

**University of California, Irvine  
Statistics Seminar**

***Some New Perspectives on Sparse Estimation of Large  
Covariance/precision Matrices: Repeated Measurements,  
Regularization Tuning, and Covariate Adjustment***

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6011 Donald Bren Hall**

Estimating large covariance/precision matrices are fundamental problems in modern multivariate statistics. Virtually all of the existing methods in this literature assume independent samples. In the first part of the talk, I will present our recent studies of the problem of covariance matrix estimation in the presence of dependence among samples due to repeated measurements.

In the second part of this talk, we focus on Gaussian graphical Models (GGMs), where the target of estimation is the inverse of the covariance matrix (precision matrix). Despite the vast literature on sparse GGMs, the majority of current methods hinge on computationally expensive methods (e.g., cross-validation) to determine the proper level of regularization. I will introduce a completely tuning-free approach for estimating sparse GGMs.

If time allows, in the last part of the talk, I will introduce an ongoing project on covariate-adjusted GGMs, where the target precision matrix can be better estimated with the help of an additional set of adjusting covariates. Our new estimator is (to our knowledge) the first convex formulation of such problems, and thus enjoys favorable theoretical and computational properties compared with existing methods.