

**ISS SEMINAR SERIES**  
**SPRING 2009 - ELE 519**  
**ROOM B-205**

<http://www.ee.princeton.edu/seminars/iss/Spring2009/>

---

**SPEAKER:** Mokshay Madiman, Department of Statistics, Yale University  
**DATE:** Thursday, April 16th  
**TIME:** 4:30 pm  
**TITLE:** Fundamental Limits of Distributed Estimation and Multiuser Information-Theoretic Games

**ABSTRACT:** The first part of the talk focuses on fundamental limits of distributed estimation, motivated by a toy model for sensor networks. In distributed estimation, it is of interest to relate the minimax risks of estimating a parameter for users who have access to different sets of observations. We present some insights into this question in the case of a location parameter, where each user sees either the concatenation or the sum of observations from a set of sources. Surprisingly, the results are closely related to results of fundamental interpretive importance in probability, such as the fact that the entropy of the normalized sums in the central limit theorem increases monotonically to the Gaussian entropy. This part of the talk is joint work with Andrew Barron (Yale), and Abram Kagan and Tinghui Yu (University of Maryland).

The second part of the talk reviews basic notions from cooperative game theory, and exposes a fundamental duality between properties of multiuser scenarios (interpreted as games) on the one hand and information inequalities on the other. In particular, we outline how this duality can be used to understand certain well known facts about Slepian-Wolf data compression and multiple access channels. Coming full circle, we apply the game theoretic framework to the first part of the talk, and solve a resource allocation problem for our toy sensor network model.

**BIO:** Mokshay M. Madiman was born and raised in India. He received the B.Tech. degree in electrical engineering from the Indian Institute of Technology, Bombay, in 1999, and the Sc.M. and Ph.D. degrees in applied mathematics from Brown University, Providence, RI, in 2001 and 2005 respectively. He joined the Department of Statistics at Yale University, New Haven, CT, in July 2005, as a Gibbs Assistant Professor. Since July 2006, he has been an Assistant Professor in the same department, and also has a courtesy appointment in the Yale Applied Mathematics Program. For the period of January to May 2007, he was a Visiting Fellow at the Tata Institute of Fundamental Research, Mumbai, India. Professor Madiman's research interests span information theory, statistical inference, and aspects of discrete mathematics and theoretical and applied probability.

Electrical  
Engineering



**PRINCETON**