

Psyx 222 Psychological Statistics Fall 2011 Syllabus

Instructor: Judith A. McLaughlin, PhD

Room & Time: LA 302, MWF 9:20-10:20 a.m.

Office & Hours: TR 9:15-10:15 a.m.
LA 505, 657-2961 or 657-2242; email: jmclaughlin@msubillings.edu

Text: McLaughlin, J. A. *Understanding Statistics in the Behavioral Sciences*.
Wadsworth, 2002.

Equipment: Battery-operated calculator that performs at least the standard arithmetic operations and square roots.

Web Page: A copy of the course syllabus is available in PDF format at
www.msubillings.edu/CASFaculty/mclaughlin/

Course Objective: This course is designed to enable students to analyze appropriately and interpret the results of psychological research.

Prerequisites: This course has as a prerequisite competence in statistics at the level of Stat 141.

Examinations:

There will be four in-class unit exams. Students may bring one 8x10.5" page of notes to the exam. Students are responsible for all material presented in class. Students may make up exams either before the class period following the exam or during the final exam period. Only one makeup exam may be taken during the final exam period. Tentatively, each exam will cover three chapters in the text and will be worth 100 points.

Grading:

The maximum number of points possible on the four exam grades is 400. In addition to exams, students may earn 1/2 point extra credit for each day attending class, for a maximum of 20 points. These points will be added to the final point total, potentially raising the final grade by up to one-half letter grade. It is the student's responsibility to sign the attendance sheet at the beginning of class. Note that all work must be completed by the final exam period. No work will be accepted after that time.

Final grades will be assigned as shown below.

A	360 points or more (90% or higher)
B	320 to 359 points (80 - 89.9%)
C	280 to 319 points (70 - 79.9%)
D	240 to 279 points (60 - 69.9%)
F	239 or fewer points (59.9% or lower)

Tentative Schedule

Please note that this schedule is tentative! The instructor reserves the right to change this schedule in the interest of the academic needs of the class.

MONDAY	WEDNESDAY	FRIDAY
	9/7 Intro to class	9/9 2: Measurement
9/12 2: Measurement	9/14 2: Measurement	9/16 3: Tables/Graph
9/19 3: Tables/Graph	9/21 4: Central Tendency	9/23 4: Central Tendency
9/26 4: Central Tendency	9/28 Review	9/30 EXAM 1
10/3 5: Variability	10/5 5: Variability	10/7 5: Variability
10/10 6: Relative Standing	10/12 6: Relative Standing	10/14 7: Normal Distribution
10/17 7: Normal Distribution	10/19 Review	10/21 EXAM 2
10/24 8: Correlation	10/26 8: Correlation	10/28 8: Correlation
10/31 18: Correlation	11/2 11: Sampling Distributions	11/4 11: Sampling Distributions
11/7 11: Sampling Distributions	11/9 Review	11/11 VETERANS DAY No Classes
11/14 EXAM 3	11/16 12: Hypothesis Testing	11/18 12: Hypothesis Testing
11/21 14,15,18: Testing Correlations	11/23 Thanksgiving No Classes	11/25 Thanksgiving No Classes
11/28 Testing Correlations	11/30 13: One-Sample Tests	12/2 13: Two-Sample Tests
12/5 13: Two-Sample Tests	12/7 Review	12/9 EXAM 4
<p>Wednesday, 12/14 8:00–9:50 a.m Final Exam Period: Makeup Exams</p>		

Learning Objectives

Chapter 2: Research and Measurement

- Define and be able to identify/give examples of the following: population, sample, parameter, statistic, variable, constant, unit of measurement, continuous variable, discrete variable
- Compute the lower real limit and upper real limit for a given value
- Define and be able to identify/give examples of each of the four scales of measurement

Chapter 3: Frequency Tables and Graphs

- Define and differentiate between the following: a distribution, a theoretical distribution, a frequency distribution
- Correctly construct the following types of tables: frequency table, relative frequency table, cumulative frequency table, relative cumulative frequency table
- Correctly construct the following graphs: bar graphs, frequency histograms, frequency polygons.
- Identify the types of data for which each of the above graphs is appropriately used, and explain why.

Chapter 4: Measures of Central Tendency

- Compute the following: $\sum X$, $\sum X^2$, $(\sum X)^2$
- Correctly round a given value either up or down and to the correct place.
- Calculate the mean of a distribution
- Calculate the median of a distribution from raw data, using the precise formula.
- Find the mode(s) of a given distribution.
- Explain in what way the mean, median, and mode are the center of a distribution.
- Describe and be able to identify/give examples of distributions for which each of the measures of central tendency are appropriate to use.

Chapter 5: Measures of Variability

- Calculate the range of a given distribution.
- Explain why the average deviation from the mean and the average absolute deviation from the mean are not generally used as measures of variability
- Describe the relationship between the variance and standard deviation.
- Differentiate between formulas for a population and sample standard deviation and use appropriately.
- Calculate the standard deviation using the definitional formula and using the computational formula..

Chapter 6: Measures of Relative Standing

- Describe how the standard deviation is used as a unit of measurement for standard scores.
- Describe how a standard score (z score) measures the relative standing of a score.
- Convert a distribution of raw scores to standard scores
- Convert a distribution of standard scores back to the original measurement scale.
- Convert a distribution of raw scores to a different measurement scale.
- Be able to compare the relative standing of two scores in the same distribution and of two scores in different distributions.
- Calculate the percentile rank of a score value.

Chapter 7: The Normal Distribution

- Explain why the normal distribution is considered a theoretical distribution.
- Explain when it is and is not appropriate to use the normal distribution table.
- Use the normal distribution table to determine the proportion of scores in a normal distribution: (a) above a given value, (b) below a given value, (c) between two given values, (d) within a given standard deviation of the mean, and (e) beyond a given standard deviation of the mean.
- Use the normal distribution table to determine the value in a distribution: (a) above which a given proportion of scores lie, and (b) below which a given proportion of scores lie.
- Use the normal distribution table to determine the values in a distribution that cut off: (a) a given proportion of scores around the mean, and (b) a given proportion of scores farthest from the mean.

Chapter 8: Measures of Linear Correlation & Chapter 18: Chi Square

- Explain what a correlation is and differentiate between linear and non-linear correlations.
- Define and identify/give examples of the following: a positive correlation, a perfect positive correlation, a negative correlation, a perfect negative correlation, and a null correlation.
- Identify the component of a correlation coefficient that indicates: (a) the direction of the relationship and (b) the magnitude of the relationship.
- Calculate Pearson's product-moment correlation coefficient.
- Identify factors that affect the size of Pearson's coefficient.
- Calculate Spearman's rank-order correlation coefficient.
- Calculate chi square.
- Identify characteristics of distributions for which it is appropriate to use each measure of correlation.
- Explain why evidence of a correlation does not prove causation.

Chapter 11: Sampling Distributions

- Differentiate between a distribution of scores and a sampling distribution.
- Explain why a sampling distribution is considered a theoretical distribution.
- Construct a distribution of sample proportions and calculate the mean and standard deviation of it.
- Construct a distribution of sample means and calculate the mean and standard deviation of it.
- Be able calculate the confidence limits from a distribution of sample proportions and from a distribution of sample means.

Chapter 12: Hypothesis Testing

- Explain in terms of populations and samples the purpose of hypothesis testing.
- Explain what the null hypothesis and alternative hypothesis predict.
- Construct the null and alternative hypotheses for the z test of a sample mean.
- Describe the difference between a unidirectional hypothesis test and a bidirectional hypothesis test.
- Explain the relevance of the level of significance, α . Determine the critical value(s) for the z test for a sample mean for the .10, .05, and .01 levels of significance.
- Be able to write the decision rule for a z test of a sample mean.
- Describe what conclusions can be drawn when the null hypothesis is and is not rejected. Explain why it is not possible to ever accept the null hypothesis.
- Following the steps outlined in the text, conduct a z test of a sample mean.

Chapter 13: Parametric Tests for One Sample

- Describe how the t test differs from the z test and identify when it is appropriate to use each.
- Describe the concept of degrees of freedom.
- Determine the critical value(s) for the t test of a sample mean at the .10, .05, and .01 levels of significance for a given sample size.
- Following the steps outlined in the text, conduct a t test of a sample mean.
- Following the steps outlined in the text, conduct a z test of a sample proportion.

Chapters 14, 15, & 18: Hypothesis Testing With Correlations

- Determine the critical value(s) for a test of Pearson's r at the .10, .05, and .01 levels of significance for a given sample size.
- Following the steps outlined in the text, conduct a test of Pearson's r .
- Determine the critical value(s) for a test of Spearman's rank-order correlation at the .10, .05, and .01 levels of significance for a given sample size.
- Following the steps outlined in the text, conduct a test of Spearman's rank-order correlation.
- Determine the critical value(s) for a test of chi square at the .10, .05, and .01 levels of significance for a given sample size.
- Following the steps outlined in the text, conduct a test of association using chi square.