad for two and half years. There, he worked on different security related projects of DRDO and NTRO, India. He is known for the design of lightweight block ciphers like GIFT and FUTURE. His research area includes both public key and private key cryptography. He has worked in the area of signcryption in public key, identity based and attribute-based setting. In the private key setting, he has done significant work in the design of efficient and optimal branch diffusion layers using companion matrices. Nowadays, he is interested in quantum computation and quantum cryptography also.

## Programme Fees

Particulars	Amount* (₹)
<b>Total Programme Fees</b>	<b>2,56,000 + taxes</b>

\*Including GST @ 18% and Bank Charges.

Note: In case a participant's profile is rejected by IIT Jammu, ₹5,000/- is refunded to candidate and ₹5,000/- of the application fee is non-refundable. GST is non-refundable.

## Payment Schedule

Instalment	Date
50% of Total Programme Fees	One week before start of Semester 1
Balance 50% of Total Programme Fees	One week before start of Semester 2

## Programme Timelines

Application Closure Date	6 <sup>th</sup> June, 2023
Programme Start Date	2 <sup>nd</sup> September, 2023
Tentative Programme End Date	August 2024

**APPLY NOW**





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## Indian Institute of Technology Jammu

### Vision

"To create tomorrow's world through technological interventions which are humanistic, creative, and futuristic."

### Motto

Learn, Engage, Invent, Create, Impact

IIT Jammu is recognised as an 'Institute of National Importance' under the 'Institutes of Technology Act' of 1961. It is an autonomous public higher education Institute funded by the Government of India, and functions under the governance of the IIT Council.

IIT Jammu was inaugurated on 6th August, 2016, and welcomed the first batch of students into the campus in Paloura, Jammu. In 2018, IIT Jammu shifted the primary operations to the Main Campus in Jagti, Nagrota, where the Government of Jammu and Kashmir has provided 400 acres of land for the establishment of a permanent campus. Currently the Phase 1 A of the main campus, spread across 25 acres, is operational. Phase 1 B and 1 C are undergoing construction. The campus in Paloura currently houses the PhD scholars and is being developed into a high-end research facility.

IIT Jammu encourages students to stir up the curiosity that fuels their minds with knowledge and practical understanding to lead innovation.



TimesPro, the award-winning EdTech initiative of The Times Of India Group, was established in 2013 to cater to the diverse learning needs of Indians with aspirations of career growth.

Taking the rich legacy of trust, knowledge, and learning of The Times Of India Group forward, TimesPro strives to embody the values of Education 4.0 – learner-centric, industry-relevant, role-specific, and technology-enabled – in its executive education programmes.

Ranging across industries and domains, these programmes are curated and offered in collaboration with premier national and global educational institutions to fulfil the aspirations of millions of professionals by equipping them with the right knowledge and skills.



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