

Curriculum Vitæ of
SUBHASHIS GHOSHAL (variation: GHOSAL)

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Academic Positions

Department of Statistics, North Carolina State University, U. S. A.:

August, 2008–Present — *Full Professor*.

August, 2004–July, 2008 — *Associate Professor* (with tenure).

August 2001 — July, 2004, *Assistant Professor*.

School of Statistics, University of Minnesota, U. S. A.:

January 2000–August, 2001 — *Assistant Professor*

Other Appointments

Royal Netherlands Academy of Arts and Sciences Visiting Professorship,
hosted by Leiden University, May 21, 2013–May 20, 2014.

EURANDOM Chair Professor, 2010–2011, Eindhoven, The Netherlands.

Sabbatical leave in Vrije University, Amsterdam, The Netherlands, August–October, 2007 (Courtesy Aad van der Vaart).

Education

Ph.D. (Statistics), 1995, Indian Statistical Institute, Calcutta, India.

M. S. (Statistics), 1990, Indian Statistical Institute, Calcutta, India.

B. S. (Statistics), 1988, Indian Statistical Institute, Calcutta, India.

Awards

1. IMS Medallion lecturer 2017.
2. Fellow of the International Society for Bayesian Analysis (ISBA), 2016
3. “Thank a teacher” honor for teaching, North Carolina State University, Spring 2015.
4. Cavel Brownie Mentoring Award, North Carolina State University, 2015.
5. Fellow of the American Statistical Association, 2010.
6. International Indian Statistical Association Young Researcher Award in Theoretical Statistics, 2006–2007.
7. Fellow of the Institute of Mathematical Statistics, 2006.
8. Sigma Xi research award and elected to be a member of Sigma Xi, 2004.
9. Young Scientist award by the Indian Science Congress in its 82nd session (1995).
10. Professor P. C. Mahalanobis Gold Medal (by the Indian Statistical Institute) awarded to the most outstanding student in M. Stat. (1990).

11. Indian Statistical Institute Alumni Association Gold Medal for performance in the M. Stat. (1990).
12. Indian Statistical Institute Alumni Association Gold Medal for performance in the B. Stat. (1988).
13. Prizes for good performance in exams 1985–1990.

Funded research

1. **National Science Foundation (DMS-Statistics):** *Bayesian methods of estimation and uncertainty quantification for high dimensional data*. Proposal number 1510238. Funding level \$200,000. Single PI grant. Duration: 07/01/2015–06/30/2018.
2. **National Security Agency:** *Computational Approaches to Feature Selection For Massive Data*. Proposal number H98230-12-1-0219. Funding level \$117,070. Co-PI (with Hao Helen Zhang). Duration: 01/01/2012–09/30/2014.
3. **National Science Foundation (DMS-Statistics):** *Bayesian methods for structure detection in analysis of object data*. Proposal number 1106570. Funding level \$250,000. Single PI grant. Duration: 06/01/2011–05/31/2015.
4. **National Science Foundation (DMS-Statistics):** *Collaborative Research: Mixture model approach to multiple hypothesis testing for dependent and complex data*. Proposal number 0803540. Funding level \$59,999. PI on collaborative proposal. Duration: 09/01/2008–08/31/2011.
5. **National Science Foundation (DMS-Statistics) CAREER AWARD 2003:** *Default Bayesian Methods for Nonparametric Problems*. Proposal number 0349111. Funding level \$400,000. Single PI grant. Duration: 06/01/2004–05/31/2010.

Other supports

1. **Army Research Office:** 10th conference on Bayesian nonparametrics. Funding level \$10000. PI. Duration 2015–16.
2. **Office of Naval Research:** 10th conference on Bayesian nonparametrics. Funding level \$9200. PI. Duration 2015–16.
3. **National Science Foundation (DMS-Statistics):** *10th conference on Bayesian nonparametrics*. Proposal number DMS-1507428. Funding level \$15,000. PI. Duration 2015–16.
4. Faculty course release and a student support for the academic year 2013-2014 obtained from NSF for serving as SAMSI faculty fellow for the program on Low Dimensional Structure in High Dimensional Data.
5. **National Science Foundation (DMS-Statistics):** *9th Conference on Bayesian Nonparametrics*. Proposal number 1262034. Funding level \$20,000. PI. Duration 2013.
6. **National Science Foundation (DMS-Statistics):** *2011 International Conference on Probability, Statistics and Data Analysis*. Proposal number 1105469. Funding level \$20,000. PI. Duration 04/01/2011-03/31/2012.
7. **National Security Agency:** *2011 International Conference on Probability, Statistics and Data Analysis*. Proposal number 1105469. Funding level \$14,950. PI. Duration 04/01/2011-03/31/2012.
8. Royal Netherlands Academy of Arts and Sciences Visiting Professorship grant (Courtesy Aad van der Vaart).
9. Eurandom chair professor support grant from The National Science Foundation of the Netherlands (NWO), 2010–2011 (Courtesy Eduard Belitser, Harry van Zanten and Aad van der Vaart).
10. Sir Isaac Newton Institute (Cambridge, UK) program participant grant, August 2007.

11. Faculty course release and a student support for the academic year 2004-2005 obtained from NSF for serving as a SAMSI faculty fellow for the program on Latent variable Models for Social Sciences.

Current Research Interests

High Dimensional Models

Nonparametric and Semiparametric Methods

Bayesian Inference

Asymptotic Statistics

Image Processing

Differential equation models

Quantile regression

Functional Data Analysis

Multiple Hypotheses Testing

ROC analysis

Biomedical applications

Doctoral Student Advising

Current Students

1. **Qianwen (Sherry) Tan:** Expected in 2017.
2. **Ran (Jennifer) Wei:** Expected in 2017 (jointly with Brian Reich).
3. **Xingqi (Maggie) Du:** Expected in 2018

4. **Priyam Das:** Expected in 2016.
5. **Xiuqi Li:** Expected in 2018 (Operations Research).
6. **Bo Ning:** Expected in 2017 (jointly with Peter Bloomfield).
7. **Jami Jackson:** Expected in 2018.
8. **Arkaprava Ray:** Expected in 2018.
9. **Moumita Chakraborty:** Expected in 2018.

Students Graduated (In reverse chronological order)

1. **Adam Suarez:** (co-advised with Jesus Rodriguez, NCSU-Math)
May 2016.
Thesis title: *Bayesian Methods for Exploratory Functional Data Analysis and Existence.* Theorems for Solutions to Nonlinear Differential and Difference Equations
2. **Shikai Luo:** (co-advised with Rui Song) March 2016.
Thesis title: *Optimal treatment strategy for complex data.*
3. **Meng Li:** July 2015.
Thesis title: Bayesian methods for images and trees.
Visiting Assistant Professor, Duke University.
4. **Prithwish Bhaumik:** March 2015.
Thesis title: *Bayesian Estimation and Uncertainty Quantification in Differential Equation Models.*
Post-doctoral researcher in Department of Statistics, University of Texas at Austin.
5. **William Weimin Yoo:** October 2014.
Thesis title: *Sup-norm Posterior Convergence Rates for Regression Models with Application to Estimating the Location of Function Maximum.*
Post doctoral researcher in University of Paris-Dauphine.
6. **Sayantana Banerjee:** February 2014.
Thesis title: *Bayesian inference for high dimensional models: Convergence properties and computational issues.*

Finalist of L. J. Savage Award for best thesis in Bayesian Statistics, 2014–15.

Post doctoral researcher at M. D. Anderson Cancer Center.

7. **Weining Shen:** May 2013.

Thesis title: *Adaptive Bayesian Function Estimation.*

Winner of L. J. Savage Award for best thesis in Bayesian Statistics, 2013–14.

Tenure-track Assistant Professor, Department of Statistics, University of California-Irvine.

8. **John White:** May 2010.

Thesis title: *Bayesian Multiscale Smoothing of Photon-limited Images with Applications to Astronomy and Medicine.*

SAS Institute, Inc.

9. **Carl Dicasoli:** (co-advised with Sujit Ghosh) August 2009.

Thesis title: *Bayesian Methods for Crossing Survival Curves.*

10. **Wookyeon Hwang:** August 2009.

Thesis title: *Boosting Methods for Variable Selection in High Dimensional Sparse Models.*

11. **Yuefeng Wu:** March 2009. North Carolina State University.

Thesis title: *Asymptotic Behavior of Some Bayesian Nonparametric and Semiparametric Procedures.*

Tenure track assistant professor, Department of Mathematics and Computer Science, University of Missouri-St. Louis.

12. **S. McKay Curtis:** (co-advised with Sujit Ghosh) July 2008.

North Carolina State University.

Thesis title: *Bayesian Variable Selection Methods and Applications.*

13. **Jiezhun Gu:** July 2007. North Carolina State University.

Thesis title: *Nonparametric and Semiparametric Inference about ROC Curve.*

14. **Liansheng Zu:** (co-advised with Sujit Ghosh): July 2006. North

Carolina State University.

Thesis title: *Analyzing Longitudinal Data with Non-ignorable Missing.*

15. **Changku Kang:** December 2005. North Carolina State University.

Thesis title: *Bayesian Regression Via Clustering Using Dirichlet Process.*

16. **Yongqiang Tang:** November 2003, North Carolina State University.

Thesis title: *Bayesian Nonparametric Estimation of the Transition Density and Prediction in a Markov Process.*

Project Advising

1. **Bradley Turnbull:** NSA funded project “Computational Approaches to Feature Selection For Massive Data”
2. **Priyam Das:** Mathematics Masters thesis “A new global optimization algorithm”. Defended April 2016.
3. **Arkaprava Ray:** Computational project “Regressing multivariate proportion data on high dimensional predictor with applications to bioinformatics”.

Publications

(in reverse chronological order.)

Books

- (a) **Ghosal, S.** and van der Vaart, A. W. (2016). *Fundamentals of Nonparametric Bayesian Inference*, Cambridge University Press (in production, expected in 2016).
- (b) Clarke, B. S. and **Ghosal, S.** (2008). *Pushing the Limits of Contemporary Statistics: Contributions in honor of Professor Jayanta K. Ghosh*. IMS Collection **3**, Institute of Mathematical Statistics, Beachwood, OH.

Papers

- Summary of Publication Outlet

(Including accepted and invited revision status)

<i>Ann. Statist.</i>	14	<i>J. Amer. Statist. Assoc.</i>	2
<i>Biometrika</i>	3	<i>J. Roy. Statist. Soc, Ser. B</i>	1
<i>Bernoulli</i>	4	<i>Electron. J. Statist.</i>	6
<i>J. Multivar. Anal.</i>	4	<i>Biometrics</i>	1
<i>Stat. Medicine</i>	2	<i>Bayesian Anal.</i>	3
<i>J. Comp. Graph. Statist.</i>	1	<i>Comp. Statist. Data Anal.</i>	2
<i>J. Statist. Plan. Inf.</i>	4	<i>Sankhya</i>	2
<i>Test</i>	1	<i>Ann. Inst. Statist. Math.</i>	2
<i>J. Theoret. Probab.</i>	2	<i>Acta Math. Hung.</i>	1
<i>Signal Process.</i>	1	<i>Statist. Interface</i>	1
<i>Statist. Anal. Data Mining</i>	1	<i>Statist. Methodology</i>	3
<i>Statist. Decisions</i>	1	<i>Math. Methods Statist.</i>	2
<i>Acta Applicande Math.</i>	1	<i>J. Nonpara. Statist.</i>	1
<i>Cal. Statist. Assoc. Bull.</i>	1	<i>Scand. J. Statist.</i>	1
<i>STAT</i>	1	<i>IEEE Trans. Image</i>	1
<i>Stat. Prob. Lett.</i>	1	<i>Book chapters</i>	16
<i>Submitted</i>	3	<i>Under preparation</i>	9

- Papers Published in Journals

1. **Ghosal, S.**, Turnbull, B., Zhang, H. H. and Hwang, W. (2016). Sparse penalized forward selection for support vector classification. *Journal of Computational and Graphical Statistics* **25**, 493–514.
2. Yoo, W. W. and **Ghosal, S.** (2016). Uniform norm posterior contraction and credible sets for nonparametric multivariate regression. *Annals of Statistics* **44** 1069–1102.
3. Suarez, A. J. and **Ghosal, S.** (2016). Bayesian clustering of functional data using local features. *Bayesian Analysis* **11**, 71–98.

4. Shen, W. and **Ghosal, S.** (2016). Adaptive Bayesian density regression for high dimensional data. *Bernoulli* **22**, 396–420.
5. Li, M. and **Ghosal, S.** (2015). Fast translation invariant multiscale denoising. *IEEE Transactions on Image Processing* **24**, 4876–4887.
6. Bhaumik, P. and **Ghosal, S.** (2016). Bayesian two-step estimation in differential equation models. *Electronic Journal of Statistics* **9**, 3124–3154.
7. Shen, W. and **Ghosal, S.** (2015). Adaptive Bayesian procedures using random series prior. *Scandinavian Journal of Statistics* **42**, 1194–1213.
8. **Ghosal, S.** (2015). Invited Discussion of "Frequentist coverage of adaptive nonparametric Bayesian credible sets" by Szabo, van der Vaart and van Zanten, *Annals of Statistics* **43**, 1455–1462.
9. Luo, S. and **Ghosal, S.** (2015). Prediction consistency of forward iterated regression and selection technique. *Statistics and Probability Letters* **107**, 79–83.
10. Banerjee, S. and **Ghosal, S.** (2015). Bayesian estimation of sparse precision matrix. *Journal of Multivariate Analysis* **136**, 147–162.
11. Banerjee, S. and **Ghosal, S.** (2014). Bayesian variable selection in generalized additive partial linear models. *STAT* **3**, 363–378.
12. Gu, J., **Ghosal, S.** and Kleiner, D. (2014). Bayesian ROC curve estimation under verification bias. *Statistics in Medicine* **33**, 5081–5096.
13. Banerjee, S. and **Ghosal, S.** (2014). Posterior convergence rates for estimating a large precision matrix using graphical models. *Electronic Journal of Statistics* **8**, 2111–2137. (Winner of SBSS student paper competition, 2013).
14. Li, M. and **Ghosal, S.** (2014). Bayesian multiscale smoothing for Gaussian noised images. *Bayesian Analysis* **9**, 733–758. (Winner of SBSS student paper competition, 2014).

15. Curtis, S. M., Banerjee, S. and **Ghosal, S.** (2014). Fast Bayesian model assessment for nonparametric additive regression. *Computational Statistics and Data Analysis*, Special issue on Bayesian Computing, Methods and Applications, **71**, 347–358.
16. Turnbull, B., **Ghosal, S.** and Zhang, H. H. (2013). Iterative selection using orthogonalized regression techniques. *Statistical Analysis and Data Mining* **6**, 557–564.
17. Shen, W., Tokdar, S. T. and **Ghosal, S.** (2013). Adaptive Bayesian multivariate density estimation with Dirichlet mixtures. *Biometrika* **100**, 627–640.
18. White, J. T. and **Ghosal, S.** (2013). Denoising three-dimensional and colored images using a Bayesian multi-scale model for photon counts. *Signal Processing* **93**, 2906–2914.
19. Bean, G. J., DeRose, E. A., Mercer, L. D., Thayer, L. K., Roy, A. and **Ghosal, S.** (2013). Skew-mixture models for estimation of positive false discovery rates. *Statistical Methodology* **10** 46–57.
20. Belitser, E. N., **Ghosal, S.** and van Zanten, H. (2012). Optimal two-stage procedures for estimating location and size of maximum of multivariate regression functions. *The Annals of Statistics* **40** 2850–2876.
21. **Ghosal, S.** and Roy, A. (2011). Predicting false discovery proportion under dependence. *Journal of the American Statistical Association* **106**, 1208–1218.
22. White, J. T. and **Ghosal, S.** (2011). Bayesian smoothing of photon-limited images with applications in astronomy. *Journal of Royal Statistical Society, Series B* **73**, 579–599.
23. **Ghosal, S.** and Roy, A. (2011). Identifiability of proportion of null hypotheses in mixture models for p-value distributions. *Electronic Journal of Statistics* **5**, 329–341.
24. Wu, Y. and **Ghosal, S.** (2010). The L_1 -consistency of Dirichlet mixtures in multivariate density estimation. *Journal of Multivariate Analysis*. **101** 2411–2419.

25. Clarke, B. S. and **Ghosal, S.** (2010). Posterior normality and reference priors for exponential families with increasing dimension. *Electronic Journal of Statistics* **4**, 737–780.
26. Hwang, W., Zhang, H. H. and **Ghosal, S.** (2009). FIRST: Combining forward selection and shrinkage in high dimensional linear regression. *Statistics and Its Interface* **2**, 341–348.
27. Wu, Y. and **Ghosal, S.** (2008). Posterior consistency for some semiparametric problems. *Sankhyā, Ser. A*, (Invited paper), **70**, 267–313.
28. Roy, A., **Ghosal, S.** and Rosenberger, W. F. (2008). Convergence properties of sequential Bayesian D-optimal designs. *Journal of Statistical Planning and Inference* **139**, 425–440.
29. Gu, J. and **Ghosal, S.** (2008). Bayesian ROC curve estimation under binormality using a partial likelihood based on ranks. *Journal of Statistical Planning and Inference*, **139** 2076–2083.
30. Gu, J., **Ghosal, S.** and Roy, A. (2008). Nonparametric estimation of ROC curve. *Statistics in Medicine* **27**, 5407–5420.
31. Gu, J. and **Ghosal, S.** (2008). Strong approximations for resample quantile process and applications to ROC methodology. *Journal of Nonparametric Statistics* **20**, 229–240.
32. Wu, Y. and **Ghosal, S.** (2008). Kullback-Leibler property of kernel mixture priors in Bayesian density estimation. *Electronic Journal of Statistics* **2**, 298–331, 2008.
Correction: *Electronic Journal of Statistics* **3**, 316–317, 2009.
33. **Ghosal, S.**, Lember, J. and van der Vaart, A. W. (2008). Nonparametric Bayesian model selection and averaging. *Electronic Journal of Statistics* **2**, 63–89.
34. Tang, Y., **Ghosal, S.** and Roy, A. (2007). Nonparametric Bayesian estimation of positive false discovery rates. *Biometrics* **63**, 1126–1134.

35. **Ghosal, S.** and van der Vaart, A. W. (2007). Convergence rates of posterior distribution for noniid observations. *The Annals of Statistics* **35**, 192–223.
36. **Ghosal, S.** and van der Vaart, A. W. (2007). Posterior convergence rates of Dirichlet mixtures of normal distributions at smooth densities. *The Annals of Statistics* **35**, 697–723.
37. Tang, Y. and **Ghosal, S.** (2007). A consistent nonparametric Bayesian procedure for estimating autoregressive conditional densities. *Computational Statistics and Data Analysis* **51**, 4424–4437.
38. Tang, Y. and **Ghosal, S.** (2007). Dirichlet mixture of normal models for Markov processes. *Journal of Statistical Planning and Inference* **137**, 1711–1726.
39. Choudhuri, N., **Ghosal, S.** and Roy, A. (2007). Bayesian nonparametric binary regression using a Gaussian process prior. *Statistical Methodology* **4**, 227–243.
40. **Ghosal, S.** and Roy, A. (2006). Posterior consistency of Gaussian processes for nonparametric binary regression. *The Annals of Statistics* **34**, 2413–2429.
41. **Ghosal, S.** and Tang, Y. (2006). Bayesian consistency for Markov processes. *Sankhyā* **68**, 227–239.
42. Choudhuri, N., **Ghosal, S.** and Roy, A. (2004). Bayesian estimation of the spectral density of a time series. *Journal of the American Statistical Association* **99**, 1050–1059.
43. Choudhuri, N., **Ghosal, S.** and Roy, A. (2004). Contiguity of the Whittle measure in a Gaussian time series. *Biometrika* **91**, 211–218.
44. **Ghosal, S.**, Lember, J. and van der Vaart, A. W. (2003). On Bayesian adaptation. *Acta Applicandae Mathematica* **79**, 165–175.

45. Belitser, E. N. and **Ghosal, S.** (2003). Adaptive Bayesian inference on the mean of an infinite dimensional normal distribution. *The Annals of Statistics* **31**, 536–559.
46. Amewou-Atisso, M., **Ghosal, S.**, Ghosh, J. K. and Ramamoorthi, R. V. (2003). Posterior consistency for semiparametric regression problems. *Bernoulli* **9**, 291–312.
47. **Ghosal, S.** and van der Vaart, A. W. (2001). Entropies and rates of convergence for Bayes and maximum likelihood estimation for mixture of normal densities. *The Annals of Statistics*, **29**, 1233–1263.
48. **Ghosal, S.** (2001). Convergence rates for density estimation with Bernstein polynomials. *The Annals of Statistics* **29**, 1264–1280.
49. **Ghosal, S.**, Sen, A. and van der Vaart, A. W. (2000). Testing Monotonicity of Regression. *The Annals of Statistics* **28**, 1054–1082.
50. **Ghosal, S.**, Ghosh, J. K. and van der Vaart, A. W. (2000). Convergence rates of posterior distributions. *The Annals of Statistics* **28**, 500–531.
51. **Ghosal, S.** (2000). Asymptotic normality of posterior distributions for exponential families when the number of parameters tends to infinity, *Journal of Multivariate Analysis* **74**, 49–69.
52. **Ghosal, S.** (1999). Probability matching priors for non-regular cases. *Biometrika*, **86**, 956–964.
53. **Ghosal, S.**, Ghosh, J. K. and Samanta, T. (1999). Approximation of the posterior distribution in a change point problem. *Annals of the Institute of Statistical Mathematics* **51**, 479–497.
54. **Ghosal, S.**, Ghosh, J. K. and Ramamoorthi, R. V. (1999). Consistent semiparametric Bayesian inference about a location parameter. *Journal of Statistical Planning and Inference* **77**, 181–193.

55. **Ghosal, S.**, Ghosh, J. K. and Ramamoorthi, R. V. (1999). Posterior consistency of Dirichlet mixtures in density estimation *The Annals of Statistics* **27**, 143–158.
56. **Ghosal, S.** (1999). Asymptotic normality of posterior distributions in high dimensional linear models. *Bernoulli* **5**, 315–331.
57. **Ghosal, S.** and Chandra, T. K. (1998). Complete convergence of martingale arrays. *Journal of Theoretical Probability* **11**, 621–631.
58. Chandra, T. K. and **Ghosal, S.** (1997). On extensions of an inequality of Kolmogorov. *Calcutta Statistical Association Bulletin* **47**, 1–9.
59. **Ghosal, S.** (1997). Normal approximation to the posterior distribution for generalized linear models with many covariates. *Mathematical Methods of Statistics* **6**, 332–348.
60. **Ghosal, S.** (1997). Reference prior in multiparameter nonregular cases. *Test*, **6**, 159–186.
61. **Ghosal, S.** and Samanta, T. (1997). Expansion of Bayes risk for entropy loss and reference prior in nonregular cases. *Statistics and Decisions* **15**, 129–140.
62. **Ghosal, S.** and Samanta, T. (1997). Asymptotic expansions of posterior distributions in nonregular cases. *Annals of the Institute of Statistical Mathematics* **49**, 181–197.
63. Chandra, T. K. and **Ghosal, S.** (1996). Strong law of large numbers for weighted average of dependent variables. *Journal of Theoretical Probability* **9**, 797–809.
64. Chandra, T. K. and **Ghosal, S.** (1996). Extensions of the strong law of large numbers of Marcinkiewicz and Zygmund under dependence. *Acta Mathematica Hungarica* **71**, 327–336.
65. **Ghosal, S.** and Samanta, T. (1995). Asymptotic behaviour of Bayes estimates and posterior distribution in multiparameter nonregular cases. *Mathematical Methods of Statistics* **4**, 361–388.

66. **Ghosal, S.**, Ghosh, J. K. and Samanta, T. (1995). On convergence of posterior distributions. *The Annals of Statistics* **23**, 2145–2152.
- Papers Published in Conference Proceedings or Book Chapters (refereed)
 - 67. White, J. T. and **Ghosal, S.** (2014). Multiple testing methods for removing background noise from images. In *Topics in Non-Parametric Statistics: Proceedings of the First Conference of the International Society for Nonparametric Statistics* (M. Akritas, S. N. Lahiri and D. Politis, eds.), Springer Proceedings in Mathematics and Statistics, **74**, 95–104.
 - 68. **Ghosal, S.** (2011). Invited discussion of “Integrated objective Bayesian estimation and hypothesis testing” by J. M. Bernardo. In *Bayesian Statistics* **9**, 1–68, Oxford University Press.
 - 69. **Ghosal, S.** (2010). Dirichlet process, related priors and posterior asymptotics. In *Bayesian Nonparametrics*, (N. L. Hjort, *et al.*, eds.), 35–79, Cambridge University Press.
 - 70. **Ghosal, S.** and Roy, A. (2009). Bayesian nonparametric approach to multiple testing. In *Perspectives in Mathematical Sciences I* (N. S. N. Sastry, *et al.*, eds.), 139–164, World Scientific Publishing Company, Singapore.
 - 71. Kang, C. and **Ghosal, S.** (2007). Clusterwise regression using Dirichlet mixtures. In *Advances in Multivariate Statistical Methods*. (A. Sengupta, ed.), 305–325, World Scientific Publishing Company, Singapore.
A shorter version of this paper appears in the JSM Proceedings, 2007, Section on Nonparametric Statistics, 1624–1631.
 - 72. Clarke, B. S. and **Ghosal, S.** (2008). J. K. Ghosh’s contribution to statistics: A brief outline. In *IMS Collection 3: Pushing the Limits of Contemporary Statistics: Contributions in honor*

- of Professor Jayanta K. Ghosh (B. Clarke and S. Ghosal, eds.), 1–18. Institute of Mathematical Statistics, Beachwood, OH.
73. **Ghosal, S.**, Roy, A. and Tang, Y. (2008). Posterior consistency of Dirichlet mixtures of beta densities in estimating positive false discovery rates. In *IMS Collection 1: Beyond Parametrics in Interdisciplinary Research: Festschrift in honor of Professor Pranab K. Sen*, (E. Pena and M. Silvapulle, eds.), 105–115. Institute of Mathematical Statistics, Beachwood, OH.
 74. Ghosh, S. K. and **Ghosal, S.** (2006). Semiparametric accelerated failure time models for censored data. In *Bayesian Statistics and its Applications* (S. K. Upadhyay *et al.*, eds.), 213–229, Anamaya Publishers, New Delhi.
 75. Choudhuri, N., **Ghosal, S.** and Roy, A. (2004). Bayesian methods for function estimation. In *Handbook of Statistics 25*, 373–414, (D. Dey., ed.), Elsevier.
 76. **Ghosal, S.** (2003). Invited discussion of “A Nonparametric Bayesian Approach to Inverse Problems” by R. L. Wolpert, K. Ickstadt and M. B. Hansen. In *Bayesian Statistics 7* (J. M. Bernardo *et al.*, eds.), 403–417, Oxford University Press.
 77. **Ghosal, S.** and van der Vaart, A. W. (2003). Discussion of “New Tools for Consistency in Bayesian Nonparametrics” by G. Salinetti. In *Bayesian Statistics 7* (J. M. Bernardo *et al.*, eds.), 369–384, Oxford University Press.
 78. **Ghosal, S.**, Ghosh, J. K. and Ramamoorthi, R. V. (1999). Consistency issues in Bayesian nonparametrics. In *Asymptotics, Nonparametrics and Time Series: A Tribute to Madan Lal Puri* (Subir Ghosh, Ed.), 639–667, Marcel Dekker, Inc.
 79. Chandra, T. K. and **Ghosal, S.** (1998). Some elementary strong law of large numbers: a review. In *Frontiers in Probability and Statistics* (S. P. Mukherjee *et al.*, eds.), 61–81, Narosa Publishing House, New Delhi.

80. **Ghosal, S.**, Ghosh, J. K. and Ramamoorthi, R. V. (1997). Non-informative priors via sieves and packing numbers. In *Advances in Statistical Decision Theory and Applications* (S. Panchapakesan and N. Balakrishnan, Eds.), 119–132, Birkhauser, Boston.
81. Chandra, T. K. and **Ghosal, S.** (1994). On Borel-Cantelli lemmas. In *Essays on Probability and Statistics, Festschrift in honour of Professor Anil Kumar Bhattacharya* (S. P. Mukherjee et al. (eds.)), Department of Statistics, Presidency College, Calcutta, 231–239.
82. Ghosh, J. K., **Ghosal, S.** and Samanta, T. (1994). Stability and convergence of posterior in non-regular problems. In *Statistical Decision Theory and Related Fields V* (S. S. Gupta and J. O. Berger, eds.), 183–199.

Papers Accepted or Revision Invited in Journals

83. Bhaumik, P. and **Ghosal, S.** (2016). Efficient Bayesian estimation and uncertainty quantification in differential equation models. *Bernoulli* (to appear). Winner of 2015 Laplace student paper award by SBSS of ASA.
84. Bhaumik, P. and **Ghosal, S.** (2015). Bayesian inference for higher order ordinary differential equation models. Under revision for *Journal of Multivariate Analysis*.
85. Suarez, A. J. and **Ghosal, S.** (2016). Bayesian principal component analysis for functional data. *Bayesian Analysis* (to appear).
86. Luo, S. and **Ghosal, S.** (2016). Forward Selection and Estimation in High Dimensional Single Index Model. *Statistical Methodology* (to appear).
87. Li, M. and Ghosal, S. (2015). Bayesian detection of image boundaries. Revision submitted to *Annals of Statistics*.

Papers Submitted/to be Submitted for Publication

(Preprints available)

88. Sundaram, R., Ma, L. and Ghosal, S. (2015). Median cost analysis associated with recurrent episodic illnesses in presence of terminal events. Submitted.
89. Yoo, W. W. and **Ghosal, S.** (2015). Optimal Bayesian estimation of the mode of a multivariate regression function. Submitted.
90. Turnbull, B., **Ghosal, S.** and Zhang, H. H. (2015). Penalized forward selection in high dimensional generalized linear models. Under preparation.
91. Das, P. and **Ghosal, S.** (2016). Bayesian quantile regression using random B-spline series prior. Submitted.
92. Shen, W. and **Ghosal, S.** (2015). Bayesian derivative estimation. Under preparation.
93. Das, P. and **Ghosal, S.** (2016). Analyzing US ozone concentration by Bayesian spatio-temporal quantile regression. Under preparation.
94. Belitser, E. and **Ghosal, S.** (2016). Empirical Bayes method for oracle uncertainty quantification in regression models. Under preparation.
95. Li, M. and **Ghosal, S.** (2016). Bayesian analysis of tree data. Under preparation.
96. Banerjee, S., Chakraborty, S. and **Ghosal, S.** (2016). Bayesian analysis of gene-pathway data. Under preparation.
97. Roy, A., Clarke, B. S. and **Ghosal, S.** (2016). Sparse multicategory classification using multi-type predictors.
98. Bhaumik, P. and **Ghosal, S.** (2016). Bayesian two-step methods for partial differential equation models. Under preparation.
99. Wei, R., Reich, B., Hoppins, J. and **Ghosal, S.** (2016). Bayesian variable selection for additive nonparametric models with applications to studying effects of pesticides on health. Under preparation.

University and professional services

• Editorial activities

1. Editor of *Sankhyā*, the Indian Journal of Statistics, Series A, 2012–2015.
2. Guest editor, *Electronic Journal of Statistics*, special volume on Bayesian Nonparametrics, 2015–2016.
3. Guest editor, *Journal of Statistical Planning and Inference*, special volume on Bayesian Nonparametrics, 2013–2014.
4. Associate Editor, *The Annals of Statistics*, 2005–present.
5. Associate Editor, *Bernoulli*, from January, 2013.
6. Associate Editor, *Electronic Journal of Statistics*, 2007–present.
7. Associate Editor, *Statistics Surveys* 2005–present.
8. Associate Editor, *Journal of Japan Statistical Society* From June 2013.
9. Co-editor of *Sankhyā*, the Indian Journal of Statistics, 2004–2011.

• Academic Activities

Program committee, ISBA 2016.

IMS nomination committee, 2014–2015.

ISBA prize committee, 2014–2017, chair 2015–2016.

Chair of local organizing committee of 10th Conference on Bayesian Nonparametrics, Raleigh, June 2015.

Member of faculty team for SAMSI program Low Dimensional Structure in High Dimensional Models, 2013–2014.

Chair of the scientific committee, 9th Workshop on Bayesian Nonparametrics, Amsterdam, The Netherlands, 2013.

Member of Advisory Board of EURANDOM, Eindhoven, The Netherlands, 2012–2016.

Founding member, International Society for Nonparametric Statistics.

Savage Thesis Award Committee, 2010–2011.

Program committee, Nonparametric Bayesian workshop, Veracruz, Mexico, 2011.

Co-chair of organizing committee, International Indian Statistical Association Conference, Raleigh, April 2011.

Program chair for summer conference of Southern Regional Council on Statistics (SRCOS), 2010.

Program committee, Nonparametric Bayesian workshop, Turin, Italy, 2009.

Young Researcher Award Committee, International Indian Statistical Association, 2008.

Member of faculty team for SAMSI program Latent Variable Models for Social Sciences, 2004–2005.

IMS nominee to the ISBA.

Member of the program committee of eighth Valencia conference, 2006.

Regularly referee papers for many journals including *Annals of Statistics*, *Journal of the American Statistical Association*, *Probability Theory and Related Fields*, *Bernoulli*, *Journal of Multivariate Analysis*, *Scandinavian Journal of Statistics*, *Sankhyā*, *Australian Journal of Mathematics*, *Calcutta Statistical Association Bulletin*, *Statistics and Probability Letters*, *Journal of Statistical Planning and Inference*, *Econometric theory*, *Statistica Sinica*, *Metrika*, *Metron*, *Journal of Korean Statistical Society*, *Indian Journal of Pure and Applied Mathematics*, *IEEE transaction on Pattern Recognition and Machine Learning*

Regularly review proposals submitted to US and foreign funding agencies.

- **Doctoral Committee Member**

Served as or currently serving as a member of doctoral committee:

North Carolina State University: Yifang Li, Bradley Turnbull, Lovely Goyal, Muhtar Osman (Statistics), Daniel Finkel, Girish Ramachandra (Operations Research), Suvajit Samanta (Bioinformatics), Maryam Sadat Sakhaei Far (Civil Engineering), Natalie Wright (Psychology) and numerous masters committees (occasionally as chair).

Other institutions: Natesh Pillai (Duke University), Taeryon Choi (Carnegie Mellon University), Pam Binns (University of Minnesota).

- **Inter-disciplinary collaboration**

Participated in Engineering Research Center proposal at NCSU and UIUC to address statistical issues in this multi-disciplinary research.

- **Consulting**

1. Served as the faculty advisor for consultant Trena Phipps on a project on psychological test of working environments.
2. Served as the faculty advisor for consultant Sanggohn Han on a project on network sharing protocol.
3. Served as the faculty advisor for consultant Ming Xiong on a project on survey of consumer preferences for specific patterns and images in printed textiles.

- **Committee work**

Served in many departmental committees including Statistics search committee (2004-05; 2005-06; 2012-13; 2015-16), Ph. D. qualifier committee (August 2015; chairs August 2005; January 2006; August 2011), written prelim committee (2003; co-chair 2008; 2010, chair 2012), curriculum committee (2006-07, 2008-09), post-tenure review committee (2008-11), COS/PAMS research advisory council (2008-14), seminar committee (2010-11).

- **Mentoring work**

Faculty mentor of Yichao Wu (Assistant Professor, NCSU, 2008–2013) and Arnab Maity (Assistant Professor, NCSU, 2010–Present).

Conferences, seminars and academic visits

1. Plenary/distinguished speaker in

- Institute of Mathematical Statistics Medallion lecture, JSM 2017, Baltimore (forthcoming);
- 7th Statistics Day Conference, The Reserve Bank of India, Mumbai, August 30, 2013: Bayesian methods for structure detection in high dimensional models;
- van Dantzig distinguished seminar, University of Amsterdam, The Netherlands, 2013: Bayesian methods for high dimensional models — convergence issues and computational challenges;
- Eurandom Chair Public Lecture, Eurandom, Eindhoven, The Netherlands, 2011: Bayesian methods for finding structures in complex data objects;
- Workshop of Bayesian Nonparametric Regression, Cambridge, UK, 2007: Dirichlet process and posterior asymptotics;

2. Invited speaker in

- International Indian Statistical Association Conference, Corvallis, OR, August 17-21, 2016;
- Statistics Research Day, Maxpoint Inc., August 10, 2016;
- World Congress on Probability and Statistics, Toronto, ON, July 11-15, 2016;
- IMS Asia-Pacific Rim Conference, Hong Kong, June 27–30, 2016;
- 3rd conference of International Society for Non-Parametric Statistics, Avignon, France, June 2016;

- Second International Conference on Statistics, Dhaka University Statistics Department Alumni Association, Dhaka, Bangladesh, December 27–29, 2015;
- 2015 IISA Conference, Pune, India, December 20–24, 2015 (special invited speaker);
- Joint Statistical Meeting, 2015, Seattle, August 2015;
- Summer Research Conference of SRCOS, Wilmington, NC, June 2015;
- Workshop on “Probabilistic techniques in modern statistics”, Oberwolfach, Germany, May 2015;
- 2014 IISA Conference, Riverside, CA, July 11–13, 2014 (also chair and session organizer);
- IMS Annual Meeting, Sydney, Australia, July 7–10, 2014 (also chair and session organizer);
- CANSSI–SAMSI Workshop: Geometric Topological and Graphical Model Methods in Statistics;
- First Conference of the International Society for Nonparametric Statistics, Chalkidiki, Greece, June 2012 (also chair and session organizer);;
- Contemporary issues and applications of statistics, Indian Statistical Institute, Kolkata, 2012.
- Workshop on “Very high dimensional semiparametric models”, Oberwolfach, Germany, 2011;
- 58th Conference of International Statistical Institute, Dublin, 2011;
- 8th Workshop on Bayesian Nonparametrics, Veracruz, Mexico, 2011;
- Frontiers of Statistical Decision Making and Bayesian Analysis - in Honor of James O. Berger, San Antonio, TX, 2010;
- IISA 2010 conference, Visakhapatnam, India, 2010;

- Calcutta Triennial Conference, Kolkata, India, 2009;
- Neural Information Processing Systems Conference, Whistler, BC, 2009;
- 7th Workshop on Bayesian nonparametrics, Turin, Italy, 2009;
- International *Indian Statistical Association meeting* 2008, Storrs, CT;
- Indian Statistical Institute Platinum Jubilee Conference, Kolkata, India, 2008;
- Bayesian Nonparametric Regression, Cambridge, U.K., 2007;
- WNAR-IMS session 2007, Irvine, CA;
- Multivariate Conference in Honor of S. N. Roy, Kolkata, India, 2006;
- Mini symposium on Bayesian nonparametrics, Storrs, 2006;
- Joint Statistical Meeting, 2006, Seattle;
- IMS Annual Meeting, 2006, Rio de Janeiro, Brazil;
- Bayesian Nonparametric Workshop, Jeju Island, Korea, 2006;
- Bayesian Nonparametric Workshop, Rome, 2004;
- Army Research Conference, Raleigh, 2002;
- IMS Annual Meeting 2002;
- 8th Vilnius conference on Probability and Statistics, Vilnius, Lithuania, 2002;
- IMS Annual Meeting, Banff, AB, 2002;
- European Meeting of Statisticians, Funchal, Portugal, 2001;
- Nonparametric Bayesian Workshop, Ann Arbor, 2001;
- Joint Statistical Meeting, Indianapolis, 2000;
- AMS-IMS-SIAM Summer Research Conference, Mount Holyoke, MA, 2000;
- International Workshop on Objective Bayesian Methodology, Valencia, 1999;

- National Seminar on Bayesian Statistics and its Applications, Varanashi, 1996;
- National Seminar on Reliability and Survival Analysis, Calcutta, 1995.

3. **Short course on**

- Bayesian Nonparametrics, 2011, EURANDOM, The Netherlands;
- Bayesian Nonparametrics, 2007, Bilkent, Turkey;
- Bayesian Nonparametrics, 2006, Luminy, France.

4. **Invited discussant at**

- Lead panel discussant in SAMSI program Bayesian nonparametrics: synergies between statistics, probability and mathematics 2015;
- O'Bayes 2015, Valencia, Spain, June 2015;
- ISBA Meeting, Kyoto, Japan, 2012;
- Objective Bayes 5, Branson, MO, June 4–8, 2005;
- 7th Valencia Meeting, Tenerife, Spain, 2002.

5. **Organizer of**

- Invited session in International Indian Statistical Association Conference, Corvallis, OR, August 17-21, 2016;
- Topic contributed session in IMS Asia-Pacific Rim Conference, Hong Kong, June 27–30, 2016;
- Invited session in 3rd conference of International Society for Non-Parametric Statistics, Avignon, France, June 2016;
- IMS Invited session in JSM 2015, Seattle, WA;
- Invited Session in 2014 IISA Conference, Riverside, CA, July 11–13, 2014;
- Invited Session in IMS Annual Meeting, Sydney, Australia, July 7–10, 2014;

- Second week workshop on Bayesian Nonparametrics, June 17–21, 2013, Leiden, The Netherlands;
- Invited Session in ISBA Regional Meeting, Varanashi, India, 2013;
- Invited session in First Conference of International Society for Nonparametric Statistics, Chalkidiki, Greece, 2012;
- Invited session in ISBA Meeting, Kyoto, Japan, 2012;
- Invited sessions in Summer Research Conference of Southern Regional Conference on Statistics, Virginia Beach, VA, 2010;
- IMS invited session “Bayes-frequentist reconciliation in large parameter spaces”, Joint Statistical Meeting, Washington DC, 2009.

6. **Contributed speaker at**

- Joint Statistical Meeting, San Diego, CA, 2012;
- Joint Statistical Meeting, Vancouver, BC, 2010;
- Joint Statistical Meeting, Washington, DC, 2009;
- Joint Statistical Meeting, Denver, CO, 2008 (topic contributed);
- IMS Annual Meeting and World Congress in Probability and Statistics, Singapore, 2008;
- Joint Statistical Meeting, Salt Lake City, UT, 2007;
- Joint Statistical Meeting, San Francisco, CA, 2003;
- Joint Statistical Meeting, New York, NY, 2002;
- 6th Purdue Symposium, West Lafayette, IN, 1998;

7. **Poster presenter at**

- Latin American Meeting on Probability and Statistics, Los Cabos, Mexico, 2005;
- Regional Meeting of ISBA, Laguna Beach, CA, 2001;
- 6th Valencia Meeting, Alcossebre, Spain, 1998.

8. **Visited**

- Leiden University, The Netherlands, 2015, 2014, 2013;
- University of Paris 7: 2015, 2013;
- Eurandom, 2012, 2010–2011;
- Nanyang Technological University, 2009;
- Utrecht University, the Netherlands, 2009, 2002;
- Collegio Alberto, Moncalieri, Italy, 2009;
- Isaac Newton Institute, Cambridge, U.K., 2007;
- Free University, Amsterdam, 2016, 2007, 2004, 2002;
- Bilkent University, Ankara, Turkey, 2007;
- Indian Statistical Institute, New Delhi, 2007;
- Indian Statistical Institute, Kolkata, 2013, 2007, 2006, 2004, 2003;
- University of Florida, Gainesville, 2003;
- University di Roma “La Sapienza”, 1999;
- University of Hyderabad, 1997, 1996;
- Indian Statistical Institute, Bangalore, 1996;
- Tata Institute of Fundamental Research, 1989.

9. Seminars at

- University of Paris 6, June 2016;
- Bayes Club, University of Amsterdam, June 2016;
- University of Texas at Austin, April 2016.
- University of Georgia, Athens, March 2016.
- Purdue University, September 2015.
- University of Paris 7, France, May 2015.
- University of Nebraska, Lincoln, March 2015.
- Rutgers University, Piscataway, November 2014.
- Temple University, Philadelphia, November 2013;

- Virginia Commonwealth University, Richmond, Department of Biostatistics, October 2013;
- University of Missouri, Columbia, Department of Statistics, October 2013;
- Division of Statistics, The Reserve Bank of India, Mumbai, August 2013;
- Applied Statistics Unit, Indian Statistical Institute, Kolkata, June 2016, December 2015, August 2013, ;
- University of Michigan, Department of Statistics, February 2013;
- Yale University, Department of Statistics, 2012;
- Bordeaux Segalen University, France, 2011;
- Concordia University, Montreal, QC, 2011;
- University of Minnesota, Minneapolis, MN, 2011;
- George Washington University, Washington DC, 2011;
- Princeton University, 2010;
- University of Maryland, Baltimore County, 2012, 2009, 2002;
- Utrecht University, the Netherlands, 2009, 2002;
- Iowa State University, Ames, IA, 2008;
- Jawaharlal Nehru University, New Delhi, 2007;
- Indian Statistical Institute, New Delhi, 2012, 2007;
- Free University, Amsterdam, 2007, 1997–1999;
- University of North Carolina-Chapel Hill, Biostatistics, 2006;
- Carnegie Mellon University, 2005;
- University of Connecticut, 2004;
- Duke University, 2004;
- North Carolina Chapter of the American Statistical Association, 2004;
- University of Florida, Gainesville, 2003;

- University of North Carolina, Chapel Hill, Statistics, 2011, 2003;
- Case Western Reserve University, 2002;
- Bocconi University, Italy, 2002;
- EURANDOM, The Netherlands, 2011, 2010, 2002;
- Tilburg University, The Netherlands, 2001;
- University di Roma “La Sapienza”, 1999;
- Michigan State University, 1998;
- Indian Statistical Institute, Calcutta, 2007, 2004, 2003, 2001, 2000, 1999, 1990–1997;
- Indian Institute of Sciences, Bangalore, 1997;
- University of Hyderabad, 1996;
- Indian Statistical Institute, Bangalore, 1996;
- Hong Kong University of Science and Technology, 1996;

10. SAMSI program participation:

- Bayesian nonparametrics: synergies between statistics, probability and mathematics 2015;
- Low-dimensional Structure in High-dimensional Systems (2013–14);
- Analysis of Object Data (2010–11);
- Semiparametric Bayesian Inference in PKPD Analysis (2010);
- Geometry and Statistics of Shape Spaces (2007);
- High Dimensional Inference and Random Matrices (2006);
- Latent (Hidden) Variable Models in the Social Sciences (2004–05);
- Data Mining and Machine Learning (2003–04).

Society Membership

Institute of Mathematical Statistics (IMS), Bethesda, Maryland, U. S. A.
(life member).

Indian International Statistical Association (life member).

Indian Statistical Institute (life member).

International Society for Bayesian Analysis (ISBA).

American Statistical Association, 2007–2012.

Founding member of Bayesian nonparametric section of ISBA.

Founding member of International Society for NonParametric Statistics
(ISNPS).

Teaching Experience

1. North Carolina State University:

- Statistics 790: Asymptotic Statistics (developed this advanced elective course) 4 times;
- Statistics 790: Bayesian nonparametrics (developed this advanced elective course);
- Statistics 810V: Bayesian nonparametrics (developed this special topics course);
- Statistics 778: Measure theory and advanced probability I (2 times);
- Statistics 779 (new syllabus): Measure theory and advanced probability (5 times);
- Statistics 779 (old syllabus): Measure theory and advanced probability II (3 times);
- Statistics 746: Stochastic Processes (9 times);
- Statistics 361: Statistics for engineers (5 times);

- Statistics 810K: Weak convergence (developed this special topics course);
 - Statistics 740: Bayesian Inference and Analysis (3 times);
 - ST 521: Statistical Theory I (4 times);
 - ST 522: Statistical Theory II (4 times).
2. University of Minnesota, Twin Cities:
Statistics 3021: Introduction to Probability and Statistics (4 times).
3. Indian Statistical Institute, Calcutta, India:
Statistical Methods in Large Samples, Non-parametric Inference, Asymptotic Theory of Inference (3 times), *Sequential Analysis and Optimal Stopping* (3 times), *Statistical Inference II, Probability tutorial* (2 times), *Statistical Methods in Biology, Multivariate Analysis tutorial*.