

ASEN 5519: Special Topics – Experimental Design and Statistical Methods  
Lecture: T/Th 2:00-3:15pm, ECCR 1B51

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This 5000 level graduate student course is aimed at examining the applied issues of designing experiments and performing statistical analyses to reach justified scientific conclusions. The approach will rigorously address the mathematical underpinnings of statistical tests and modeling through applied examples. Efficient and appropriate experimental design approaches will be integrated with statistical analysis techniques to enable application to real-world research questions. A special focus will be placed on the unique challenges of human subject experiments. Statistical software (e.g., R) will be used extensively.

5 k ]XY fUb [ Y cZ hcd] Wg k ]` VY Wcj YfYX hc dfcj ]XY UÍ cbY ghcdÍ `cj Yfj ]Yk `cZ ghU gh] Wg Zcf` the engineer. This includes data visualization, hypothesis formulation, inferential statistics (e.g. t-test), briefly correlation and (multiple) regression, uncertainty and confidence intervals, ANOVA (fixed effects, random effects, and mixed), ANOVA-derived methods (e.g. ANCOVA, Nested designs), post-hoc comparisons and corrections, diagnostics and remedial measures, and best practices for reporting statistics in publication. Approaches and challenges that are common for human subject experiments will receive special attention, including repeated measures (within subjects) designs and analyses, outlier identification, non-parametric techniques, and small N approaches such as Bayesian statistics. Additional topics beyond the scope of the course will be touched upon to provide guidance for self-exploration of areas of ]bhYfYghYX `Zcf` ]bX]j ]Xi U`gDfYgYUfWk ``

Table 1 outlines the material by which student performance will be assessed. The

*Table 1: Distribution of course assessments*

Exams (2)	30%
Homework (5)	50%
Semester Project	20%
	100%

There is no required textbook for the class. An online version of the primary text, <https://mysite.science.uottawa.ca/rkulik/mat3378/mat3378-textbook.pdf> is available here:

<https://mysite.science.uottawa.ca/rkulik/mat3378/mat3378-textbook.pdf>

Readings will be assigned from other resources as needed, and will be announced at least one week in advance of the due date.

#### 4. Distance Students



