

Abhay Kumar Singh

Professor, Department of Mathematics & Computing, IIT (ISM), Dhanbad

CONTACT INFORMATION	Department of Mathematics & Computing Science Block Indian Institute of Technology (Indian School of Mines), Dhanbad Dhanbad, Jharkhand - 826004 India	<i>Mobile:</i> +91 8986696177 <i>Phone(O):</i> +91-3262235670 <i>Fax:</i> +91-3262296619 <i>E-mail:</i> abhay@iitism.ac.in
DATE OF BIRTH	August 24, 1981	
MARITAL STATUS	Married	
CITIZENSHIP	Indian	
RESEARCH INTERESTS	• Quantum Computing • Post-Quantum Cryptography	• Coding Theory • DNA Computing
EXPERIENCE	Professor April 20, 2026 - Present <i>Department of Mathematics & Computing,</i> Indian Institute of Technology (ISM), Dhanbad, India Associate Professor April 12, 2021 - April 19, 2026 <i>Department of Mathematics & Computing,</i> Indian Institute of Technology (ISM), Dhanbad, India Visiting Associate Professor Sept 01, 2023 - Sept 30, 2023 <i>Quantum Computing Research, School of Computing and Information System,</i> University of Melbourne, Australia Visiting Associate Professor May 19, 2022 - July 18, 2022 <i>Department of Mathematics & Computing,</i> Vietnam Institute for Advanced Study in Mathematics, Hanoi, Vietnam Visiting Faculty October, 2020 - April, 2021 Indian Institute of Management, Rohtak, India Assistant Professor July, 2010 - April, 2021 <i>Department of Mathematics & Computing,</i> Indian Institute of Technology (ISM), Dhanbad, India Assistant Professor September, 2009 - June, 2010 <i>Department of Mathematics,</i> <i>Mahatma Gandhi Kashi Vidyapith, Varanasi, India</i> Lecturer March, 2007 - August, 2009 <i>Department of Mathematics,</i> <i>UIET, CSJM University Kanpur, India</i>	
EDUCATION	Ph.D. Indian Institute of Technology (Banaras Hindu University),	2007

Varanasi, Uttar Pradesh, India Dissertation Topic: "Characterization of Compressible Modules, Clean Rings and study of the properties of such Modules related with Injectivity"

M.Sc., Mathematics

2002

Banaras Hindu University,

Varanasi, Uttar Pradesh, India

First Division

**International
Research
Collaboration and
Funding**

- Guided two Ph. D. students jointly with **Prof. Hai Q. Dinh, Kent State University, Ohio, USA.**
- Jointly guided an integrated M.Tech student, Vatsal Jha, with **Prof. Udaya Parampalli, Melbourne University, Australia** on Quantum Coding.
- Offered visiting position in summer 2019 at **Telecom Paris Tech, France** with monthly stipend 2500 Euro per month.
- **Visiting Associate Professor, Vietnam Institute for Advance Study in Mathematics, Hanoi, May 17, 2022 to July 16, 2022.**
- **Visiting Associate Professor, Department of CSE, University of Melbourne, Australia. Sept. 1 to Sept. 30, 2023.**

**AWARDS /
SCHOLARSHIPS**

- **CSIR-JRF (NET)**
Mathematical Sciences 2005
- **CSIR-UGC (NET)**
Mathematical Sciences 2004
- **Graduate Aptitude Test for Engineering(GATE)**
Mathematics, IIT Madras 2003

**SPONSORED
RESEARCH
PROJECT**

CSS construction with Symbol-pair Metric over Finite Field **Completed**
Metrics funding scheme of *March 2022- March 2025*
Science and Engineering Research Board, Department of Science & Technology
Grant Amount: 6.6 Lakhs INR

Design and Analysis of Code-based Public-Key Cryptosystem **Completed**
Defense Research and Development Organization *July 2022- December 2024*
Grant Amount: 49.90 Lakhs INR

Symbol-Pair Codes over Finite Rings **Completed**
Extramural Research (EMR) funding scheme of *2017-2020*
Science and Engineering Research Board, Department of Science & Technology
Grant Amount: 15.32 Lakhs INR

Compressible Modules and their Application **Completed**
National Board for Higher Mathematics, Department of Atomic Energy *2017-2020*
Grant Amount: 3.53 Lakhs INR

Characterization of Clean Rings **Completed**
FRS Scheme, *2010-2013*
Indian Institute of Technology (ISM), Dhanbad
Grant Amount: 3.90 Lakhs INR

Clean Rings and Their Application **Completed**
University Grant Commission, New Delhi *2009-2010*
Grant Amount: .95 Lakhs INR

- INVITED LECTURES
- 2025, June 27: delivered lectures on Overview of Code based Cryptography in PQC workshop, IIT Dhanbad
 - 2025: Delivered 40 hours Lecture for IPM Students at IIM Rohtak, 2025
 - 2024, Dec 27: Delivered lectures on coding theory at IIT Patna.
 - 2024, Sept 26: Delivered lecture on CSS construction for Symbol-pair metric, IIT Bombay and Verginia Tech USA, Joint workshop on Coding Theory.
 - 2023, Sept 26: Delivered lecture on Symbol Codes, Department of CSE, Melbourne University, Australia.
 - 2023, Sept. 22: Delivered lecture on b -Symbol Codes, Department of Mathematics, RMIT University, Australia.
 - 2023, Sept 20: Delivered lecture on Symbol Codes, Department of CSE, Monash University, Australia.
 - 2022 May 24: "An Overview of Code-based cryptography", Algebra with Applications Seminar Department of Mathematics Aligarh Muslim University, **Aligarh Muslim University, Aligarh (Invited Speaker)**
 - 2022 February 01-07: "Code-based Post-Quantum Cryptography", 20-Hours lecture series for Code-based Post-Quantum Cryptography training, **Department of Research and Defence Organisation. (Invited Speaker)**
 - 2021, November 16: "Linear Algebra for Quantum Computing and Quantum Information Refresher Course on "Advances in Mathematical and Physical Sciences", **UGC-Human Resource Development Centre, Doctor Harisingh Gour Vishwavidyalaya, Sagar (MP). (Invited Speaker)**
 - 2021 October 06: "Post Quantum Cryptography", National Workshop on Computational Intelligence and Blockchain Technology, **National Institute of Technology, Raipur (Expert Lecture)**
 - 2021, August 13: "Codes over finite fields applications", Five Day webinar on "Stability Analysis and Cryptography in Engineering", **Department of Mathematics, KPR Institute of Engineering and Technology, Coimbatore. (Invited Speaker)**
 - 2021, April 28 - May 02 : "Overview on Code-based Cryptography", e-workshop Recent trends in Information Security and Blockchain Technology, **Department of Mathematics and Scientific Computing, NIT Hamirpur. (Invited Speaker)**
 - 2020, December 23: "Finite Field, Coding and It's Applications", Faculty Development Programme on "Applications of Algebra and Number Theory in Network Security", **Mahatma Hansraj Faculty Development Centre, Hansraj College. (Invited Speaker)**
 - 2020, December 14-19 : "Challenges and Applications of Cyber-Physical System", AICTE Sponsored STTP 2020, GIET Gunupur. (Invited Speaker)
 - 2018, June 07: "Symbol-Pair Constacyclic Codes over Finite Fields", ADMA 2018, **IIT Gandhinagar. (Invited Speaker)**
 - 2017, December 13-17: "DNA Cyclic Codes", Short-term course on Coding Theory and Cryptography, **IIT (ISM), Dhanbad. (Invited Speaker)**
 - 2017, June 15: "Symbol-Pair Codes over Finite Fields", SAG, **DRDO, New Delhi. (Invited Speaker)**
 - 2017, May 17: "A Course on Linear Algebra", Faculty Development Centre, **IIT (ISM), Dhanbad. (Invited Speaker)**
 - 2012, May 28: "An Introduction to Real Analysis", Undergraduate Training Program on Linear Algebra and Real Analysis (DST), **IIT (ISM), Dhanbad. (Invited Speaker)**
 - 2010, February 21: "Uniquely Clean Ideals", Conference on Algebra and its Application, **Aligarh Muslim University, Aligarh. (Paper Presented)**
 - 2007, December 30: "Essentially Slightly Compressible Modules and Rings", Annual Conference of **BHU, Varanasi. (Paper Presented)**

TEACHING
EXPERIENCE

University Level Courses Taught:

- Cryptography
- Calculus
- Complex Analysis
- Vector Calculus & its Application
- Algebra I
- Algebra II
- Linear Algebra
- Real Analysis
- Information & Coding Theory
- Quantum Computing

	• Post-Quantum Cryptography
PH.D. STUDENTS SUPERVISED:	• 2017: Shiv Kumar • 2017: Amrit Kumar Mahato • 2018: Sukhamoy Pattanayak • 2020: Pratyush Kumar • 2020: Narendra Kumar • 2022: Sampurna Satpati • 2022: Madhu Kant Thakur • 2022: Pooja Mishra (Co-Supervised)(CSE Dept) • 2024: Ekta Bindal
DOCTORAL STUDENTS (IN PROGRESS):	• 2021: Mrinal Kanti Bose • 2023: Anamika Singh • 2024: Anubhav Tiwari • 2024: Chiranjeev Bhaya(Jointly with CSE Dept)
REVIEW DUTY	Reviewer of • Cryptography and Communications Discrete Structures, Boolean Functions and Sequences - Springer • Journal of Applied Mathematics and Computing - Springer • Applicable Algebra in Engineering, Communication and Computing - Springer • Information Sciences - Elsevier • Journal of Algebra Combinatorics Discrete Structures and Applications • Discrete Mathematics, Algorithms and Applications - World Scientific • Turkish Journal of Mathematics • IEEE Communication Letter • IEEE Transactions on Information Theory • Designs, Codes and Cryptography • Discrete Mathematics • Indian Journal of Pure and Applied Mathematics • International Journal of Theoretical Physics • Finite Fields and Their Applications
ADMINISTRATIVE RESPONSIBILITIES	• Professor in charge of Quantum Computing Center <i>2022-till date</i> • Hostel Warden <i>2011-2014</i> • Co-ordinator of M.Sc.(Mathematics & Computing) <i>2013-2022</i> • Faculty Mentor of 1st year B.Tech <i>Batch: 2017-18, 2018-19</i> • Member of Departmental Budget Committee • Invigilation Duty In-charge of Departmental Semester Examination • Member of DUGC <i>2018 - 2022</i> • Member of DPGC <i>Since 2022</i>
REFERENCES	• Prof Bimal Roy, ISI Kolkata. • Prof B Sundar Rajan, IEEE Life fellow, IISc Bengaluru. • Prof Vaneet Aggarwal, Purdue University, USA