# Subhas Khajanchi

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# **Personal Information**

Father Name: **Rabindra Nath Khajanchi** Date of Birth: **October 07, 1987** Marital Status: **Married** Nationality: **Indian** Sex: **Male** 

# **Research Interests**

#### Mathematical Biology, Mathematical Modeling, Nonlinear Dynamics

- Tumor immune competitive system.
- Growth of malignant gliomas and invasion.
- Infectious diseases (TB transmission, HTLV-I viral dynamics, SEIR models etc.).
- Ecological modeling.

### Education

- Indian Institute of Technology (IIT) Roorkee, Uttarakhand, India.
  - Ph.D. in Mathematics (July 25, 2011 March 04, 2016).
  - Dissertation Title: Mathematical Modeling of Malignant Brain Tumor with T11 Target Structure.
  - Thesis Supervisor: Dr. Sandip Banerjee.
  - Date of Completion/Defense: February 29, 2016.
- Jadavpur University, Kolkata, West Bengal, India.
  - Master of Science in Applied Mathematics (2010) with First class.
- Jadavpur University, Kolkata, West Bengal, India.
  - Bachelor of Science; Mathematics (major), Physics, Chemistry & Computer Programming (2008), Fist class with distinction.
- Nimpith Ramkrishna Vidyabhavan (WBCHSE), Nimpith, South 24 Parganas, West Bengal, India.
  - Higher Secondary (HS); Bengali, English, Physics, Chemistry, Mathematics, Biology (2005) with First class.
- Moukhali Chandiban Fanindra Vidyamandir (WBBSE), Moukhali, South 24 Parganas, West Bengal, India.





 Madhyamik; Bengali, English, Physical & Life Science, History, Geography, Mathematics, Additional Mathematics (2003) with First class.

# **Teaching Experience**

#### **Assistant Professor**

- Department of Mathematics, Presidency University, Kolkata, August 09, 2018 Ongoing.
- Department of Mathematics, Bankura University, September 15, 2015 August 08, 2018.
- Faculty of Mathematics, Dinabandhu Andrews College (Calcutta University), March 09, 2015 September 14, 2015.

## **PhD Guidance**

- Dhiraj Kumar Das, Dynamics of tuberculosis transmission with exogenous reinfections and endogenous reactivation. Ongoing (with Prof. T. K. Kar, IIESTS).
- Sovan Bera, Mathematical modeling of neoplastic processes. Ongoing (with Prof. T. K. Roy, IIESTS).
- Mrinmoy Sardar, Mathematical modeling of tumor-immune competitive system: model analysis and validation. Ongoing.
- Samaresh Kumbhkar, Project Student (UNDER SERB). Ongoing.
- Kankan Sarkar, Mathematical modeling of ecological system. Ongoing.

### List of Publications

- Sarkar K, & Subhas Khajanchi, Impact of fear effect on the growth of prey in a predator-prey interaction model, Ecological Complexity, 42 (2020) 100826.
- Misra AK, Singh RK, Tiwari PK, Subhas Khajanchi, & Kang Y, Dynamics of algae blooming: effects of budget allocation and time delay, Nonlinear Dynamics, 100 (2020): 1779–1807.
- Das DK, Subhas Khajanchi, & Kar TK, Transmission dynamics of tuberculosis with multiple re-infections, Chaos, Solitons & Fractals, 130 (2020): 109450.
- Das DK, Subhas Khajanchi, & Kar TK, The impact of media awareness and optimal strategy on the prevalence of tuberculosis, Applied Mathematics and Computation, 366 (2020): 124732.
- Subhas Khajanchi, Chaotic dynamics of a delayed tumor-immune interaction model, International Journal of Biomathematics, 13(2) (2020): 2050009 https://doi.org/10.1142/S1793524520500096.
- Subhas Khajanchi, Stability analysis of a mathematical model for glioma-immune interaction under optimal therapy. International Journal of Nonlinear Sciences and Numerical Simulation, 20(3-4) (2019): 269–285: doi:10.1515/jinsns-2017-0206
- Subhas Khajanchi, & Banerjee S, A strategy of optimal efficacy of T11 target structure in the treatment of brain tumor. Journal of Biological System, 27(2) (2019): 225–255.
- Subhas Khajanchi, & Nieto Juan J, Mathematical modeling of tumor-immune competitive system, considering the role of time delay. Applied Mathematics and Computation, 340 (2019): 180–205.

- Subhas Khajanchi, Perc M, & Ghosh D, The influence of time delay in a chaotic cancer model. Chaos, 28 (2018): 103101.doi:10.1063/1.5052496
- Subhas Khajanchi, Modeling the dynamics of glioma-immune surveillance. Chaos, Solitons & Fractals, 114 (2018): 108–118.
- Subhas Khajanchi, & Banerjee S, Influence of Multiple Delays in Brain Tumor and Immune System Interaction with T11 target structure as a Potent Stimulator. Mathematical Biosciences, 302 (2018): 116–130.
- Subhas Khajanchi, Das DK, & Kar TK, Dynamics of tuberculosis transmission with exogenous reinfections and endogenous reactivations. Physica A, 497 (2018): 52–71.
- Subhas Khajanchi & Banerjee S, Quantifying the role of Immunotherapeutic Drug T11 Target Structure in Progression of Malignant Gliomas: Mathematical Modeling and Dynamical Perspective. Mathematical Biosciences, 289 (2017): 69–77.
- Subhas Khajanchi, Uniform Persistence and Global Stability for a Brain Tumor and Immune System Interaction. Biophysical Reviews and Letters, 12(4) (2017): 187–208.
- Ghosh D, **Subhas Khajanchi**, Mangiarotti S, Denis F, Dana SK, & Letellier C, How tumor growth can be influenced by delayed interactions between cancer cells and the microenvironment?. **BioSystems**, 158 (2017): 17–30.
- Subhas Khajanchi & Banerjee S, Role of constant prey refuge on stage structure predator -prey model with ratio dependent functional response. Applied Mathematics and Computation, 314 (2017): 193–198.
- Subhas Khajanchi, Modeling the dynamics of stage-structure predator-prey system with Monod Haldane type response function. Applied Mathematics and Computation, 302 (2017): 122–143.
- Subhas Khajanchi, Bifurcations and Oscillatory Dynamics in a Tumor Immune Interaction Model. BIOMAT 2015: International Symposium on Mathematical and Computational Biology, (2016): 241–259.
- Banerjee S, Subhas Khajanchi, & Chaudhuri S, A mathematical model to elucidate brain tumor abrogation by immunotherapy with T11 target structure. PLOS ONE, 10(5) (2015) : e0123611. doi:10.1371/journal.pone.0123611.
- Subhas Khajanchi & Ghosh D, The combined effects of optimal control in cancer remission. Applied Mathematics and Computation, 271 (2015): 375–388.
- Subhas Khajanchi, Bifurcation analysis of a delayed mathematical model for tumor growth. Chaos, Solitons & Fractals, 77 (2015): 264–276.
- Subhas Khajanchi & Banerjee S, Stability and bifurcation analysis of delay induced tumor immune interaction model. Applied Mathematics and Computation, 248 (2014): 652–671.
- Subhas Khajanchi, Dynamic behavior of a Beddington-DeAngelis type stage structured predator-prey model. Applied Mathematics and Computation, 244 (2014): 344–360.
- Subhas Khajanchi & Banerjee S, Global stability of a tumor immune interaction model. Mathematical Sciences International Research Journal, 2(2) (2013): ISSN 2278–8697. (Conference Paper).
- Nandi S, Subhas Khajanchi, Chatterjee AN, & Roy PK, Insight of viral infection of Jatropha Curcas plant (Future Fuel): A control based mathematical study. Acta Analysis Functionalis Applicata, 13(4) (2011): 366–374.

# Accepted & Submitted Manuscript

- Sarkar K, Subhas Khajanchi, Modeling and forecasting of the COVID-19 pandemic in India, (Submitted).
- Subhas Khajanchi, Sarkar K, Mondal J, Perc M, The impact of media on the transmission dynamics of COVID-19 in India, (Submitted).
- Subhas Khajanchi, Optimal treatment strategies using dendritic cell vaccination for a tumor model with parameter identifiability, (Submitted).

- Subhas Khajanchi, Bera S, & Roy TK, Quantifying the dynamics of HTLV-I viral infection: a mathematical approach, (Submitted).
- Subhas Khajanchi, Modeling the dynamics of spatiotemporal pattern formation of malignant gliomas and immune system interaction, (Submitted).
- Sarkar K, & Subhas Khajanchi, Multiple stable equibria in a simple predator-prey model with different kind of functional responses, (Submitted).

### **Research Projects**

Title of the Project: Mathematical Modeling of Tumor Immune Competitive Systems: Model Analysis and Validation Funding Agency/Institute: Science and Engineering Research Board (SERB) Period: 3 years (2018 – 2021) Completed/Ongoing: Ongoing Amount: 22,59,060/-

Title of the Project: Mathematical Modeling of hematopoiesis process in application to chronic and acute myelogenous leukemia Funding Agency/Institute: INDO-FRENCH Centre for Applied Mathematics (IFCAM) Period: 2 years (2018 – 2020) Completed/Ongoing: Ongoing

### Awards & Fellowships

- National Board of Higher Mathematics (**NBHM**) Travel Grant to attend 9th International Congress on Industrial and Applied Mathematics (ICIAM 2019), Universitat de Valencia, Valencia (Spain), July 15-19, 2019.
- INSA Visiting Scientists for two months in the year 2017-2018.
- Department of Science and Technology (DST) Travel grants to attend the "Summer School on Mathematics of Infectious Diseases" at York University, Toronto, Canada.
- Research Scholar fellowship from 'IIT Roorkee', from 2013 to 2015 (March 08, 2015).
- Junior Research Scholar fellowship from 'IIT Roorkee', from 2011 to 2013.
- Received National Merit-Cum-Scholarship in Master of Science (M. Sc.), from 2008 to 2010.
- Qualified Graduate Aptitude Test in Engineering (GATE) in the year 2011.
- Qualified National Eligibility Test (NET) for Lectureship (December 2010).

### Conference, Workshop, Schools and Talks

#### **Invited Talks**

- "Mathematical modeling of glioma-immune interaction with immunotherapeutic drug", Jahangirnanagar University, Savar, Dhaka, Bangladesh, at "International Workshop on Recent Trends in Mathematical Biology – RTMB 2020", January 14 - 15, 2020.
- "Mathematical Modeling of Brain Tumor Immune surveillance with immunotherapeutic drug T11 Target Structure", University of Dhaka, Bangladesh, at 20th International Mathematics Conference, December 8 - 10, 2017.
- "Dynamics of Brain Tumor and Immune System Competition with T11 Target Structure: Model Analysis and Validation", Department of Mathematics, Bankura University, West Bengal, India, Indo-German Conference on Modeling, Simulation and Optimization in Applications, February 22 - 24, 2017.

 "A Mathematical Model to Elucidate Brain Tumor Abrogation by Immunotherapy with T11 Target Structure", H. Lee Moffitt Cancer Center, Tampa, Florida, USA, July 18 - 22, 2016.

#### **Contributed Talks**

- Optimal treatment strategies using dendritic cell vaccination for a tumor model with parameter identifiability, 9th International Congress on Industrial and Applied Mathematics (ICIAM - 2019), Universitat de Valencia, Valencia (Spain), July 15-19, 2019.
- Bifurcations and Oscillatory Dynamics in a Tumor Immune Interaction Model, Indian Institute of Technology Roorkee, Uttarakhand, India, at BIOMAT 2015, 15th International Symposium on Mathematical and Computational Biology, November 02 - 06, 2015.
- Influence of time delay in a chaotic Tumor immune interaction model, Indian Statistical Institute (ISI) Kolkata, India, Physics and Applied Mathematics Unit (PAMU), Physics and Applied Mathematics Researchers' Meet -2015, March 18 - 20, 2015.

#### School(s)

 Summer School on Mathematics of Infectious Diseases, York University & Field Institute, Toronto, Canada, Department of Mathematics and Statistics, May 19 - 27, 2013.

#### **Conference and Symposiums**

- Mathematical Modeling of Malignant Brain Tumor with T11 Target Structure as a Potent Immune Stimulator, Calcutta University, West Bengal, India, National Seminar on "Recent Advances in Computational Mathematics", December 27 - 29, 2016.
- Bifurcation analysis of a delayed mathematical model for tumor growth, Department of Mathematics, Indian Institute of Technology Madras (IITM), India, "International Conference on Mathematical Modeling and Computer Simulation (ICMMCS)", December 8 - 10, 2014.
- The combined effects of optimal control in cancer remission, Jointly Organized by Agricultural and Ecological Research Unit & Physics and Applied Mathematics Unit, "3rd International Symposium on Complex Dynamical Systems and Applications (CDSA - 2014)", March 10 - 12, 2014.
- "National Conference on Mathematics and its Application (NCMA)", Department of Mathematics, Jadavpur University, January 13 -14 2010.

#### Workshops

- "Indo Canadian Workshop on Mathematics of Infectious Diseases", Department of Mathematics, Indian Institute of Technology (IIT) Roorkee, January 20 - 22, 2014.
- "Workshop on Nonlinear Differential Equations: Dynamics of Complex Systems (NDEDCS-2013)", under the auspices of National Program on Differential Equations: Theory, Computation and applications (NPDE-TCA), Department of Applied Mathematics, University of Calcutta, September 23 - 28 2013.
- "Workshop on Nonlinear Dynamics in Biology", Department of Mathematics, Indian Institute of Science (IISc), Bangalore, July 8 13 2013.
- "Advance Level Workshop on Differential Equations in Ecology and Epidemiology" under the auspices of National Program on Differential Equations: Theory, Computation and applications(NPDE-TCA), Department of Mathematics, Indian Institute of Technology (IIT) Roorkee, October 10 - 14 2012.
- "Workshop on Adaptive Finite Element Method (AFEM)", Department of Mathematics, Indian Institute of Space Science and Technology (IIST), Trivundrum, India, March 16 - 25, 2011.

# **Computer Proficiency**

- Programming language: MATLAB.
- *Typesetting*: Latex.

## **Professional References**

#### • Dr. Sandip Banerjee

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#### • Dr. Dibakar Ghosh

Physics and Applied Mathematics Unit (PAMU), Indian Statistical Institute, Kolkata, 203, B. T. Road, Kolkata – 700108, E-mail: dibakar@isical.ac.in/ diba.ghosh@gmail.com Tel: +91 9830334136.

#### • Dr. Bunimovich Svetlana

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#### • Prof. Mostafa Adimy

INRIA Senior Researcher (Directeur de Recherche), Head of the "DRACULA" project-team, INRIA Antenne Lyon la Doua, Bâtiment CEI-2, 56, Boulevard Niels Bohr, 69603 Villeurbanne, France, Tel : 04 72 43 74 88 E-mail: mostafa.adimy@inria.fr

#### • Prof. Sujit Kumar Sardar

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