NAME: Sandip Banerjee   **PHONE**:   Mobile:+919410511782
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Home (present): 140/4, Vikas Nagar,   Office:
IIT Roorkee, Roorkee – 247667,   Department of Mathematics
Uttarakhand, India.   Indian Institute of Technology, Roorkee
                                             Roorkee – 247667, Uttarakhand, India.

Home (permanent): 28/1C, N C
Chowdhury Road, Ground Floor, Kolkata –
700042, India.

DATE OF BIRTH: **CITIZENSHIP**:
October 19, 1969   Indian

EDUCATION

Ph.D. in Applied Mathematics, March 2001, University of Calcutta, India.

Master of Science, Applied Mathematics, December 1993, University of Calcutta, First Class.

Bachelor of Science, Mathematics (Honors), St. Xavier's College, August 1991, University of Calcutta, First Class.

RESEARCH INTEREST

Dynamics of tumor and immune system; Mathematical Modeling of brain tumor and immunotherapy with T11 Target Structure; Mathematical modeling of interaction between tumor and immune system – the spatial aspect and its three dimensional representation; Mathematical model of drug delivery using nano-particles; Immunotherapy with Interleukin-2; Application of stochastic delay differential equations to population dynamics and tumor modeling; Ecological dynamics of interacting populations, mainly, effects of space and stochasticity; Phytoplankton bloom and its control through mathematical modeling; Stage structured prey predator models with multiple delays.

TEACHING INTEREST

Undergraduates: Analytical geometry of 2 and 3 dimensions; Vector algebra and vector calculus; Kinematics of 2 and 3 dimensions; Numerical methods; Probability and Statistics; Differential and integral calculus; Differential equations; Engineering Mathematics.

Graduates: Numerical Analysis; Mathematical ecology; Dynamical systems; Stochastic process; Stochastic differential equations and its application to biology; Computer Programming.

ACADEMIC POSITIONS

Assistant Professor (March 2007 – till date), Mathematics Group, Birla Institute of Technology and Science (BITS), Pilani, Rajasthan, India.

Post Doctoral Research Fellow (Feb. 2005–Jan. 2007), Metapopulation Research Group, Department of Biological and Environmental Sciences, University of Helsinki, Finland.

Senior Lecturer (Sep. 2000–Jan. 2005), Department of Mathematics, St. Xavier's College, University of Calcutta, India.

Lecturer (October 1997–August 2000), Department of Mathematics, Chittaranjan College, University of Calcutta, India.

Senior Research Fellow (January 1996–October 1997), Department of Applied Mathematics, University of Calcutta, India.

Junior Research Fellow (January 1994–December 1995), Department of Applied Mathematics, University of Calcutta, India.

PUBLICATIONS (PAPERS)

1. B. Dubey, Uma S. Dubey and Sandip Banerjee, Modeling the interaction between avascular cancerous cells and acquired immune response, Journal of Biological Systems (Accepted).

2. Sandip Banerjee and Ram Rup Sarkar, Delay induced model for tumor-immune interaction and control of malignant tumor growth, *Biosystems (2008),* 91 (1), 268-288.

3. Ramrup Sarkar, R. Bhattacharyya, B. Mukhopadhyay and Sandip Banerjee, Time lags can control algal blooms in two harmful phytoplankton-zooplankton system, *Applied Mathematics and Computation* (2007)*,* 186, 445 −459.

4. M. Bandyopadhyay and Sandip Banerjee, A stage structured prey-predator model with discrete time delay , *Applied Mathematics and Computation* (2006), 182 (2), 1385-1398.

5. Ramrup Sarkar and Sandip Banerjee, Cancer self remission and tumor stability – a stochastic approach, *Mathematical Biosciences* (2005), 196, 65–81.

6. R. Bhattacharya, M. Bandyopadhyay and Sandip Banerjee, Stability and Bifurcation in a Diffusive Prey-predator System: Non-linear Bifurcation Analysis*, Journal of Applied Mathematics and Computing* (2002), 10, 17–26.

7. Sandip Banerjee, Rakhi Bhattacharya and C. G. Chakrabarti, Shift of Bifurcation Point due to Noise Induced Parameter, *International Journal of Mathematics and Mathematical Sciences* (2000), 23 (6), 435– 439.

8. Sandip Banerjee, A Stochastic Model of a Diffusive Prey-Predator System: Fluctuation and Stability; *Journal of Natural and Physical Sciences* (2000), 14, 37–48.

9. Sandip Banerjee and C. G. Chakrabarti, Non-Linear Bifurcation Analysis of Reaction-Diffusion Activator-Inhibitor System, *Journal of Biological Physics* (1999), 25, 23–33.

10. Sandip Banerjee and C. G. Chakrabarti) Stochastic Dynamic Modeling of Damped Lotka-Volterra System, System *Analysis Modeling and Simulation* (1998) 30, 1–10.

11. Sandip Banerjee and C. G. Chakrabarti, Stochastic model of Symmetric Lotka-Volterra Competition System: Non-equilibrium Fluctuation and Stability, *Bulletin of Calcutta Mathematical Society* (1996), 88, 235–244.

PUBLICATIONS (BOOKS)

1. Topics in Mathematics I: Numerical methods, Linear Programming, Probability and Statistics (2005), Books and Allied Private Ltd, India.

2. Topics in Mathematics II: Differential Equations of second order, Partial Differential equations, Laplace Transform, Fourier Series (in press, with the same publisher).

3. Topics in Mathematics III: Computer Fundamentals and Fortran 77 (in press, with the same publisher).

4. Chapter in edited volumes: *Cancer self Remission and Tumor Instability as a prey predator System* in "Mathematical Biology - Recent Trends" , Editors Peeyush Chandra and B.V. Rathish Kumar, 2006., Anamaya Publications, pp 312 - 315, 2006.

PUBLICATIONS (CONFERENCE)

1. Sarkar, R.R. and Banerjee, Sandip. 2006. A time delay model for control of malignant tumor growth, In M. Lakshmanan and R. Sahadevan (eds.) *Nonlinear Phenomena in Medical and Biological Sciences, Proceedings of the Third National Conference on Nonlinear Systems and Dynamics*, pp.223-226, NCNSD-2006 (ISBN: 81-7764-993-0), Allied Publishers Pvt. Ltd.

COMPLETED PAPERS (Submitted)

1. Immunotherapy with Interleukin-2, a study based on Mathematical Modeling.

2. (With Siddhartha P. Chakraborty) A delay induced mathematical model with interleukin-2 therapy in the treatment of metastatic melanoma or renal cell cancer.

3. (With Siddhartha P. Chakraborty) A control theory approach to cancer self remission aided by an optimal therapy.

4. (With R. Bhattacharyya and B. Mukhopadhyay) A stage structure predator prey model with two discrete time delays.

WORK IN PROGRESS

1. Prey attack and predator defend: counterattacking prey trigger parental care in predators- a mathematical model.

2. Application of stochastic delay differential equations to population dynamics and tumor modeling.

3. Mathematical modeling of HIV.

4. (With Otso Ovaskainen) Existence of space and stochasticity on n-competing plant species.

5. (With Siddhartha P. Chakraborty and Ram Rup Sarkar) An optimal harvesting strategy to control harmful macro-algae bloom.

6. (With Ram Rup Sarkar) Malaria – a review on mathematical modeling.

7. (With Balram Dubey and Srihari Radhakrishnan) Effect of space on tumor-immune dynamics with Beddington-DeAngelis functional response.

TEACHING /EXAMINING EXPERIENCE

1. St. Xavier's College, University of Calcutta (From 09/2000-01/2005).
2. Chittaranjan College, University of Calcutta (10/1997-08/2000)

I taught courses on Coordinate geometry of 2 and 3 dimensions, Linear programming problems, Vectors, Particle dynamics, Rigid dynamics, Statics, Boolean algebra, Numerical methods, Probability and Statistics, Algebra (Classical, Linear and Abstract), Differential and Integral Calculus, Application of Calculus and Differential equations to undergraduates.

3. External Examiner, University of Calcutta.

AWARDS AND HONORS

1. Senior Research Fellowship in Mathematical Sciences by Council of Scientific and Industrial Research (CSIR), India in 1996.

2. Junior Research Fellowship in Mathematical Sciences by Council of Scientific and Industrial Research (CSIR), India in 1995.

3. National Scholarship in the Bachelor of Sciences in 1991.

PROFESSIONAL MEMBERSHIP

1. SIAM membership: IM OUT012   Yearly

2. Indian Statistical Institute, Kolkata, India   Life member

3. The Indian Science Congress Association, Kolkata, India,   Life Member

REVIEWER

1. Biomedical Signal Processing and Control (Elsevier).
2. IET Systems Biology.

SEMINARS / WORKSHOPS /TALKS

1. Invited talk at Department of Mathematics, IIT Guwahati, India (Mar13, 2008).

2. International Biomedical Modeling School and Workshop, organized by the Centre for Applicable Mathematics, TIFR, Bangalore, India (Feb27 – Mar02, 2008).

3. Talk titled "*Delay induced model for tumor-immune interaction and control of malignant tumor growth*" at Indian Institute of Technology, Kanpur, India (24th August, 2007).

4. Refresher Course on "*Advances in Biophysics*", Centre of Cellular and molecular Biology, Hyderabad, India (25th May – June 8th , 2007).

5. Talk titled "*A time delay model for malignant tumor growth*" at Tata Institute of Fundamental Research (TIFR), Bangalore, India (21st November, 2006).

6. Talk titled "*Spatial Ecology*" at the Department of Civil Engineering, University of Glasgow, Scotland, UK (18th September, 2006).

7. Talk titled "*Modeling tumor-immune interactions and control of malignant tumor growth - a study based on time delay effect*" at the Faculty of Veterinary Medicine, University of Glasgow, Scotland, UK (11th September, 2006).

8. Talk titled "*Modeling tumor-immune interactions and control of malignant tumor growth - a study based on time delay effect*" at the Department of Mathematics, University of Dundee, Scotland, UK (30th August, 2006).

9. *SIAM Conference on the Life Sciences* (July 31-August 4, 06), Brownstone Hotel and Conference Center1707 Hillsborough Street Raleigh, North Carolina, to present a paper.

10. *CM06 Workshop III: Angiogenesis, NeoVascularization and Morphogenesis* (May 8-12, 2006) organized by Institute for Pure and Applied Mathematics (IPAM) situated on the University of California, Los Angeles campus.

11. Workshop on Spatial Ecology (March 13-17, 2006) organized by Lou Gross, Claudia Neuhauser, Chris Cosner, and Mark Kot, Mathematical Biosciences Institute (MBI), Ohio State University.

12. Talk at the Department of Applied Mathematics, University of Leeds (16th January, 2006) on "Effect of delay on malignant tumor".

13. Workshop entitled "Mathematical Modeling in Medicine" organized by Prof. Brian Sleeman, Department of Applied Mathematics, University of Leeds.

14. Workshop on Mathematical Biology (19th December, 2005), organized by Biomathematics Research Group, spearheaded by Prof. Mats Gyllenberg, Department of Mathematics, University of Helsinki.

15. International Seminar on Mathematical Biology (February, 2004) organized by Prof. Piyush Chandra, Head, Department of Mathematics, Indian Institute of Technology, Kanpur, India.

16. Talk (February 2002) entitled "Non-Linear bifurcation Analysis of Reaction-Diffusion Activator-Inhibitor System" at the Biomathematical Research Group, University of Turku, Finland.

References

1. Dr. Otso Ovaskainen, Academy Research Fellow, Metapopulation Research Group, Department of Biological and Environmental Sciences, University of Helsinki, P.O. Box 65 (Viikinkaari 1), 00014 University of Helsinki, Finland
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2. Prof. C. G. Chakrabarti, S. N. Bose Professor of Theoretical Physics, Department of Applied Mathematics, University of Calcutta, 92, A.P.C Road, Kolkata -700 009, India.
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3. Rev. P. C. Mathew , Principal, St. Xavier's College, University of Calcutta, 30, Park Street, Kolkata – 700016, India.   **(For Teaching)**
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5. Prof. Ranendra N. Saha
   Professor of Pharmacy,
   Dean Faculty Division III and Educational Development Division,
   Birla Institute of Technology and Sciences (BITS) Pilani,
   Pilani 333031, Rajasthan, India.
   E mail: rnsaha@bits-pilani.ac.in