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 Office Hours: Monday, Wednesday, 3rd, 4th Periods  
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The purpose of this course is to acquaint the students with methods for analyzing data from unbalanced models with fixed, random, or mixed effects. Some emphasis will be placed on studying the effect of data imbalance on the traditional analysis of variance for such models.

### Course Content

1. A quick review concerning the analysis of variance for balanced models — distribution of sums of squares and derivation of expected mean squares.
2. Satterthwaite's approximation
3. Measures of data imbalance
4. Derivation of expected mean squares in the unbalanced case.
  - (a) Henderson's Method Three
  - (b) The Hartley-Rao procedure.
5. Exact tests for fixed-effects unbalanced models — Type I, II, III, and IV testable hypotheses.
6. The effects of imbalance in the one-way random model.
7. Analysis of the unbalanced random one-way model. The Thomas-Hultquist approximate procedure. Investigating adequacy of this approximation.
8. Unbalanced random two-way models.
  - (a) Approximate tests
  - (b) Exact tests
9. Unbalanced two-fold nested models — the approximate procedure by Cummings and Gaylor.
10. Analysis of mixed models
11. Designs for estimating variance components — the use of quantile dispersion graphs to compare design efficiencies.

### Grading Policy

	<u>Points</u>	<u>Date</u>
Test 1	100	February 20
Test 2	100	April 30 (5:30 - 7:30 P.M.)
Projects	200	

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