STAT 210: Statistics

Fall 2017

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**Prerequisites**:

MATH 140, MATH 212, or consent of instructor. Please note that STAT 210 is a first course in statistics.

**Homework/Quizzes**:

Homework assignments may be given throughout the course. Questions on the assigned homework should be asked at the beginning of each class period. I may collect some homework assignments. I strongly encourage you to stay current in your homework assignments. Late homework assignments will not be accepted in this class.

In addition to homework, there may be some quizzes given throughout the semester. Each quiz will be worth 20 points. About half of the quizzes will be done in groups with the remaining being individual quizzes. I will not announce the type (individual or group) beforehand. There is no makeup for missed quizzes.

**Exams**:

There will be a midterm exam and a final exam in this course. These exams will likely consist of an in-class portion and out-of-class portion. I will test your true understanding of material presented in class. Exams will evaluate your ability to make conclusions and/or extensions to the methods/techniques presented in class. If you know you are going to miss an exam, the exam must be taken early. Makeup exams will be given in extreme (my judgment) cases only.

**Grades**:

Your grade will be determined by your performance on exams, quizzes, homework.  My “target” for the number of points is: midterm = 125 pts, final exam 125 pts, homework/quizzes 200pts. I do no weighting, so a point is worth a point in this class.  Your final grade will be determined using the following percentages.

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| Your Percentage | Grade |
| greater than 90%    | A |
| 80% - 90% | B |
| 70% - 80% | C |
| 60% - 70% | D |
| less than 60% | F |

**Learning Outcomes**

Students who successfully complete STAT 210 will be able to:

1. Understand the relationship between posed scientific question(s) and provided data;
2. Summarize key data features, using statistical software to provide appropriate graphical or numerical summaries;
3. Understand limitations and potential of data sets as they relate to the posed scientific question(s) due to data collection methods or data quality;
4. Be able to understand and recommend various statistical techniques to answer the posed scientific question(s) and carry out these analyses using statistical software;
5. Clearly communicate descriptive and inferential results in a way that is suitable for someone with little or no statistics background

**Academic Integrity Policy**

The Academic Integrity Policy at Winona State University can be found here: <http://www.winona.edu/sld/academicintegrity.asp>. Copying another student’s work and/or allowing someone to copy your work are clear violations of WSU’s Academic Integrity Policy. If there is reasonable evidence of copying another individual’s or group’s work, it will be construed as an act of plagiarism. The first occurrence of cheating will result in a score of zero on that specific homework assignment or exam portion; the second occurrence will result in failure of the course.

**Extras**:

* I encourage you to use a 3-ring binder for this class because class material will be a combination of note taking, handouts, and possible some computer output.
* Attendance in mandatory.  If you miss class, it is your responsibility to get the material and get yourself caught up.
* If necessary, I reserve the right to make policy changes for this course as the semester progresses.

The following is the official course outline for this course.  My goal is to cover most of these topics, but not necessarily in the order given.

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| OUTLINE OF MAJOR CONTENT AREAS1. The Research Process
2. The research question/hypothesis and the predictor, response, and population of interest
3. The role of random samples; population vs. sample
4. Types of studies
	1. experiments and the role of randomization
	2. observational studies and effects of confounding
	3. surveys and possible biases
5. Data Displays and Summary Statistics
6. Categorical variables
	1. bar charts
	2. frequency distributions
7. For numeric variables
	1. measure of central tendency: mean/average, median
	2. measures of variation: variance, standard deviation, interquartile range
	3. robustness
	4. histograms and boxplots
8. Contingency tables
	1. row/column percentages
	2. relative risk, difference between proportions, and odds ratios
	3. relationships in r x c tables
9. Scatterplots
	1. measures of correlation
	2. simple linear regression
10. Introduction to Sampling Distributions
	1. Statistics vs. parameters
	2. Sampling errors
	3. The importance of random samples
11. Confidence Interval Estimation
	1. One-sample confidence intervals
		1. Inference about a single proportion
		2. Inference about a single mean
	2. Two-sample confidence intervals
		1. Inference about a difference between two proportions
		2. Inference about relative risks
		3. Inference about a difference between means
	3. Paired-sample confidence interval, involving inference about a mean difference
12. Hypothesis Testing
	1. Logic of hypothesis tests
	2. Formulating hypotheses
	3. P-values, type I & type II errors
	4. Interpretation of results
		1. association vs. causation
		2. description of a sample vs. inference about a population
		3. statistical vs. practical significance
13. Comparative Analysis
	1. Independent samples
		1. difference between proportions
		2. difference between means
		3. Mann-Whitney-Wilcoxon Test
	2. Paired-sample tests
		1. paired-sample t-test
		2. Wilcoxon signed-rank test
	3. Tests for contingency tables
		1. Fisher's Exact Test for 2x2 tables
		2. ii. Chi-square test
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