MASTER SYLLABUS

MATH 141 - STATISTICS

Created by: Jiayuan Lin and Patrick Casselman
Updated by: Patrick Casselman
A. **TITLE:** Statistics

B. **COURSE NUMBER:** MATH 141

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE:** N/A

E. **GER CATEGORY:** 1

F. **SEMESTER(S) OFFERED:** Fall and Spring

G. **COURSE DESCRIPTION:** This course is an introduction to the standard methods of descriptive statistics, probability, and inferential statistics. Topics include: organization and presentation of data, descriptive measures of data, linear correlation and regression analysis, probability, binomial and normal probability distributions, t-distributions, estimation of parameters, and hypothesis testing. The Chi-square distribution and Chi-square applications are covered if time permits.

H. **PRE-REQUISITES/CO-REQUISITES:**

   a. Pre-requisite(s): College Algebra (MATH 121), (MATH 123) Survey of Mathematics (MATH 111), or Mathematics for Elementary Teachers II (MATH 116) with a grade of C or better, or 3 years of high school mathematics with a grade of 75 or above on the third New York State Regents mathematics examination, or permission of instructor.
   b. Co-requisite(s): N/A
   c. Pre- or co-requisite(s): N/A

I. **STUDENT LEARNING OUTCOMES:**

<table>
<thead>
<tr>
<th>Course Student Learning Outcome [SLO]</th>
<th>PSLO</th>
<th>GER</th>
<th>ISLO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Use methods of descriptive statistics to create visual displays</td>
<td>N/A</td>
<td>1</td>
<td>3. Quantitative Lit./Reasoning [QTR]</td>
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<tr>
<td>b. Compute common statistical measures, including mean, median, mode, variance, and standard deviation</td>
<td>N/A</td>
<td>1</td>
<td>3. Quantitative Lit./Reasoning [QTR]</td>
</tr>
<tr>
<td>c. Use linear regression to find the equation of the regression line to predict y-values</td>
<td>N/A</td>
<td>1</td>
<td>3. Quantitative Lit./Reasoning [QTR]</td>
</tr>
<tr>
<td>d. Solve probability problems using addition and multiplication rules</td>
<td>N/A</td>
<td>1</td>
<td>3. Quantitative Lit./Reasoning [QTR]</td>
</tr>
<tr>
<td>e. Solve probability problems using binomial distribution</td>
<td>N/A</td>
<td>1</td>
<td>3. Quantitative Lit./Reasoning [QTR]</td>
</tr>
<tr>
<td>f. Solve probability problems using normal distribution</td>
<td>N/A</td>
<td>1</td>
<td>3. Quantitative Lit./Reasoning [QTR]</td>
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<td>Create confidence intervals to estimate the population mean using normal and t-distributions</td>
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<tr>
<td>h. Perform a hypothesis test for the population mean</td>
<td>N/A</td>
<td>1</td>
<td>3. Quantitative Lit./Reasoning [QTR]</td>
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<thead>
<tr>
<th>KEY</th>
<th>Institutional Student Learning Outcomes [ISLO 1 – 5]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISLO #</td>
<td>ISLO &amp; Subsets</td>
</tr>
<tr>
<td>1</td>
<td>Communication Skills</td>
</tr>
<tr>
<td></td>
<td>Oral [O], Written [W]</td>
</tr>
<tr>
<td>2</td>
<td>Critical Thinking</td>
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<tr>
<td></td>
<td>Critical Analysis [CA], Inquiry &amp; Analysis [IA], Problem Solving [PS]</td>
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<tr>
<td>3</td>
<td>Foundational Skills</td>
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<tr>
<td></td>
<td>Information Management [IM], Quantitative Lit./Reasoning [QTR]</td>
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<tr>
<td>4</td>
<td>Social Responsibility</td>
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<td></td>
<td>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</td>
</tr>
<tr>
<td>5</td>
<td>Industry, Professional, Discipline Specific Knowledge and Skills</td>
</tr>
</tbody>
</table>

J. **APPLIED LEARNING COMPONENT:** Yes _____ No x ____


L. % **REFERENCES:** N/A

M. % **EQUIPMENT:** Smart Classroom (computer projection and access to the internet). A graphing calculator is required for this course.

N. % **GRADING METHOD:** A-F

O. % **SUGGESTED MEASUREMENT CRITERIA/METHODS:**
- Homework
- Quizzes
- Tests
- Participation
P. DETAILED COURSE OUTLINE:

I. Organizing and Presenting Sets of Data
   A. Sampling
   B. Grouped and ungrouped data
   C. Histograms, bar charts, etc.

II. Analysis of Data - The Common Statistical Measures
   A. Standard statistical measures including, mean, median, mode, variance,
      coefficient of variation, standard deviation, range, quartiles and percentiles.
   B. Requirements of the Normal Set (Empirical Rule)

III. Regression and Correlation of Paired data
   A. Types of correlation (strong, weak, positive, negative)
   B. Correlation coefficient
   C. Linear Regression

IV. Elementary Probability
   A. Additional and Multiplication Rules
   B. Conditional Probability and Independence
   C. Requirements of a Probability Distribution

V. Probability Distributions - Binomial and Normal
   A. The Binomial Distribution
   B. The Normal Distribution
   C. Distribution of sample means and the Central Limit Theorem

VI. Estimation of Parameters
   A. Confidence intervals for the mean.
   B. Sample Size.
   C. Confidence interval for paired differences.
   D. Confidence interval for proportion, large and small samples.
   E. Confidence interval for difference of proportion (optional).

VII. Hypothesis Testing
   A. The components and methods of hypothesis testing.
   B. Type I and Type II errors.
   C. Hypothesis test for the mean.
   D. Hypothesis test for the difference of two means.
   E. Hypothesis test for a proportion, large and small samples.
   F. Hypothesis test for difference of proportions (optional).

VIII. Additional Topics at Instructor's Discretion
   A. Chi-Square test for a table of data.
   B. Chi-Square test for a row of data, (goodness of fit).
   C. Testing and Estimating the Standard Deviation (F distributions)
   D. Analysis of the Variance, (ANOVA test).

Q. LABORATORY OUTLINE: N/A