Math 128
Elementary Statistics

Course Description
This is a first course in statistics focusing on statistical reasoning and the solving of problems using real-world data. Included are: data collection processes, frequency distributions, measures of position and variation, basic probability theory, probability distributions and the normal curve, correlation and least-squares regression, and confidence intervals and hypothesis tests using p-values. A statistical software package will be used.

Illinois Articulation Initiative (IAI) number: M1 902

Credit and Contact Hours:
Lecture   **4**
Lab   **0**
Credit Hours   **4**

Prerequisites: Satisfactory placement test score or grade of "C" in Math 098 or equivalent.

Books, Supplies, and Supplementary Materials

A.   **Required Textbooks**
              MyMathLab Direct Digital Access. The eText is included in MyMathLab so if you are comfortable reading the textbook on the computer, you may use the eText alone. **There is no need to purchase a physical textbook for this course; the direct digital access fee for the eText was included in your course fees. Registration instructions are posted in our iCampus/Canvas site.**

B.   **Other Required Materials**
              StatCrunch

C.   **Methods of Instruction:**
              Lecture, Hybrid, or Online

General Education Student Learning Outcome
1. Quantitative Literacy: Students possess the ability to reason and solve quantitative problems from an array of contexts.

Course Learning Outcomes (CLOs)
1. Students should recognize and be able to explain the central role of variability in the field of statistics.
2. Students should be able to produce graphical displays and numerical summaries and interpret what these do and do not reveal.
3. Students should recognize and be able to explain the central role of randomness in designing studies and drawing conclusions.

4. Students should demonstrate an understanding of, and ability to use, basic ideas of statistical inference, both hypothesis tests and interval estimation, in a variety of settings.
5. Students should be able to interpret and draw conclusions from standard output from statistical software.

Lesson Learning Outcomes (LLOs)

1. Define data collection techniques including observational studies and design of experiments.
2. Identify appropriate sampling methods.
3. Differentiate qualitative and quantitative data graphically. This includes graphs such as bar plots, histograms, and dot plots.
4. Calculate measures of central tendency for data.
5. Explain the concept of resistance.
6. Decide which measure of central tendency to report for various data sets.
7. Determine measures of dispersion for data.
8. Determine standard scores, percentiles, and quartiles.
9. Identify outliers using quartiles.
10. Interpret boxplots.
11. Evaluate the linear correlation coefficient for bivariate quantitative data.
12. Evaluate whether the coefficient is significant at a given level.
13. Explain the difference between correlation and causation.
14. Determine the least-squares regression equation for a given set of bivariate data.
15. Predict values of the dependent variable using the least-squares regression equation.
16. Interpret the slope and intercept of the least-squares regression equation.
17. Test the requirements of the least-squares regression model using residual analysis.
18. Determine and interpret the coefficient of determination.
19. Graphically analyze bivariate quantitative data for outliers and influential observations.
20. Describe the association between two qualitative variables using conditional distributions.
21. Explain Simpson's Paradox.
22. Apply probability rules for union, intersection, and complementary events.
23. Differentiate between dependent and independent events.
24. Estimate probabilities using simulations.
25. Determine mean, variance, and standard deviation for given discrete probability distributions.
26. Determine probabilities of events using binomial distributions.
27. Determine probabilities of events using the normal model.
28. Describe sampling distributions of the sample mean and sample proportion.
29. Determine probabilities corresponding to random variables using the appropriate distribution.
30. Interpret confidence intervals for one population proportion.
31. Interpret confidence intervals for one population mean.
32. Interpret confidence intervals for two population proportions.
33. Interpret confidence intervals for two population means.
34. Define Type I and Type II errors.
35. Explain a Type I or Type II error in context of a problem.
36. Construct hypothesis tests for one population mean.
37. Construct hypothesis tests for one population proportion.
38. Construct hypothesis tests for two independent population means.
39. Construct hypothesis tests for two dependent population means.
40. Construct hypothesis tests for two population proportions.
41. Evaluate Goodness-of-Fit tests.
42. Evaluate Chi-Square tests for independence between two qualitative variables.
43. Evaluate Chi-Square tests for the homogeneity of proportions.
44. Use *StatCrunch and online applets* to analyze data and perform simulations.
45. Determine when statistical results can be generalized to the population.
46. Determine when cause-and-effect conclusions can be inferred from a statistical study.

Final Course Grading Scale

Grade	Percentage
A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	lower than 60%

Faculty Commitment

Faculty members are committed to providing a quality learning experience through thoughtful planning, implementation, and assessment of course activities. They are also committed to being readily available to students throughout the semester by returning e-mails and phone calls within 48 hours and to returning graded course work within a week. Furthermore, they are committed to selecting appropriate course materials and making them available in an organized and timely manner.

Student Commitment

For every credit hour a student is enrolled in, they should expect to spend at least 2 hours outside of class studying, working on assignments, and preparing for class each week of the fifteen-week semester. For example, for this four credit-hour class, students can expect to spend four hours per week in class actively engaged in learning the material by participating in face-to-face classes or viewing lectures and instructional material online. In addition, students should expect to spend another eight hours per week outside of class completing homework and assignments, posting to discussion boards online, or studying for quizzes and tests. This means students should spend a minimum of 12 hours per week engaged in achieving the learning outcomes for this course. If you are not achieving your desired results in this class, you should consider increasing your prep time outside of class, in addition to using available resources such as instructor office hours and tutoring services.

By registering for this course, you commit yourself to active participation in course activities as well as the submission of all assignments and exams on time. Furthermore, you commit to accessing the course site and checking your JJC e-mail several times a week.