Arka P. Ghosh

Assistant Professor
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(I) Degrees:

Ph.D.	University of North Carolina (UNC), Chapel Hill (USA) (Thesis: Control problems for queueing networks in heavy traffic, Advisor: A. Budhiraja)	Statistics	Aug. 2005
M.S.	University of North Carolina (UNC), Chapel Hill (USA)	Statistics	May 2005
M.Stat.	Indian Statistical Institute (ISI), Calcutta (India) (Specialization: Mathematical Statistics and Probability)	Statistics	June 2000
B.Stat.	Indian Statistical Institute (ISI), Calcutta (India)	Statistics	June 1998

(II) Professional Experience:

Iowa State University appointment:

Assistant Professor	Statistics	Aug. 2005 - present
Courtesy appointment	Mathematics	Aug. 2008 - present

Other appointments:

Graduate Fellow	Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC	Aug. 2003 - May 2004
Math. Instructor	Summer Bridge Program, Dept of Mathematics, UNC-Chapel Hill	Summer 2002, 2003, 2004
Stat. Instructor	Dept of Statistics, UNC-Chapel Hill (as a TA, with full course responsibility)	Spring 2002- Fall 2004.

(III) Teaching:

(a) Courses: (average Enrol. and Eval. shown)

Course # & Title	**Sem.**	**Enrol.**	**Eval.**
Iowa State:			
Stat 430X: Empirical Methods for Comp. Sc. Research	S06, S07	16	4.32/5
Stat 642: Measure Theory and Probability Theory	F06, F08	20	4.58/5
Stat 322: Probabilistic Methods for Electr. Engineers	F05, S08	50	4.465/5
Stat 305: Engineering Statistics	S09 (2)	60	4.14/5
UNC-Chapel Hill:			
Stat 011: Introduction to Statistics	F04, S03, F02, S02	55.75	3.75/5
Math 010: College Algebra	Sum02, Sum03, Sum04	13	4.33/5

(b) Course and curriculum development activity:

Stat 430X: Developed the new course, STAT 430: *Empirical Methods For Computer Science Research* and taught this course in Spring of 2006 and 2007. The objective of this course was to provide a sound foundation in statistical thinking and methodologies that are relevant for the research of the

graduate students in Computer Science (and other disciplines such as Bioinformatics and Computational Biology). The students were required to apply the statistical techniques learned in this course in research problems arising in their research area, and complete an detailed project - many of which became significant parts of their dissertations and some led to research publications (see [8], [9] and [11] in the publication list).

(IV) **Advising:**

(a) Ph.D.: Currently co-advising 2 Ph. D. students (one with H. Wu, Stat. and S. Basu, Computer Science, and the other with R. Maitra, Statistics).

(b) M.S.: Graduated 1 M.S. student (co-advised with R. Maitra, Statistics).

(c) Undergraduate: Advised 2 students in Summer of 2009 in the Research Experience for Undergraduates (REU) program in Statistics and Mathematics at Iowa State University (co-advised with A. Roitershtein, Mathematics).

(d) Committees: I have been in 10 Ph.D committees and 3 M.S committees so far.

(V) **Publications:**

(a) Book Chapters

[1] Heavy traffic methods in wireless systems: towards modeling heavy tails and long range dependence. (R. T. Buche, A. P. Ghosh, V. Pipiras, and J. X. Zhang). *IMA Volumes in Mathematics and its Applications Series, Vol. 143: Wireless Communications, Springer-Verlag.* (Editors: P. Agrawal, D. M. Andrews, P. J. Fleming, G. Yin, and L. Zhang) vol 143, 2007, X, p. 53-74 (2007).

(Authors listed alphabetically: My contribution 30%)

(b) Journal Publications (refereed)

[2] A simple statistical method for recognition of hand-written numerals. *Calcutta Statistical Association Bulletin*, 54, no. 213-214, p. 81-91 (2003).

[3] A large deviations approach to asymptotically optimal co–+ntrol of crisscross network in heavy traffic. (A. Budhiraja and A. P. Ghosh), *Annals of Applied Probability*, Vol 15, no. 3, p. 1887-1935 (2005).

(Authors listed alphabetically: My contribution 50%)

[4] Diffusion approximations for controlled stochastic networks: An asymptotic bound for the value function. (A. Budhiraja and A. P. Ghosh), *Annals of Applied Probability*, Vol. 16, no. 4, p. 1962-2006 (2006).

(Authors listed alphabetically: My contribution 65%)

[5] Optimal buffer size for a stochastic processing network with a drift (A. P. Ghosh and A. Weerasinghe) *Queueing systems*, Volume **55**, Number 3 / March, 2007, p. 147 - 159 (2007).

(Authors listed alphabetically: My contribution 60%)

[6] Growth of preferential attachment random graphs via continuous-time branching processes. (K. B. Athreya, A. P. Ghosh and S. Sethuraman), *Proceedings Mathematical Sciences Proceedings Mathematical Sciences* , Volume **118**, Number 3 / August, 2008, p. 473-494, (2008).

(Authors listed alphabetically: My contribution 35%)

(c) Conference Proceedings (refereed)

[7] Heavy traffic limits in a wireless queueing system with long range dependence (R. T. Buche, A. P. Ghosh and V. Pipiras), *Proceedings of the IEEE Conference on Decision and Control*, New Orleans, LA, December 2007, p. 4447–4452 (2007).

(Authors listed alphabetically: My contribution 30%)

[8] Estimating statistical significance of pairwise protein local alignments using a clustering classification approach based on amino-acid composition . (A. Agrawal, A. P. Ghosh and X. Huang), *Bioinformatics Research and Applications: Lecture Notes in Computer Science*, Volume 4983/2008, Springer Berlin-Heidelberg, p. 473-494, (2008).

(Authors listed in order of contribution with student first: My contribution 50%)

[9] Modeling of available bandwidth of end-to-end paths. (W. Putthividhya, A. P. Ghosh and W. Tavanapong), *Proceedings of IEEE International Symposium on Parallel and Distributed Processing and Applications (ISPA 2008), Sydney, Australia*, p. 27-34 (2008).

(Authors listed in order of contribution, with student first: My contribution 55%)

[10] Approximate Model Checking of PCTL involving Unbounded Path Properties. (S. Basu, A. P. Ghosh and R. He) Accepted in *Proc. of International Conference on Formal Engineering Methods 2009 (ICFEM-2009), Rio de Janeiro. December 9 -12, 2009*, (2009).

(Authors listed alphabetically: My contribution 50%)

(d) Unrefereed Publications:

[11] Statistical Verification and Validation of an Energy-Balanced Model for Data Transmission in Sensor Networks. (N. V. Subramanian and A. P. Ghosh), *ISU Computer Science Technical Report*, (2007).

(Authors listed in order of contribution, with student first: My contribution 40%)

(e) Pending:

[12] Optimal buffer size and dynamic rate control for a queueing network with reneging in heavy traffic. (A. P. Ghosh and A. Weerasinghe), *Submitted, under revision*, (2008).

(Authors listed alphabetically: My contribution 60%)

[13] Optimal control of a stochastic network driven by a fractional Brownian motion input. (A. P. Ghosh , A. Roitershtein and A. Weerasinghe), *Submitted, under revision*,(2008).

(Authors listed alphabetically: My contribution 45%)

[14] An Ergodic Rate Control Problem for Single Class Queueing Networks." (A. Budhiraja, A. P. Ghosh and C. Lee), *Submitted, under revision*, (2008).

(Authors listed alphabetically: My contribution 35%)

[15] Optimal Prices and Production Rate in a Closed Loop Supply Chain under Heavy Traffic. (A. P. Ghosh, S. M. Ryan, L. Wang, A. Weerasinghe), *Submitted, under revision*, (2008).

(Authors listed alphabetically: My contribution 35%)

[16] Heavy traffic approximations of a queue with varying service rates and general arrivals. (R.T. Buche, A. P. Ghosh and V. Pipiras). *Submitted, under revision*, (2009).

(Authors listed alphabetically: My contribution 40%)

[17] A Separability Index for Higher-dimensional Classification Problems and its Applications. (A. P. Ghosh, R. Maitra and A. Peterson). *Submitted, under revision*, (2009).

(Authors listed alphabetically: My contribution 35%)

[18] Random linear recursions with dependent coefficients. (A. P. Ghosh, A. Roitershtein, D. Hay, V. Hirpara, R. Rastegar, A. Schulties, and J. Suh.) *Submitted, under revision.* (2009).

(Authors listed alphabetically: My contribution 25%)

(VI) **Honors and Awards:**

(a) Grants received:

(1) **NSF Proposal** DMS-0608634 (2006): *Collaborative Research: Heavy Traffic Limit Models and Control Analysis for Wireless Queueing Systems - Incorporating Long Range Dependence and Heavy Tails.* I am the PI on this grant, with my part being $117000, Sept 2006 - Aug 2010. Other Collaborators R.T. Buche (NC state) and V. Pipiras (UNC-Chapel Hill)).

(2) **IMA Participating Institutions (PI) Conference Proposal** for organizing Ames Symposium in Probability and Statistics, (in honor of Krishna B. Athreya) September 18-19, Ames, Iowa , 2009, $3000 (other PIs: A. Roitershtein, S. Sethuraman, A. Weerasinghe (Mathematics, Iowa State)).

(b) Awards:

(1) *Prasanta Chandra Mahalanobis Gold Medal* (2000). For most outstanding student in M-Stat program (ISI-CAL).

(2) *Wassily Hoeffding Fellowship* (2001). For best performance in the first year of PhD program (Statistics Dept, UNC-CH).

(3) *SAMSI Graduate Student Fellowship* (2003-2004). Research fellow in the program of "Network Modeling for the Internet" in SAMSI.

(4) *Excellence in Teaching Award* (2004). For undergraduate teaching (Department of Statistics and Operations Research, UNC-CH).

(5) *Laha Award* (2005). To attend the Joint Statistical Meetings/IMS Annual Meeting. (Institute of Mathematical Statistics)

(6) *Bose-Nandi Award* (2005). For the best paper in Applied Statistics in Calcutta Statistical Association Bulletin for the publication [2]. (Calcutta Statistical Association).

(7) Nominated for the *LAS Award for Early Achievement in Teaching* (2009) from department of statistics.

(VII) **Presentations:**

[Presentations by co-authors are not listed]

(a) Invited:

(1) 12th International Conference on Statistics, Combinatorics, Mathematics and Applications (SCMA), Auburn University. (Dec. 2005).

(2) Seminar, Theoretical Statistics and Mathematics Unit, Indian Statistical Institute, Calcutta, India (June 2006).

(3) Seminar, Statistical Sciences Group, Los Alamos National Laboratory. (Jan. 2007).

(4) Spring Colloquium, Department of Statistics and Actuarial Sciences, University of Iowa. (Feb. 2007).

(5) The 14th Applied Probability Society of Institute for Operations Research and the Management Sciences (INFORMS) Conference, in Eindhoven University of Technology & EURANDOM, Eindhoven, Netherlands. (July 2007).

(6) Probability/Comp. Finance seminar, Department of Mathematical Sciences, Carnegie Mellon University. (Oct. 2007).

(7) International conference on Recent Advances in Probability, Indian Statistical Institute, Calcutta, India (part of the celebration of its Platinum Jubilee (75th year)). (Dec. 2007).

(8) International Symposium on the Mathematical Theory of Networks and Systems (MTNS 2008), Virginia Tech., Blacksburg, VA, (July-Aug., 2008).

(9) Statistics seminar, Department of Statistics, Colorado State University, (Oct. 2008).

(10) Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting 2009, San Diego CA, (Oct. 2009).

(11) Department Colloquium, Department of Mathematics, Tulane University, New Orleans, LA (Nov. 2009)

(12) International Conference on Statistics, Probability, Operation Research, Computer Science and Allied Areas, Visakhapatnam, India (Jan. 2010).

(b) Contributed:

(1) Fifth International Triennial Calcutta Symposium on Probability & Statistics, Calcutta, India. (Dec. 2003).

(2) Workshop on Congestion Control and Heavy Traffic Modeling, Statistical and Applied Mathematical Sciences Institute (SAMSI) (2003).

(3) Joint Statistical Meeting, San Francisco. (Aug. 2003).

(4) Conference on Stochastic Processes & their Applications, Santa Barbara (July 2005).

(5) Joint Statistical Meeting, Minneapolis. (Aug. 2005).

(6) Conference on Stochastic Processes & Its Applications, Paris, France. (July 2006).

(7) Sixth International Triennial Calcutta Symposium on Probability & Statistics, Calcutta, India. (Dec. 2006).

(8) Conference on Stochastic Processes and Its Applications, University of Illinois, Urbana-Champaign. (July 2007).

(9) Probability at Warwick Workshop (P@W, 2009), Warwick University, U.K. (July 2009).

(10) Conference on Stochastic Processes & their Applications, Berlin, Germany (July 2009).

(c) Participant:

(1) Workshop on Internet Tomography, Statistical and Applied Mathematical Sciences Institute (SAMSI), (2003).

(2) Workshop on Sensor Networks, Statistical and Applied Mathematical Sciences Institute (SAMSI), (2003).

(3) 30th Midwest Probability Colloquium, Northwestern University, Evanston, IL, (Oct. 2008).

(d) Local (within Iowa State):

(1) *Optimal Controls for Stochastic Networks in Heavy Traffic.* VIGRE Theory Group seminar, Dept. of Statistics. (Oct. 2005).

(2) *Queues in Heavy Traffic* (series of 3 talks). Probability Seminar, Dept of Mathematics. (Oct.-Nov. 2005).

(3) *Optimal controls for Queueing Networks in Heavy Traffic.* Communications and Signal Processing Seminar, Dept. of Electrical and Computer Engineering. (Feb. 2006).

(4) *Scale Free Networks and the Internet.* VIGRE Theory Group seminar, Dept. of Statistics. (Feb. 2006).

(5) *Optimal buffer size and a rate control problem for a queueing network in heavy traffic* Probability Seminar, Dept of Mathematics. (Oct. 2007).

(6) *How to apply for Academic jobs.* (with C. Yu and P. Liu) VIGRE Survey Group seminar, Dept of Statistics. (Oct. 2007).

(7) *Internet Modeling with fBm.* Probability Seminar, Dept of Mathematics (March, 2008).

(8) *Optimal Pricing & Production Rates in a Remanufacturing Network in Heavy Traffic.* Mathematics Colloquium, Dept of Mathematics, (Sept. 2008).

(9) *Optimal prices and production rate in a closed loop supply chain with re-manufacturing under heavy traffic.* IMSE Graduate Seminar, (Jan. 2009).

(VIII) **Service:**

(a) Departmental Committees:I served as a question-writer for Ph.D. Prelim Exams in 2007 and 2009. I was involved with the following committees:

2005-2006 Strategic Planning/External Review Committee, Library Committee.
2006-2007 Ph.D Prelim Exam Committee, Admissions Committee, Library Committee.
2007-2008 Ph.D Prelim Exam Committee, Admissions Committee, Renovation Committee.
2008-2009 Ph.D/MS Prelim Exam Committee, Admissions Committee, Renovation Committee.
2009-2010 Ph.D/MS Prelim Exam Committee, Graduate Committee, Curriculum Committee, local conferences committee.

(b) Refereeing for Journals/Conferences:

(1) *Queueing Systems*,
(2) *Electronic Journal of Probability*,
(3) *Statistical Methodology*,
(4) *Mathematics of Operations Research*.
(5) *Operations Research*,
(6) *Sankhyā (Series A)*,
(7) *Acta Applicandae Mathematicae*,
(8) *The American Statistician*,
(9) *Computers & Operations Research*,
(10) *Electronic Communications in Probability*.
(11) *2008 American Control Conference (Seattle, Washington)*.

(c) Membership in Professional Organization:

(1) *Institute of Mathematical Statistics (IMS)*. Member since 2000, (Life-)member since 2008.
(2) *American Statistical Association (ASA)*. Member since 2000.
(3) *Society for Industrial and Applied Mathematics (SIAM)*. Member since 2005.
(4) *Applied Probability Society (APS)* - subdivision of *Institute for Operations Research and the Management Sciences (INFORMS)*: Member since 2007.
(5) *Calcutta Statistical Association (CSA)*. (Life-)member since 2006.
(6) *International Indian Statistical Association (IISA)*. (Life-) member since 2009.

(d) Organizing Conferences:

(1) Contributed program Chair, *Spring Research Conference (SRC)*, Ames, Iowa, (May, 2007).
(2) Session Chair, Invited Session on Statistical theory and methods, *Conference Celebrating the 75th anniversary of the Statistical Laboratory*, Department of Statistics and Statistical Laboratory, Iowa State University, Ames IA, (June 2009)
(3) Organizer, *Ames Symposium of Probability and Statistics (ASPS)*, Ames, Iowa (Sept. 18-19) sponsored by IMA, Departments of Statistics, Mathematics, Economics, Computer Science, College of Arts and Sciences and the Provosts office of Iowa State University. (Sept 2009).

(e) Synergistic Activities:

(1) Faculty mentor of V. Kalivarapu in the *Preparing Future Faculty (PFF)* program offered by the Center for Excellence in Teaching (CELT) in Iowa State (Fall 2007).
(2) Faculty mentor for the *Research Experiences for Undergraduates (REU)* program sponsored by the NSF, organized by the Mathematics and Statistics Departments of Iowa State University, (Summer 2009).
The final project has been submitted for publication and listed as [18] in the publication list.
(3) Faculty advisor of the Student Organization, *Bangladeshi Community of Iowa State University (BCISU)*. 2009-2010.