JOLIET **JUNIOR COLLEGE** —1901— *Dept. of Mathematics*	*Math 128 Elementary Statistics* *Spring 2018*

Instructor's Name:

Office Location:

Office Hours:

Office Phone:

E-mail:

Course Description

This is a first course in statistics focusing on mathematical reasoning and the solving of real-life problems. Included are: frequency distributions, measures of position and variation, basic probability theory, probability distributions and the normal curve, statistical inference, correlation and regression, f-test, and analysis of variance. Both a graphing calculator and 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.   **Textbooks**

Required:	Statistics: Informed Decisions (w/CD) 5th Edition; 2016, Sullivan, ISBN: 9780134133539, Prentice-Hall
or	
	Statistics: Informed Decisions (Set: Text/CD/*MyStatLab*), 5th Ed., 2016, Sullivan, ISBN: 9780134135366, Pearson/Prentice-Hall
or	
	MyMathLab for Sullivan/Woodbury Interactive Statistics Set, 2014, Sullivan, ISBN: 9780134081229, Pearson/Prentice-Hall
or	Introduction to Statistical Investigations, 2016, Tintle ISBN: 9781118172148, Wiley

B.   **Other Required Materials**

TI-83+ or TI-84+ graphing calculator or StatCrunch

Methods of Instruction:

Lecture
Online

Student Learning Outcomes: General Education Student Learning Outcomes:
Students will demonstrate the ability to accurately apply correct mathematical methods and techniques in various applications such as applied sciences, theoretical mathematics, physics, natural sciences and other applied sciences.

Objectives
Upon completion of this course, the student will be able to:

1. Understand data collection techniques including observational studies and design of experiments.
2. Recognize appropriate sampling methods.
3. Describe qualitative and quantitative data graphically. This includes graphs such as bar plots, pie charts, histograms, dot plots, and stem-and-leaf plots.
4. Calculate measures of central tendency for data. Explain the concept of resistance. Decide which measure of central tendency to report for various data sets.
5. Calculate measures of dispersion for data.
6. Calculate standard scores, percentiles, and quartiles. Use quartiles to identify outliers.
7. Construct and interpret boxplots.
8. Apply probability rules for union, intersection, and complementary events.
9. Determine whether a given pair of events is independent.
10. Compute conditional probabilities.

11. Estimate probabilities using simulations.
12. Find mean, variance, and standard deviation for given discrete probability distributions.
13. Calculate probabilities of events using binomial distributions and the normal model.
14. Find probabilities for binomial random variables using the normal approximation.
15. Describe sampling distributions of the sample mean and sample proportion. Use the appropriate distribution to find probabilities corresponding to these random variables.
16. Calculate and interpret confidence intervals for a population mean.
17. Determine minimum sample size in estimating μ given a margin of error, standard deviation, and level of significance.
18. Calculate and interpret confidence intervals for a proportion.
19. Determine a minimum sample size in estimating a population proportion given a margin of error and a level of significance.
20. Understand and define Type I and Type II errors.

21. Formulate null and alternative hypotheses for testing statements about population means (one and two-tailed); to perform such tests using t-distributions at a given level of significance.
22. Use P-values in hypothesis testing.
23. Formulate null and alternative hypotheses for testing statements about proportions (one and two-tailed), and perform such tests using a normal distribution and a given level of significance.
24. Formulate null and alternative hypotheses concerning the equality of the means of two populations for both dependent and independent samples; to determine the appropriate test and perform such a test for given sample data.
25. Calculate and interpret confidence intervals and conduct hypotheses for the difference of two population means for both dependent and independent samples.
26. Formulate null and alternative hypotheses for testing statements about equality of two independent proportions, and perform such tests using a normal model. Emphasis is on the P-value approach.
27. Calculate and interpret confidence intervals for the difference of two population proportions given data from two independent samples.
28. Calculate the linear correlation coefficient for bivariate quantitative data; determine whether the coefficient is significant at a given level. Explain the difference between correlation and causation.

29. Determine the least-squares regression line for a given set of data pairs and to use this equation to make predictions. Interpret the slope and intercept of the least-squares regression line.
30. Test the requirements of the least squares regression model using residual analysis. Find and interpret the coefficient of determination.

31. Graphically analyze bivariate quantitative data for outliers and influential observations.
32. Describe the association between two qualitative variables using conditional distributions.
33. Explain Simpson's Paradox.
34. Use the simple linear regression equation and correlation coefficient to determine prediction intervals for y, explained variation, unexplained variation, coefficient of determination, and standard error of estimate. Test the significance of the slope in a least-squares regression.
35. Perform Goodness-of-Fit tests.
36. Perform Chi-Square tests for independence between two qualitative variables.
37. Perform Chi-Square tests for the homogeneity of proportions.
38. Test the equality of three or more population means using one-way analysis of variance using.
39. Use *StatCrunch*, MINITAB, *Excel*, or some other statistical software to analyze data and perform simulations.
40. Use a graphing calculator or statistical software to analyze data. Suggested applications include: drawing histograms; finding measures of central tendency; performing simulations to give approximate values for probabilities; drawing boxplots, histograms, normal probability plots and scatter diagrams; using the binomial probability formula; finding z values from a given area or probability; calculating test statistics and confidence intervals for data sets; determining correlation and regression; calculating the chi-square test statistic for multinomial experiments; calculating analysis of variance.

TOPICAL OUTLINE

Section	Title	Reading Assignment
1.1	Introduction to the Practice of Statistics	All
1.2	Observational Studies and Designed Experiments	All
1.3	Simple Random Sampling	All
1.4	Other Effective Sampling Methods	All
1.5	Sources of Error in Sampling	All
1.6	The Design of Experiments	Objectives 1 – 4 only
2.1	Organizing Qualitative Data	All
2.2	Organizing Quantitative Data	All
2.4	Graphical Misrepresentations of Data	All
3.1	Measures of Central Tendency	All
3.2	Measures of Dispersion	All
3.3	Measures of Central Tendency and Dispersion from Grouped Data	All
3.4	Measures of Position	All
3.5	The Five-Number Summary	All
4.1	Scatter Diagrams and Correlation	All
4.2	Least-Squares Regression	All
4.3	Diagnostics on the Least-squares Regression Line	All

4.4	Contingency Tables and Association	All
5.1	Probability Rules	All
5.2	The Addition and Complement Rule	All
5.3	Independence and the Multiplication Rule	All
6.1	Discrete Random Variables	All
6.2	The Binomial Probability Distribution	All
7.1	Properties of the Normal Distribution	All
7.2	Applications of the Normal Distribution	All
7.3	Assessing Normality	All
8.1	Distribution of the Sample Mean	All
8.2	Distribution of the Sample Proportion	All
9.1	The Logic in Constructing Confidence Intervals	All
9.2	Confidence Intervals about a Population Proportion	All
9.3	Confidence Intervals about a Population Mean	All
9.4	Putting It All Together	All
10.1	The Language of Hypothesis Testing	All
10.2	Hypothesis Tests for a Population Proportion	All
10.3	Hypothesis Tests for a Population Mean	All
10.4	Putting It All Together	All
11.1	Inference about Two Population Proportions	All
11.2	Inference about Two Means: Dependent Samples	All
11.3	Inference about Two Means: Independent Samples	All
11.4	Putting It All Together	All
12.1	Goodness of Fit Test	All
12.2	Tests for Independence and the Homogeneity of Proportions	All
13.1	Comparing Three or More Means	All
14.1	Testing the Significance of the Least-squares Regression Model	All
14.2	Confidence and Prediction Intervals	All

Graded Assignments and Policies

Graded Assignments

Grading Policy
The individual instructor will determine which items he or she considers essential for the student to memorize without error and test accordingly. The individual instructor will determine the types of projects that the student will complete during the class.

Each instructor will set minimum standards for performance on tests.

Grading should fall within these ranges:
In Class Quizzes   0 – 20%

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Mathematics Department

Participation	0 - 5 %
Projects	0 – 20%
Homework	0 – 30%
Tests	50 - 85%
Final	15 – 30%

Major Tests and Quizzes

The individual instructor will determine which items he or she considers essential for the student to memorize without error and test accordingly. Each instructor will set minimum standards for performance on tests. A comprehensive final examination will be given.

Classroom Policies and Procedures

General Information

Attendance Policy

Make-up Policy

Extra-credit Policy

Final Exam Information

A comprehensive proctored final examination will be given according to the JJC final exam schedule. All students are required take the final exam as part of his/her grade. If a student does not take the final exam, a zero is the final exam score.

Academic Honor Code

The objective of the academic honor code is to sustain a learning-centered environment in which all students are expected to demonstrate integrity, honor, and responsibility, and recognize the importance of being accountable for one's academic behavior.

College Statement about grades of "F" and Withdrawal from Class

Students may withdraw from a course by processing an add/drop form during regular office hours through the Registration and Records Office at Main Campus or Romeoville Campus, or by phone at 815-744-2200. Please note the withdrawal dates listed on your bill or student schedule. Every course has its own withdrawal date. Failure to withdraw properly may result in a failing grade of "F" in the course.

At any time prior to the deadline dates established, an instructor may withdraw a student from class because of poor attendance, poor academic performance or inappropriate academic behavior, such as, but not limited to, cheating or plagiarism.

Intellectual Property

Students own and hold the copyright to the original work they produce in class. It is a widely accepted practice to use student work as part of the college's internal self-evaluation, assessment procedures, or other efforts to improve teaching and learning and in promoting programs and recruiting new students. If you do not wish your work to be used in this manner, please inform the instructor.

Student Code of Conduct

Each student is responsible for reading and adhering to the Student Code of Conduct as stated in the college catalog.

Sexual Harassment Joliet Junior College seeks to foster a community environment in which all members respect and trust each other. In a community in which persons respect and trust each other, there is no place for sexual harassment. JJC has a strong policy prohibiting the sexual harassment of one member of the college community by another. See the Catalog or Student Handbook.

Student Support http://jjc.edu/services-for-students/pages/default.aspx

a. Disability Services: http://www.jjc.edu/disability-services/Pages/default.aspx.
    Student Accommodations and Resources (StAR): If you need disability-related accommodations, specialized tutoring, or assistive technology in this class, if you have emergency medical information you wish to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class. New students should request accommodations and support by scheduling an appointment with the Student Accommodations and Resources (StAR) Office, Campus Center 1125, (815) 280-2230.

b. Tutoring: http://jjc.edu/tlc/Pages/default.aspx

c. Counseling and Advising: http://www.jjc.edu/counselingadvising/Pages/default.aspx

d. Academic Resources: http://www.jjc.edu/academic-resources/Pages/default.aspx

e. Support Programs and Services:
    http://www.jjc.edu/support-programs-services/Pages/default.aspx

f. Technology Support: http://jjc.edu/services-for-students/Pages/technology-support.aspx

g. My Degree Progress: My Degree Progress is a computerized system to track a student's progress toward graduation. The report indicates every course and places these courses into their appropriate category as a General Education, Major Course, or Elective, according to the degree requirements. This tool is useful for preparing before an advising appointment, for planning, for registering, and for checking that the student is on track for graduation. https://eresources.jjc.edu

* Instructor reserves the right to modify, add to or change the syllabus. Any changes to the syllabus or schedule will be announced in class.

Math 128 Weekly Schedule

Week One 1/11	1.1 – 1.6
Week Two 1/18	2.1, 2.2, 3.1
Week Three 1/25	3.2 – 3.5
Week Four 2/1	Exam #1
Week Five 2/8	4.1 – 4.3
Week Six 2/15	4.4; 5.1 - 5.2
Week Seven 2/22	5.3; 6.1 – 6.2
Week Eight 2/29	Exam #2
Week Nine 3/7	7.1 – 7.3; 8.1
Week Ten 3/21	8.2; 9.1
Week Eleven 3/28	9.2, 9.3; 10.1
Week Twelve 4/4	10.2 - 10.4
Week Thirteen 4/11	Exam #3
Week Fourteen 4/18	11.1 – 11.4
Week Fifteen 4/25	12.1, 12.2, 13.1
Week Sixteen 5/2	14.1, 14.2
Week Seventeen 5/9	Final Exam

Prepared by: Reviewed by:

Prof. Michael Sullivan   Prof. Jean McArthur
Mathematics Department   Department Chair   Date

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