

**TALK TITLE****Fluid Mechanics as a tool for Personalized Healthcare****SPEAKER****Saikat Basu, Ph.D.**

Assistant Professor (tenure-track)

Department of Mechanical Engineering

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Email: [Saikat.Basu@sdstate.edu](mailto:Saikat.Basu@sdstate.edu)Webpage: [Basu Research Group](#)**ABSTRACT**

Long-term goal of my research program is to promote fluid mechanics-based computational modeling as a planning tool that can be readily accessed by physicians as an aid to personalized clinical decisions for each patient, especially for pathologies connected to flow-based transport. The work bridges applied mathematics and biomathematical modeling, with cutting-edge applications in healthcare.

In this seminar, I will present my research vision, structured along the following two tracks:

**Track 1.** Translational questions on mechanistic transmission of topical drugs – especially via respiratory pathways, on drug administration devices, and on surgical interventions.

**Track 2.** Basic flow physics nuances such as thermal flux, vortices, and boundary layers – in the context of transport in complex anatomic pathways.

The talk will first expound representative prior and ongoing projects related to intranasal drug delivery and vortex dynamics, to provide a snapshot of the research flavor in the two tracks. Subsequently, under Track 1, I will discuss representative future projects on: drug & device engineering, prediction of surgical outcomes, and improvement of therapeutic protocols; followed by exploratory topics on brain drug delivery and deep learning. Under Track 2, I will discuss sample future projects on: thermal conditioning in clinical transport and effect of vortices on drug transmission. My eventual aim is to help bring a paradigm shift in how fluid mechanics is used in everyday medical practice.

**BIO**

Dr. Saikat Basu is a tenure-track Assistant Professor at the Department of Mechanical Engineering at South Dakota State University. His scholarly background is in theoretical and computational fluid mechanics. Basu received his Ph.D. in Engineering Mechanics from the Department of Biomedical Engineering and Mechanics at Virginia Tech, in 2014. Following that, he had two postdoctoral stints: first one at the Okinawa Institute of Science and Technology in Japan and the second one at the Department of Otolaryngology/Head and Neck Surgery at University of North Carolina – Chapel Hill’s School of Medicine. As a postdoc at UNC-CH, Basu also had a visiting appointment with UNC/NC State University’s Joint Department of Biomedical Engineering. Prior to all these, he had obtained his undergraduate B.E. degree in 2009 from Jadavpur University, India.

Dr. Basu’s doctoral dissertation was nominated for the outstanding dissertation award at Virginia Tech’s College of Engineering and was also awarded the Paul Torgersen Research Award, as one of the top three graduating dissertations of the year. Basu currently has an NIH R01 subcontract and has been the PI on a pilot study funded by NIH’s National Center for Advancing Translational Sciences. His research has been covered by press on ScienceDaily, and on the international media outlets in Germany and in Italy. In his free time, Basu enjoys sketching charcoal artworks and playing with his 16 month-old daughter, Uma.

**Timeline**

01/2019 – Present	Assistant Professor of Mechanical Engineering, South Dakota State University
04/2016 – 12/2018	Postdoctoral Fellow, Dept. of Otolaryngology, School of Medicine – UNC Chapel Hill
08/2017 – 12/2018	Visiting Faculty – Joint Dept. of Biomedical Engineering, UNC-CH/NC State University
06/2014 – 03/2016	Postdoctoral Scholar, Okinawa Institute of Science and Technology, Japan
08/2009 – 05/2014	Ph.D. – Department of Biomedical Engineering and Mechanics, Virginia Tech
07/2005 – 05/2009	Undergrad – Department of Civil Engineering, Jadavpur University, India