



# SHIV NADAR UNIVERSITY

## DEPARTMENT OF MATHEMATICS

### SCHOOL OF NATURAL SCIENCES

#### GRADUATE PROSPECTUS

##### Ph.D. in Mathematics

2021–22

[www.snu.edu.in](http://www.snu.edu.in)

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## Overview

The Department of Mathematics at SNU offers programs and courses that highlight the interdisciplinary and the multidisciplinary nature of the university. Its academic programs provide a solid base for careers in both academia and industry. There is a great demand for mathematicians in various sectors: investment banks, insurance companies, financial institutions, engineering consultancies, medical research, bioinformatics, software, computer security, and defense. Well trained students are also sought by universities all over the world for their research programs.

The following distinguishing features are common to all our programs:

- Accessibility to students from diverse backgrounds
- Melting of the artificial barriers between pure and applied mathematics and between mathematics and other disciplines.
- Exposure to leading mathematicians, scientists and thinkers from India and abroad.

The department has a close relationship with research centers at SNU; especially the **Institute for Innovations and Inventions with Mathematics and IT (IIIMIT)** and the **Big Data Analytics Center (BDAC)** which are currently headed by mathematics faculty. We have regular seminars, and have hosted national conferences and programs such as

- *Northern Regional Conference of the National Initiative in Mathematics Education* (2011, co-hosted with Ambedkar University, Delhi).
- *27th Annual Conference of the Ramanujan Mathematical Society* (2012)
- *Annual Foundation School* for Ph.D. students (2015, sponsored by the National Centre for Mathematics).
- *Mathematical Training and Talent Search* program (2015 and 2016, sponsored by the National Board for Higher Mathematics).
- *Advanced Instructional School on Matrix Analysis* (2016, sponsored by the National Centre for Mathematics).
- *National Conference on Cross-disciplinary Applications of Complex Networks* (2018, sponsored by Science and Engineering Research Board, India).
- *Annual Conference of Indian Women and Mathematics* (June 2018, sponsored by National Board for Higher Mathematics).

Research is further supported by facilities such as individual laptops/desktops for faculty, a 30-PC computer lab with Mathematica and Matlab, a generous library budget for books, and subscriptions to diverse journals. In 2015, we were awarded a five-year grant under the **DST-FIST** scheme for developing a Research Computer Lab and a Department Library.

All graduate programs at SNU are managed and coordinated by the office of the **Dean of Research and Graduate Studies**. The overall goals of graduate study at SNU are:

1. Provide scholars with a discovery-driven intellectual environment
2. Develop scholars for leadership positions in academic and research focused organizations
3. Encourage the development of interdisciplinary research orientation focused on tackling intellectually and socially relevant problems
4. Train scholars in academic and research publishing processes
5. Hone scholars' teaching abilities



Department faculty, staff and graduate students in front of the Library in December 2015.



The Department of Mathematics is housed in the School of Natural Sciences.



Graduate students at Research Computer Lab in the department. It is funded by DST under the FIST scheme.



The department library. It is funded by DST under the FIST scheme.

## Faculty

The members of the faculty of mathematics at SNU have studied or worked at leading institutions. Their mathematical interests vary across areas such as functional and harmonic analysis, representation theory, differential geometry, number theory, encryption, game theory, graph theory, category theory, differential equations, optimization, signal processing, computational methods, statistics, mathematical finance, machine learning, mathematical biology, and medical imaging.

Faculty Member	Qualifications	Areas of Interest
<b>Sanjeev Agrawal</b> Professor	Ph.D. Delhi M.A. Oxford	Functional Analysis, Operator Theory, Error Correcting Codes, and Encryption
<b>Sudepto Bhattacharya</b> Professor	Ph.D. Nagpur M.Sc. Nagpur	Complexity, Game theory, Network Theory, and Mathematical Modeling
<b>Samit Bhattacharyya</b> Associate Professor	Ph.D. Univ. of Calcutta M.Sc. Univ. of Calcutta	Applied Mathematics and Computational Biology
<b>Dipti Dubey</b> Assistant Professor	Ph.D. IIT Delhi M.Sc. Devi Ahilya Vishwavidyalaya Indore	Optimization and Game Theory
<b>Priyanka Grover</b> Assistant Professor, DST-Inspire Faculty	Ph.D. ISI Delhi M.Sc. Univ. of Delhi	Matrix Analysis and Operator Theory
<b>Neha Gupta</b> Assistant Professor	Ph.D. Univ. of Warwick M.Sc. Univ. of Warwick	Quantum Groups and Category Theory
<b>Amber Habib</b> Professor & Head	Ph.D. Berkeley M.S. (Int) IIT Kanpur	Representation Theory and Mathematical Finance
<b>Ajit Kumar</b> Assistant Professor	Ph.D. Univ. of Houston M.S. Univ. of Houston	Partial Differential Equations, Finite Element Method, and Machine Learning
<b>Pradip Kumar</b> Assistant Professor	Ph.D. HRI M.Sc. IIT Kanpur	Differential Geometry and Global Analysis
<b>Sneh Lata</b> Assistant Professor; Graduate Advisor	Ph.D. Univ. of Houston M.S. Univ. of Houston	Frame theory, Operator Theory, and Function Theory
<b>A Satyanarayana Reddy</b> Associate Professor	Ph.D. IIT Kanpur M.Sc. Andhra University	Algebraic Graph Theory, Discrete Mathematics, and Algebraic Number Theory
<b>Niteesh Sahni</b> Assistant Professor; Undergraduate Advisor	Ph.D. Delhi University M.Sc. Delhi University	Functional Analysis, Operator Theory, Dynamical Systems, and Machine Learning
<b>Charu Sharma</b> Assistant Professor	M.S. Univ. of Houston	Bioinformatics and Computational Finance

<b>Santosh Singh</b> Associate Professor; Director BDAC	Ph.D. IIT Kanpur M.A. Agra University	Medical image analysis, Image reconstruction, Computational photography, Light field, and Optimization techniques
<b>L. M. Saha</b> Professor; Fellow at IIIMIT	Ph.D. Univ. of Calcutta M.Sc. Patna University	Dynamical Systems & Chaos Theory, Celestial Mechanics & Astrophysics, and Application of Nonlinear Dynamics to Bio-Science & other areas of science

**Some major journals in which our faculty members have published:**

- Annals of Operations Research
- Bulletin of Mathematical Biology
- Forum Mathematicum
- Houston Journal of Mathematics
- Indiana University Mathematics Journal
- Journal of Mathematical Analysis and Applications
- Journal of Mathematical Chemistry
- Journal of Ramanujan Mathematical Society
- Journal of Theoretical Biology
- Linear Algebra and its Applications
- New York Journal of Mathematics
- Proceedings of the American Mathematical Society
- Proceedings of the Indian Academy of Sciences
- Proceedings of the National Academy of Sciences, USA
- Scientific Reports-Nature
- Stochastic Analysis and Applications
- Studia Mathematica
- The Journal of Fourier Analysis and Applications

## Ph.D. in Mathematics

The faculty members of the Department of Mathematics at SNU have research interests over wide areas of pure and applied mathematics. The broad areas of interest of our individual faculty have been listed earlier.

Ph.D. students can also carry out their research in collaboration with faculty in other departments or research centres such as IIIMIT, BDAC and the Centre for Informatics.

The detailed SNU Ph.D. Regulations can be obtained from the SNU website. A summary of the Mathematics Ph.D. program is given below:

- **Duration:** Six to ten semesters.

- **Admission:** Admission is through a written test and interview. The written test is described in the **Admission Process** section.
- **Course-Work:** The student must register for the following, in consultation with the Graduate Advisor:
  - Three courses of 4 credits each in the first semester.
  - Research Methodology course.
  - Coursework in the second semester will depend on performance in the first semester.
  - Retention of fellowship requires a minimum CGPA of 7.0. For more details, see **SNU Policy for Retention of Tuition Fee Waivers**.
- **Degree Requirements:** To earn a Ph.D. degree the student must:
  - Complete the required course-work.
  - Pass the Comprehensive Examination, which consists of Qualifying Examinations and a Research Seminar, by the end of the 4<sup>th</sup> semester.
  - Publish one research paper in a refereed journal before thesis submission.
  - Submit and defend the doctoral thesis.
- **Eligibility:** A Master's Degree in Mathematics or related disciplines with overall marks of at least 60% (or equivalent grade). Please enquire in case you are uncertain about your eligibility for any reason. Candidates who have qualified for CSIR-UGC NET-JRF, NBHM Fellowship, GATE-JRF, NET, JEST are preferred.
- **Fees and Financial Aid:** All students admitted to our Ph.D. program receive a Teaching Assistantship as well as significant Tuition and Hostel Fee waivers. **Please see SNU website for details.**

Continuation of the assistantship is contingent on satisfactory performance in the program evaluated continuously, and compliance with all University regulations. Further, the scholarship is only offered for the regular duration of the Ph.D. program (i.e. eight semesters).

## Our Ph.D. Alumni and their current affiliation

- Devendra Prasad (2019) – Postdoctoral fellow, IISER Tirupati, India.
- Monimala Neg (2019) – Assistant professor, Adamas University, Kolkata, India.
- Shashankaditya Upadhyay (2019) – Postdoctoral fellow, IIT Delhi, India.
- Aniruddha Deka(2021) – Postdoctoral fellow, Pennsylvania State University, USA.

## Admission Process

All interested candidates should apply online at [www.snu.edu.in](http://www.snu.edu.in). After online submission and payment of application fee, print the completed form and send by speed post to the University at the following address:



Ms. Lakshmi Arya  
*EA to the Head*  
Department of Mathematics  
School of Natural Sciences  
Shiv Nadar University P.O.  
NH-91, Tehsil Dadri  
District Gautam Buddha Nagar, UP 201314, India.

The printed form should be accompanied by the following documents:

- At least one sealed reference letter in support of the application.
- Demand Draft for application fee (if online fee payment mode is not used).

Admissions to the Ph.D. program is through an exam comprising of a written test and an interview. The key dates for Ph.D. admission exams are:

<b>Last date for applying</b>	<b>Written Test</b>	<b>Announcement of shortlisted candidates for Interviews</b>	<b>Interview dates</b>	<b>Announcement of results</b>
May 30, 2021	June 5, 2021	June 14, 2021	July 1 – July 7, 2021	July 14, 2021

## Written Exam

The written exam will be in two parts, consisting of multiple-choice and descriptive questions respectively.

The multiple-choice portion will contain Masters level questions from the fundamental areas of Linear Algebra, Algebra, Real Analysis, Metric Spaces, Complex Analysis, Numerical Analysis, Ordinary Differential Equations, Combinatorics, and Probability.

The descriptive questions will be selected from the above as well as specialized topics such as Functional Analysis, Harmonic Analysis, Differential Geometry, Partial Differential Equations, Graph Theory. As these may not have been studied by all students, the applicant will be allowed to choose between questions.

**SAMPLE QUESTION PAPER IS AVAILABLE AT:** <https://math.snu.edu.in/>

## Contact Us

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