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**STAT/BIST 6494-05**

**Nonparametric Bayesian Inference in Biostatistics**

**Time and Place**: M 2:30-3:20, 3:25-4:15 and W 2:30 -3:20, AUST 344

**Instructor**: Professor Lynn Kuo, AUST 330, 860-486-2951, [lynn.kuo@uconn.edu](mailto:lynn.kuo@uconn.edu)

Office hours: M and Th 5:30 pm to 6:30 pm.

**Short Introduction**: How to choose a model at an appropriate level of complexity has been a key problem in statistical modeling. For example, the problem may be choosing the number of clusters in a mixture distribution or the number of factors in a factor analysis with a penalty function. Bayesian nonparametric methods provide a different approach which allows the data to determine the complexity of the model directly. This is why Bayesian nonparametric methods have been favored in data analysis, modern statistics, and machine learning. I will start the course with Phadia’s book on various prior processes including Dirichlet processes (DP), gamma and extended gamma, beta and beta-Stacy, Polya tree, etc. Then I will select several research articles and chapters from Hjort et al and Mitra and Müller to discuss. They include topics on correlated DP, survival analysis, biostatistics, classification and clustering, genomics, and Bayesian networks and gene interactions. I will put all the reading materials in Husky CT. I will work with each student on a research project. So a written paper and an in-class presentation on this paper are expected at the end of the semester.

**Prerequisites:** STAT/BIST 5585 and 5685 or consent of the instructor.

**Grading:** Attendance (20%), mandatory, especially for presentations given by your classmates.

Written Paper (50%) due December 14; proposal at most one page is due November 7.

Presentation (30%) at the end of the semester.

**Textbook**: No required text books.

**Recommended Textbooks**:

1. *Prior Processes and Their Applications: Nonparametric Bayesian Estimation*, by Eswar G. Phadia. Springer, 2013.
2. *Bayesian Nonparametrics*, Edited by N. L. Hjort, C. Holmes, P. Müller and S. Walker. Cambridge University Press, 2010.
3. *Nonparametric Bayesian Inference in Biostatistics*, Edited by R. Mitra and P. Müller, Springer 2015.