

STAT 7360
Nonparametric Bayesian Models
Winter Term 2015

Class Time: Tuesday / Thursday 10:00 a.m. - 11:15 a.m.
Location: 316 Machray Hall
CRN: 26360

Instructor: Saman Muthukumarana
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Office Hours: Tuesday 1:00 - 2:30 p.m.
Thursday 1:00 - 2:30 p.m.
(Or by appointment.)

Prerequisite: You must have a fair knowledge of Bayesian inference and basic familiarity with the use of the computer and computer softwares. It is also recommended that you take STAT 7350 - Nonparametric Function Estimation prior to this course.

Assignments: Assignments are due at the beginning of class on the due date. Late assignments will not be accepted. You are encouraged to discuss your answers and computer codes with your classmates and me, but final submission must be written independently.

Final Exam: The final exam will be 3 hours in length. It will also have a take-home component.

Grading Scheme: The final grade will be determined as follows.
Assignments 50%
Final Exam 50%

Recommended Texts: The following textbooks are recommended for reading and the additional material will also be borrowing from other books and journal papers.

- *Bayesian Theory* (Second Edition), José M. Bernardo and Adrian F. M. Smith, Wiley Series (1994). (On reserve in Science Library).
- *Bayesian Nonparametrics*, J.K. Ghosh, R.V. Ramamoorthi, Springer (2003).
- *Bayesian Nonparametrics*, Nils Lid Hjort, Cambridge University Press (2010). (On reserve in Science Library).

Computing: Students should have access to the statistics packages R and BUGS. R is freely available for both Windows and Unix. You can download your own copy from R Project (CRAN) homepage at <http://www.r-project.org/>. The BUGS project at the University of Cambridge offers the BUGS language in various forms. It does both Gibbs and Metropolis-Hastings sampling and can be downloaded [here](#).

Course Outline:

- Background of Bayesian Models: Likelihood, Prior distribution, Posterior distribution, Predictive distributions
- Nonparametric Bayes: Dirichlet Process, Chinese Restaurant Process, Pólya urn construction, Stick breaking construction
- Further Topics: Inference using Simulations, Hierarchical Dirichlet Processes, Bernstein polynomials priors, model selection
- Applications