



THE UNIVERSITY of NORTH CAROLINA

GREENSBORO

Department of
Mathematics & Statistics

Helen Barton Lecture Series in Mathematical Sciences

Dr. Sujit K. Ghosh

Professor of Statistics, North Carolina State University

Deputy Director, SAMSI



Professor Sujit Kumar Ghosh earned a Ph.D. in Statistics from University of Connecticut in 1996 and is currently a tenured full professor in the Department of Statistics at North Carolina State University (NCSU). He has over 20 years of experience in conducting, applying, evaluating and documenting statistical analysis of biomedical and environmental data. He has supervised over 33 doctoral graduate students and 5 post-doctoral fellows. He has also served as a statistical investigator and consultant for over 40 different research projects funded by various leading private industries and federal agencies (e.g., BAYER, CDC, GSK, MERCK, NIH, NISS, NSF, SAS, U.S.EPA, USDA-NASS etc.).

Professor Ghosh has published over 95 refereed journal articles in the area of biomedical, econometrics and environmental sciences and co-edited a popular book entitled “*Generalized Linear Models: A Bayesian Perspective*.” He has given over 125 invited lectures and seminars at national and international meetings. He has also delivered several short courses and served as the visiting professor at leading institutions in various countries (e.g., Greece, India, Italy, Singapore, Thailand, and Turkey). Professor Ghosh’s numerous honors include the International Indian Statistical Association (IISA) Young Investigator Award in 2008; election as a Fellow of the American Statistical Association (ASA) in 2009, and election as the President of the NC Chapter of ASA in 2013. Most recently he was awarded the Honorary Doctoral Degree in Statistics by Thammasat University (Thailand) in 2015 and elected president of IISA to begin his term in 2017.

Professor Ghosh served as the Co-Director of Graduate Programs in Statistics at NCSU, managing over 150 students annually during 2010-2013, and the Project Director of a training program for undergraduates funded by the NSF during 2007-2013. He has also served as the Program Director in the Division of Mathematical Sciences within the Directorate of Mathematical and Physical Sciences at NSF in 2013-2014. Since September 2014, he has assumed the role of the Deputy Director at the Statistical and Applied Mathematical Sciences Institute (SAMSI), RTP, NC, USA. <http://www.stat.ncsu.edu/people/ghosh/>

Statistical Inference Subject to Shape Constraint

The statistical regression method is often used to explore the inherent relationships between several predictor variables and a response variable. In many practical settings, the predictors and the response are known to preserve certain shape restrictions (e.g., non-negativity, monotonicity, convexity and concavity etc.) but not necessarily based on a (known) parametric form. Some popular examples include the study of utility functions, cost functions, and profit functions in economics, the analysis of growth rates as a function of various environmental factors, the study of dose response curve in the phase I clinical trials, the estimation of the monotone hazard rates and the mean residual life functions in reliability and survival analysis, among others. Over the past decades, efforts have been devoted to search for a smooth and computationally efficient estimation method of a regression and density functions subject to a given set of shape constraints. The lecture series will provide: (i) an overview shape constraint regression and density estimation methods starting with simple linear models subject to linear inequality constraint and associated quadratic programming, (ii) nonparametric methods using Bernstein polynomial basis with single predictors and (iii) extensions to include multiple predictors. Various R packages to implement these methodologies will also be introduced with real data examples.

Lecture 1: *Introduction to Shape Constraint Statistical Methods*

Monday, November 14, 2016

Reception: Lounge, Petty 120, 3:30–4:00 PM

Lecture: Petty 136, 4:00 PM

Lecture 2: *Nonparametric Regression with Bernstein Polynomials*

Tuesday, November 15, 2016

Reception: Lounge, Petty 120, 3:30–4:00 PM

Lecture: Petty 224, 4:00 PM

Lecture 3: *Shape Constraint Regression with Multiple Predictors*

Wednesday, November 16, 2016

Reception: Lounge, Petty 120, 3:30–4:00 PM

Lecture: Petty 224, 4:00 PM