

Statistical Concepts and Analysis (MTH107)

Dr. Derek H. Ogle

Fall, 2014

Description: Introduction to the concepts and interpretation of statistics. Summary graphs and statistics; data production (sampling and experiments); random variables and sampling distributions; inference - introduction, for distributions, for proportions; correlation and regression. Prerequisite: MTH103, ACT math > 17, or SAT math > 830. 4 Credits.

Outcomes: At the end of this class you will be able to ...

1. describe why statistics is central to scientific inquiry (& your field of interest);
2. define basic statistical words and symbols;
3. perform appropriate exploratory data analyses (univariate and bivariate);
4. identify the purposes of and conduct and interpret the results of a linear regression;
5. design simple experiments and sampling strategies;
6. construct and interpret confidence intervals for one and two-sample mean and proportion problems;
7. identify the appropriate hypothesis test to perform in one- and two-sample quantitative and categorical data situations;
8. construct and interpret the results from a hypothesis test for one- and two-sample quantitative and categorical data situations; and
9. communicate statistical results and ideas in a succinct and informative manner.

We will focus on the understanding of statistical concepts and proper interpretation of statistical results.

Web Page: droglenc.wordpress.com/ then select the "Teaching" menu and "Statistical Concepts" submenu.

Location: CSE 236 (computer lab)

Time: MWF 8-9:30 (section 1), 10-1130 (section 2)

Contact: CSE239; 682-1300; dogle@northland.edu

Office Hours: MWF 12-1, or by appointment

Fellow : **Jodi Supanich** (jsupanich@northland.edu) – M 12-1p, T 11a-12n, W 8-10a

Tutors: **Louis Corcoran** – Tu 7-9p ; Th 1230-230p

Young Lee – W 7-9p, Th 7-9p

Accommodations: Students in need of academic accommodation should contact Kathleen Skoraczewski, Campus Counselor and Disabilities Service Coordinator, ext. 1369, Ponzio Center Rm. 232, kskoraczewski@northland.edu.

Conduct: Your conduct in class should revolve around the idea of being respectful of me and others in the class. I will ask you to leave class if you behave disrespectfully. Adhering to the following policies should be considered the minimum requirements to being respectful of others:

- 1) Arrive to class on time. If you arrive late, then take the first available seat as quietly as possible.
- 2) Do not bring friends, children, pets, meals, or anything else to class that should not be there.
- 3) **Turn off and store out-of-sight cell phones and other electronic devices (use of personal laptops for work related to class are permitted).**
- 4) **Do not use the college or personal computers for other than assigned tasks.**
- 5) Do not engage in side discussions while I or others are speaking to the entire class.
- 6) Do not use disrespectful language when addressing others.

Textbook: I will provide a PDF document on the webpage as the text for this course. This document cannot be printed, but I will make arrangements on the first day of class for you to a hard copy (for the cost of copying) if you are interested.

Grading: An overall percentage score will be computed from the items and associated weights below:

Daily Reading Quizzes.....	7%
Homework	15%
Midterm Exams (3)	54% <i>each equally weighted</i>
Final Exam.....	24%

Lowest possible final letter grades will be assigned by comparing your overall percentage score (rounded to a whole number) to the values shown below:

		A	92-100	A-	90-91
B+	87-89	B	82-86	B-	80-81
C+	77-79	C	70-76		
D+	67-69	D	60-66	F	0-59

Quizzes: A short quiz will be given in the **FIRST** few minutes of **EVERY** class period to encourage you to complete the reading that is required for that day's class. You will be notified of the chapter, sections, or pages in the text that will be required for the class period at the end of the previous class period. Missed quizzes cannot be made up.

Each individual quiz will be graded on a 3-point basis – 3 points for the correct answer, 1 or 2 points for an answer that is not completely correct but demonstrates some understanding from the reading, and 0 points for an answer that shows little to no understanding from the reading. If you earn at least 70% on all quizzes this semester then you will earn the full 7% towards your final grade. You will also earn one percentage point of extra credit on your final grade for every ten percentage points you earn on the quizzes over 80%. For example, if you earn a 90% quiz grade, then you will have earned the full 7% for quizzes and an additional 1% extra credit on your final grade. Alternatively, if you earned 50% on the quizzes, then you will have earned only 5% (of the 7%) for quizzes and no extra credit.

Homework: The text contains many review exercises throughout each chapter and a few homework problems at the end of each chapter. All homework problems will be completed and turned in to me at times I will announce in class. All homework problems will be graded for completeness and 30-50% of the questions will be graded for content (on-line answer keys will be provided when the graded homework is returned). Review exercises may be completed with others but homework problems should be completed by you alone. ***If there is any indication, whether I can confirm it or not, that you have not worked alone on your homework then you will receive a 0 for that homework and will be warned of further penalties for subsequent offenses.***

Exams: Exams will be on **3-Oct (Fri), 24-Oct (Fri), 14-Nov (Fri), and 12-Dec (Fri)**. Make-up exams will be provided only if you have a fixed commitment of sufficient importance that was set before the beginning of the semester or a verifiable medical condition. You will not be allowed to make up an exam missed without my prior approval. The final exam will not be given early.

Participation: This course is taught in the framework of active-learning, peer-instruction, and inquiry-based pedagogies. As such, you will be asked to prepare for class prior to class by reading the text, asking and answering questions based on your reading, working in small groups with others in the class, and participating in small- and large-group discussions. Your participation in these activities is critical to your learning and, thus, your success in this course.

I will take attendance each day but will not factor attendance into your final grade with the exception that I may, at my discretion, use your attendance record as one piece of evidence when deciding to positively adjust your final grade or not.

Incomplete Grades: Under Northland College policy, an incomplete grade will be given ONLY under extreme circumstances beyond your control, such as a major illness. An incomplete grade will be given ONLY if you have successfully completed the entire course except for the final exam.

Extra Credit: There are three options to earn as much as 5% extra credit on your final grade.

Exam Reflections. – A two-part *typed* reflection on each midterm exam. The "correction" portion of the reflection should include correct answers for each question you missed along with ***an explanation of why the answer you originally provided was not correct and why the correct answer is correct.*** You will receive no credit for simply correcting your answer, for providing another incorrect answer, or saying "I have no idea why I put that answer", "I simply wrote the wrong answer", "I don't know what I was thinking", or any other non-sensical reason. You must address every question you missed to receive full credit for this portion. Your answers must be typed and easy to find (i.e., *neatly organized by question number*) and ***you must include the original exam.*** This portion is worth 2/3rd of the overall value.

The "reflection" portion should include your ***thoughtful*** reflections about the exam, including what you did well on the exam (and why), what you did not do so well on the exam (and why), what strategy you used in preparing for the exam, how you will change your strategy to prepare for the next exam, and whether you considered the exam to be fair or not. This portion should be at least one page but not more than two pages and is worth 1/3rd of the overall value.

Each reflection is worth the lesser of either 1.5% or the percentage required for your exam score to equal 100% times 0.15. For example, if Jonny and Jenny each write perfect exam reflections but Jonny had a 70% on his exam and Jenny had a 92% on her exam then Jonny will earn 1.5% extra credit and Jenny will earn $8\% \times 0.15 = 1.2\%$ extra credit.

News Item Report. – A one- or two-page *typed* paper about a news item that illustrates the use of statistics in everyday life. Your report should discuss the background of the information in the report, the use of statistics, how the statistics relate to what you've learned in class, how the statistics were presented, how you feel about that presentation, and any questions that you may have. Note that the FOCUS of your report should be on the statistics used in the news item. Two of these reports may be completed, each is worth as much as 0.5%, and both are due before **Friday, 5-Dec.**

Report on the Use of Statistics in Other Classes. – A one- or two-page *typed* paper about your use of statistics in another class at Northland. Note that the simple reporting of someone else's statistics in a report does not qualify here; this extra credit item should pertain to your collection and analysis of data. Your report should discuss the background of the project where you used statistics, what the statistics were used for (i.e., purpose), a presentation of your statistical work in the report (i.e., findings), how the statistics relate to what you've learned in class, and any questions that you may have. Note that the FOCUS of your report should be on the statistics that you used. Reports that show little focus on the statistics will receive 0 credit. Two of these reports may be completed, each is worth as much as 0.5%, and both are due before **Friday, 5-Dec.**

Tentative Schedule (Subject to Change)

Date	Topic
3-Sep	Syllabus, Why Stats is important
5-Sep	IVPPSS and Variable Types; Introduce Rstudio
8-Sep	R Introduction
10-Sep	R Introduction
12-Sep	Univariate EDA - Quantitative
15-Sep	Univariate EDA - Quantitative
17-Sep	Univariate EDA - Categorical
19-Sep	Normal Distributions
22-Sep	Normal Distributions
24-Sep	Bivariate EDA -- Categorical
26-Sep	Bivariate EDA -- Quantitative
29-Sep	Linear Regression
1-Oct	Flex Day
3-Oct	Exam
6-Oct	Linear Regression
8-Oct	Linear Regression
10-Oct	Data Production
13-Oct	Data Production; Probability
15-Oct	Sampling Distributions
17-Oct	Sampling Distributions
20-Oct	NO CLASS
22-Oct	Flex Day
24-Oct	Exam

Date	Topic
27-Oct	Inference -- Hypothesis Testing
29-Oct	Inference -- Hypothesis Testing
31-Oct	Inference -- Confidence Regions
3-Nov	Inference -- Confidence Regions
5-Nov	Inference -- 1-Sample Z-test
7-Nov	1-sample t-test
10-Nov	1-sample t-test
12-Nov	Flex Day
14-Nov	Exam
17-Nov	2-sample t-test
19-Nov	2-sample t-test
21-Nov	Goodness-of-Fit Test
24-Nov	Goodness-of-Fit Test
26-Nov	NO CLASS
28-Nov	NO CLASS
1-Dec	Flex Day
3-Dec	Chi-Square Test
5-Dec	Chi-Square Test
8-Dec	Flex Day
10-Dec	Flex Day
12-Dec	Exam