Final Exam Topic List for STA 4211

Know the meaning of the terms: factor, factor levels, experimental units, experimental factors vs observational factors, chance variation, comparative studies, randomization, paired data, blocking, crossed vs nested factors, factorial designs, nested designs, repeated measures designs.

What are the ingredients in the ANOVA method, what is ANOVA testing and how is the test conducted? What are the Tukey and the Bonferroni methods for making multiple comparisons among levels of the single factor? What are the strengths and weaknesses of each?

In a two-factor study, what is the difference between a Main Effects (Additive) Model and an Interaction Model? What is tested with ANOVA in this problem setting and how is it performed (including the sequencing of the steps)? What follow-up procedures would be used when an ANOVA is significant?

What is the problem that occurs when we have one observation per cell and what two things can we do about it? What is the purpose of the Tukey Test for Additivity? What does the Tukey model assume?

Why are blocks used in a study? What is the model used for analyzing the data from a randomized complete block design and how is the analysis performed?

What is the purpose of Analysis of Covariance? What is a covariate and what are the restrictions that we place on them? What is the ANCOVA model and how are appropriate inferences carried out?

How is a two factor study analyzed when the sample sizes are not equal? How is the model constructed? What are type I and type III sums of squares?

What is the structure of a three factor factorial design? In what sequence are the terms tested to produce the most appropriate model?

What is a random factor? How do the models change and the analyses change when you have random factors, fixed factors or mixed models? What is the structure for a randomized complete block design where blocks are a random factor? What analyses are made in this case?

In a nested design situation, know how the model is expressed in R and what to compare in ANOVA in order to analyze main and nested effects. Know what follow-up analyses to perform on sample means.

What is the nature of a repeated measures design setting? In a one factor setting with repeated measures, the data is analyzed like what previous model? How do we analyze a repeated measures setting with two factors when one is the order of presentation?

What is the nature and purpose of a Balanced Incomplete Block Design? How is this design constructed and in what sense is it balanced? Know how to analyze data from the design.

Be prepared to identify the appropriate model, to state the assumptions of the appropriate model, to read R code and output and to conduct appropriate inferences based on the R output.

Textbook Tables that should be included on your crib sheets:

25.5 25.6 25.8 26.3 27.1 27.6