Statistics 205   (3-1-0)   Introduction to Statistical Inquiry

(see Course Descriptions under the year applicable: http://www.ucalgary.ca/pubs/calendar/)

Syllabus

Topics	Number of hours
Introduction to Probability: Sample Space, Events, Conditional Probability, Bayes Theorem, Sensitivity, Specificity, Prevalence, Odds Ratios	5
Variable Types and Data Collection: Observational Studies, Completely Randomized Experimental Designs, Confounding Variables. Data Validity. Simple Random Sampling.	2
Data Properties: Distribution, Measures of Center, Measures of Spread. Distribution Shapes, Mean, Median, Standard Deviation. Quartiles	3
Random Variables and Probability Models: The Binomial and Normal distributions. The Central Limit Theorem	3
Confidence interval estimation of the mean, the proportion (Wilson's CI for p), odds ratio	4
Testing hypotheses of the mean (T-test) and the proportion. Type I and Type II Errors. P-values	4
Two sample tests for means and proportions. Matched-Pairs Experimental Design	6
Bivariate Data. Simple Linear Regression. Chi-Square Test of Independence	5
Experimental Design and Multi Sampling Inference. Analysis of Variance (ANOVA). Tukey-Kramer Multiple Comparison Method	4
TOTAL HOURS	**36**

Course Outcomes

Expectations: A student successfully completing Statistics 205 is expected to:

1. Define a random variable; conceptualize its sample space, and calculate the likelihood of various events hat random variable(s) could produce.

2. Identify a targeted population and its corresponding target parameter. Display how various sampling methods can target a population, with minimal bias.

3. Describe and analyze a random variable's properties through a visual and numeric examination of its distribution shape, measure of centre, and measure of spread.

4. Comprehend and display the Central Limit Theorem and its implications on statistical inference via confidence interval estimation and hypothesis testing. This is to include methodology for both qualitative and quantitative data types as well as for single and multiple population comparisons.

5. Explain the correlation between bivariate data, again, for both qualitative and quantitative samples. Constructing the least-squares estimate when applicable.

6. Demonstrate how to use critical thinking, formulae, and statistical software to provide solutions for both theoretical and practical applications of course material.

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