Statistics and Linear Models (exam scope)

Lecture 1
Definition of: likelihood function, log-likelihood function, maximum likelihood estimator.

Lecture 2
Definition of: Fisher information.
Knowing and understanding of: Theorem 2, Corollary 1, Theorem 1.

Lecture 3
Definition of: efficiency of an estimator, asymptotic efficiency of an estimator.
Knowing and understanding of: Corollary 1, Theorem 2.

Lecture 4
Definition of: minimum variance unbiased estimator, sufficient statistic.
Knowing and understanding of: factorization theorem.

Lecture 5
Knowing and understanding of: Rao-Blackwell theorem, Theorem 2.

Lecture 6
Definition of: complete statistic, regular exponential class (positive and negative example).
Knowing and understanding of: Lehmann-Scheffé theorem, Theorem 2.
III Theory of Testing Statistical Hypotheses, Section 1: Definitions 3-5.

Lecture 7
Section 1: Definitions 6-10. Section 2: Definition 1, Theorem 1, and Corollary 1.

Lectures 8
Definition of: family with monotone likelihood ratio, likelihood ratio test.
Knowing and understanding of Karlin-Rubin Theorem.

Lecture 9
Definition of: (asymptotic) likelihood ratio test, Rao score test, Wald test.
Knowing and understanding of Theorem 1.

Lecture 10
Definition of Fisher information matrix.

Lectures 11 and 12
Definition of models and related statistics from Remarks 1-3.
Knowing and understanding of Theorem 1 (distribution of quadratic forms).
Definition of a one-way ANOVA model and the solution (a form of the test statistic).

Lecture 13
Definition of the Linear Model. Knowing and understanding of Theorem 2.

Lecture 14
Knowing and understanding of: Theorem 3 and 4, the form of $\hat{b}$, and Theorem 1 (Section 4.2).