



Miranda House

UNIVERSITY OF DELHI

Name: Dr. HARSHA KHARBANDA

Department: Mathematics

Current Designation: Guest Faculty

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Academic Qualifications:

- Qualified Joint CSIR-UGC (JRF) December 2014 exam under UGC lectureship scheme with Rank 71 in the subject Mathematical Sciences.
- Qualified GATE (Graduate Aptitude Test in Engineering) exam with All India Rank 352 in 2015.
- M.Sc. Mathematics, University of Delhi, Delhi (2012-2014)
- B.Sc. (H) Mathematics, University of Delhi, Delhi (2009-2012)

Research Degree:

- Ph.D. (Mathematics), University of Delhi, Delhi, India (2021) under the supervision of Dr. Sachin Kumar, Assistant Professor, Department of Mathematics, University of Delhi.
Thesis title: Modeling and qualitative dynamics in prey-predator interactions.

Field of Specialization under the Subject/Discipline: Differential Equations

Total Teaching Experience: 1 year (approx)

Teaching at Miranda House since: November 17, 2021

List of Publications:

(Articles in referred/peer-reviewed/UGC Care journals/ Books/Book Chapters)

1. Kumar, Sachin; Kumar, Amit; **Kharbanda, Harsha**. Closed-form invariant solutions from the Lie symmetry analysis and dynamics of solitonic profiles for (2+1)-dimensional modified Heisenberg ferromagnetic system. To appear in Modern Physics Letters B (2021).



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2. Dhiman, Shubham Kumar; Kumar, Sachin; **Kharbanda, Harsha**. An extended (3+1)-dimensional Jimbo-Miwa equation: Symmetry reductions, invariant solutions, and dynamics of different solitary waves. *Modern Physics Letters B* 35 (34), 2150528 (2021).
3. Niwas, Monika; Kumar, Sachin; **Kharbanda, Harsha**. Symmetry analysis, closed-form invariant solutions and dynamical wave structures of the generalized (3+1)-dimensional breaking soliton equation using optimal system of Lie subalgebra. *Journal of Ocean Engineering and Science*, (2021). <https://doi.org/10.1016/j.joes.2021.08.002>
4. Kumar, Sachin; Kumar, Amit; **Kharbanda, Harsha**. Abundant exact closed-form solutions and solitonic structures for the double-chain deoxyribonucleic acid (DNA) model. *Brazilian Journal of Physics* 51, 1043-1068 (2021).
5. Kumar, Sachin; **Kharbanda, Harsha**. Sensitivity and chaotic dynamics of an eco-epidemiological system with vaccination and migration in prey. *Brazilian Journal of Physics* 51, 986-1006 (2021).
6. Kumar, Sachin; Kumar, Dharmendra; **Kharbanda, Harsha**. Lie symmetry analysis and dynamical wave structures of new exact solutions for the (2+1)-dimensional KP-BBM equation. *Pramana-Journal of Physics* 95, 33 (2021).
7. Kumar, Sachin; Kumar, Amit; **Kharbanda, Harsha**. Lie symmetry analysis and generalized invariant solutions of (2+1)-dimensional dispersive long wave (DLW) equations. *Physica Scripta* 95 (6), 065207 (2020).
8. **Kharbanda, Harsha**; Kumar, Sachin. Chaos detection and optimal control in a cannibalistic prey-predator system with harvesting. *International Journal of Bifurcation and Chaos in Applied Sciences and Engineering* 30 (12), 2050171, 24 pp. (2020).
9. **Kharbanda, Harsha**; Kumar, Sachin. Asymptotic stability of one prey and two predators model with two functional responses. *Ricerche di Matematica* 68 (2), 435-452 (2019).
10. Kumar, Sachin; **Kharbanda, Harsha**. Chaotic behavior of predator-prey model with group defense and non-linear harvesting in prey. *Chaos Solitons & Fractals* 119, 19-28 (2019).

Article on arXiv:

1. Kumar, Sachin; **Kharbanda, Harsha**. Stability analysis of prey-predator model with infection, migration and vaccination in prey, arXiv preprint arXiv: 1709.10319 (2017).

Educational Resource Material Developed: Prepared e-content for the topic 'Google Slides'.



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Invited talks/Session chair/Resource person:

1. Presented as a resource person for 100 hours Add on Course-“Improving Mathematical skills for Competitive exams” offered by Department of Mathematics, JDMC, University of Delhi during the academic year of 2020-2021.
2. Prepared e-content and presented as a resource person for the topic ‘Google Slides’ during online certificate course on “Productivity Software and Mathematical Tools” organised by Department of Mathematics, Maitreyi College, University of Delhi during June 14-24, 2021.

Conferences/Seminar volunteered:

- Volunteered Research scholar seminar organized by Department of Mathematics, Faculty of Mathematical Sciences, University of Delhi, 2020.

Programme attended:

- Completed One week (Online) Faculty Development Programme on “Mathematical Analysis and its Applications” organised by Department of Mathematics, Vivekananda College in collaboration with MHFDC, Hansraj College, University of Delhi during July 26-31, 2021.

Seminars/Workshops/Conferences attended:

- Participated in the five days national level online “Workshop on Software in Mathematics and Statistics” (WSMS-2021) organized by Department of Mathematics, National Institute of Technology Tiruchirappalli during August 02-06, 2021.
- Participated in Value added course “A two week workshop on Scientific computing using MATLAB and Python” organized by Department of Computer Engineering & Department of Mathematics, JCBUST, YMCA, Faridabad during September 07-18, 2020.
- Presented a paper entitled ‘Dynamical analysis of one prey and two predators model with two functional responses’ at “National Research Scholars' Seminar” held at Department of Mathematics, University of Delhi, Delhi on December 28, 2018.
- Attended a “Workshop on Current Aspects of Research Evaluation and Plagiarism” organized by the Department of Mathematics, Jaypee Institute of Information Technology, Sector-128, Noida from November 30 to December 1, 2018.
- Presented a paper entitled ‘Modeling and Analysis of a Prey-Predator system with Infection, Vaccination and Migration in Prey’ at International Conference on “Mathematical Modeling and Computations in Bio-Systems” held at Department of Mathematics, IIT Roorkee, Roorkee, India during March 12-14, 2018.



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- Attended Conference on “Research Scholar Seminar and Annual Conference of the Society of Mathematical Sciences” held at Department of Mathematics, University of Delhi, Delhi during May 01-02, 2017.
- Attended a Training course on “Introduction to MATLAB” organized by Delhi University Computer Centre, University of Delhi, Delhi during April 24-28, 2017.
- Attended a National Workshop on “Mathematical Modelling and Computational Techniques using Mathematica” held at Department of Mathematics, Zakir Husain Delhi College, Delhi during March 30-31, 2017.
- Attended International Conference on “Recent Advances in Theoretical and Computational Partial Differential Equations with Applications” held at Panjab University, Chandigarh during December 05-09, 2016.
- Attended a three day “Science Academies' Lecture Workshop” on ‘Groups in Geometry and Applications’ held at Maitreyi College, University of Delhi, Delhi during October 13-15, 2016.
- Attended a Workshop on “Advanced Thematic Programme Dynamical Models in Ecological, Epidemiological Sciences and Engineering Theory, Computations, and Real World Applications” during March 15-19, 2016 in Hyderabad.