Pre-requisite material: Review of statistical inference concepts such as point estimation, confidence intervals, and hypothesis testing. These concepts will be covered in a special session that will be recorded and posted on blackboard.

0. Introduction Testing Statistical Hypotheses
   This is a review of hypotheses testing given in the context of a single sample t-test. An additional review session will be conducted on Wednesday evening during the first week of class.

1. Experimental Design (completely randomized and randomized complete block designs).
   General concepts concerning the designs and situations where one design is preferable over the others.

2. One-way experiments in a CR design and their analysis
   (a) The means model, (b) The classical model, (c) ANOVA Table and tests of hypotheses.

3. Two-way Experiments
   (a) Two-way experiments in a CR design, (b) means and classical models, (c) Analysis of variance and hypothesis tests, (d) two-way experiments with one observation per cell.

4. One-way experiments in an RCB design
   (a) Analysis of variance and testing hypothesis, (b) assumptions

5. Two-way experiments in an RCB design
   (b) Analysis of variance and testing hypothesis, (b) assumptions

6. Mean comparison procedures
   (a) LSD and Tukey’s methods, (b) orthogonal contrasts, (c) regression methods

7. General Factorial Experiments
   (a) Symmetric and non-symmetric factorial experiments, (b) 2-level symmetric factorial experiments

8. Introduction to Fractional Factorial Experiments
   (a) Alias sets, (b) Design resolution

Mid-Term Test – In Class part administered and Take Home part handed out
9. Introduction to Central Composite Designs
   (a) Design components, (b) optimal design, (c) response surface fitting

Mid-Term Test – Take Home Part Due (due a week from date given)

10. Simple Linear Regression.
   (a) The regression model and assumptions, (b) Least squares estimates, (c) ANOVA table
       and testing hypothesis, (d) Type II and Type II sum of squares, (e) testing hypotheses, (f)
       confidence and prediction intervals, (g) coefficient of determination

11. Multiple regression
   (a) The regression model and assumptions, (b) Least squares estimates, (c) ANOVA table
       and testing hypothesis, (d) Multicollinearity and detecting it, (e) confidence and
       prediction intervals, (g) coefficient of multiple determination

12. Model Selection Criteria.
   (a) Adjusted R-square, (b) Mallows C_p, (c) Forward, backward, and step-wise
       procedures

13. Regression Diagnostics.
   (a) Residual plots, (b) testing for normality, (c) lack-of-fit tests

   (a) Rank-based regression, (b) Smoothing*

End-of Term Test – Take Home Part given (due Wednesday of the finals week)

15. Logistic Regression.
   (a) Logistics regression model, (b) model estimation, (c) the odds-ratio, (d) prior
       probabilities, (d) stepwise-logistics regression

Final Report of Semester Project is Due

16. Other topics of interest to students*.
   * If time permits

FINALS WEEK
End-of-Term Test – In-Class part given on date and time scheduled for the finals
End-of Term Test – Take home part is due on Wednesday of finals week