MATHEMATICS 125: Fundamentals of Statistics, CRN 20350, Section 02, Spring 2015

Instructor:	Lisa Over
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Office Hours:	**M** 2:00-4:00; **W** 2:00-3:00; **F** 11:00-12:00
Tutoring:	TA office hours will be posted on Blackboard within a couple of weeks. Tutoring lab hours are posted outside the lab.
Class Hours:	MWF 1:00-1:50
Room:	223 College Hall
Text:	*The Basic Practice of Statistics*, 6th Edition, by Moore/Notz/Fligner
Materials:	TI-30X IIS Calculator (recommended)
Website:	https://duquesne.blackboard.com
Prerequisites:	Basic Algebra skills

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Welcome to Mathematics 125: Fundamentals of Statistics! Regardless of your major, profession, or interests, you are a consumer of statistics. After all, whether on television, in newspapers, in journal articles, or in the course of daily activities, statistics are an integral part of your everyday life. For that reason, this course is designed to provide you with information regarding the computation and interpretation of statistical measures. By the end of the course, you will have developed a working knowledge of data gathering, data analysis, probability, and statistical inference. Mastery of these topics (and the others listed on the included course calendar) will allow you to:

- Gather data and samples and understand the difference between exploratory data analysis and statistical inference
- Appropriately describe data sets using numerical measures and graphical tools
- Utilize the properties of various probability distributions (e.g. Binomial, Normal)
- Calculate the probability of a given event and understand the relationship between probability and inferential statistics
- Make inferences about a variable in question through the use of hypothesis testing
- Choose appropriate statistical procedures and tests for making inferences

Throughout this course, we will use the textbook, *The Basic Practice of Statistics* by Moore/Notz/Fligner. It provides accurate and easy-to-understand explanations of many of the concepts we will discuss this semester. The text is an essential component of this course—please read it and do the assigned practice problems! In addition, regular class

attendance is HIGHLY RECOMMENDED. In class, we will explore examples and explanations beyond what is covered in the textbook. Therefore, truly mastering the course material requires attending class regularly, reading the text, and completing the practice problems.

The grade you earn in this course will be a reflection of that mastery and will be based on the following criteria:

Homework (15%): Learning statistics involves doing statistics! Therefore, weekly homework will be assigned. Almost all homework problems will be drawn from the course textbook. However, some assignments may also include items that I supply separately. Receiving full credit for homework items requires that all solutions contain a statement of the problem and a detailed, complete, and properly sequenced display of the processes used to answer the question as well as the answer itself. All homework assignments must be STAPLED. I encourage you to work on these problems with your fellow students; after all, statistical analyses are rarely performed in isolation. However, when turning the assignment in, you must provide your own, separately written set of solutions. Specifics regarding these assignments and their due dates will be presented in class and posted on Blackboard. Assignments turned in after the due date will not receive full credit and those turned in more than one day late will receive no credit. Your lowest scoring homework assignment will be dropped.

Research Project (15%): Learning statistics involves doing statistics! Therefore, you will be asked, individually, to complete a project consisting of a survey or experiment. To complete the project, you will gather the appropriate data for exploratory data analysis and perform the analysis summarizing your data using the descriptive tools from the course. A formal report of the project is to be completed and submitted as if it were **a scientific paper ready for presentation**.

Quizzes (20%): In-class quizzes will be given regularly throughout the semester. These quizzes will be administered during the last 25-35 minutes of a class period. The items on these quizzes will closely resemble, or may be selected directly from, those found on that week's homework assignment. Quizzes are not cumulative and will only cover topics introduced since the previous quiz. Only the top 5 quiz scores will be counted. No make-up quizzes are permitted without legitimate, written documentation—a missed quiz will count as one dropped.

Tests (30%): Two cumulative, closed-book, in-class tests worth 15% each will be given. The tests will not simply be an exercise in memorization; items will require an ability to *apply* concepts. You may write equations and notes on one 3”x5” notecard, front and back. If you have a firm understanding of the material presented in class, you will have little trouble. No make-up tests are permitted without legitimate, written documentation.

Final Exam (20%): The final exam is comprehensive and will be given on Tuesday, May 5 from 1:30 PM to 3:30 PM in accordance with the Duquesne University course catalog. No exceptions will be made regarding the final exam schedule.

I'm looking forward to working with you this semester. Please don't be afraid to take advantage of my office hours and the TA office hours. We are here to help!

Additional Information

Grading. End of semester grades will be administered according to the following percentage breakdown. I recognize that these cut-offs are strict, but they are subject to lowering if warranted by the overall performance of the class. Note, however, that regardless of class performance, the cut-offs will not be raised.

Final Grade	Percentage
A	93 to 100
A-	90 to 92
B+	87 to 89
B	83 to 86
B-	80 to 82
C+	77 to 79
C	70 to 76
D	63 to 69
F	0 to 62

Academic Integrity. Although I encourage you to work with your peers on assignments and other course matters, you are still required to turn in **individual** solution sets, projects, etc. Copying another student's assignment is considered cheating and will result in a 0 for that assignment. Any student found cheating on an examination or assisting others during the course of an examination will receive an F for this course and will be subject to further sanctions. More information regarding the University's Academic Integrity Policy can be found at: http://www.duq.edu/student-conduct/code-of-conduct/academic-integrity.cfm.

Information for Students with Special Needs. Duquesne University is committed to providing all students with equal access to learning. If you have a disability requiring accommodations, you must register with the Office of Freshman Development and Special Student Services in 309 Duquesne Union (412-396-6657) in order to receive reasonable accommodations in this course. Once a disability is officially documented by this office, and with your permission, instructors will receive letters outlining the reasonable accommodations they are required to make. Once I have received this letter, you and I should meet to coordinate the implementation of these accommodations. More information can be found at http://www.duq.edu/special-students/policies.cfm.

Calculators. Calculators may be used for homework, quizzes, and tests. However, given the nature of this class, graphing calculators (such as the TI 83, TI 84, etc.) will NOT be permitted. You may not use the calculators on your cell phones or PED's (see Academic Integrity Policies) nor may you share calculators with other students during the course of a quiz or test. Any basic calculator capable of statistical functions is sufficient. I will provide written instructions for the TI-30X IIS.

Cell Phone Policy: The Department of Mathematics and Computer Science has recently adopted the following policy covering all courses taught by its faculty:
All personal electronic devices must be turned off throughout class meetings. The only exception to this policy is if the class instructor explicitly states otherwise.

A student who is found using a personal electronic device during a Math/CS class can expect the following sanctions:

> **First offense** warning
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> **Second offense** dismissal from class for the remainder of the class period
> The instructor will decide whether or not the student will be allowed to make up any graded work performed during the remainder of the period. If the course has an attendance policy, the class will be counted as an absence.
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> **Beyond the second offense** suspension from class attendance for a length of time to be determined by the instructor, up to and including the remainder of the semester. The instructor will decide the extent to which the student will be allowed to make up any graded work performed during the missed classes. All suspended classes will be counted as absences if the course has an attendance policy.

A student who is found using a personal electronic device during a quiz, exam, or other graded event in a Math/CS class can expect the following sanctions:

> **First offense** a 0 grade on the work in question is the minimum sanction, but anything up to and including failure in the course is possible. The specific sanction will be chosen by the instructor based on factors such as the percentage of the course grade based on the graded event, whether the student has had other Academic Integrity violations, and the like. Per College Academic Integrity policy, the Department Chair and/or Graduate Program Director (in the case of graduate courses) must be consulted before failing a student.
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> **Second offense** failure in the course, again after consulting with the Chair or Graduate Director
> Any associated reduction in grade will be reported to various entities within the University as required by the College and University Academic Integrity policies.

Tentative Course Calendar for MA 125 - Fundamentals of Statistics, Spring 2015
The schedule outlined in the following table may be adjusted as needed as we progress through the course.

DATE	DAY	CHAPTER	TOPIC	NOTES
Jan 9	F	1	Introduction, Goals of Statistics, Classify Data	
Jan 12	M	8	Sampling	
Jan 14	W	9	Experiments	
Jan 16	F	1	Picturing Distributions with Graphs	
Jan 19	M		MLK Holiday	
Jan 21	W	1	Picturing Distributions with Graphs	
Jan 23	F	2	Describing Distributions with Numbers	QUIZ #1
Jan 26	M	2	Describing Distributions with Numbers	
Jan 28	W	2	Describing Distributions with Numbers	
Jan 30	F	4	Scatterplots and Correlation	
Feb 2	M	4	Scatterplots and Correlation	
Feb 4	W	5	Regression	
Feb 6	F	5	Regression	
Feb 9	M	5	Regression	
Feb 11	W	5	Regression	QUIZ #2
Feb 13	F	10	Introducing Probability	
Feb 16	M	10; 12	Introducing Probability, General Rules of Probability	
Feb 18	W		REVIEW FOR TEST 1 – intro through regression	
Feb 20	F			TEST 1
Feb 23	M	12	General Rules of Probability	
Feb 25	W	12	General Rules of Probability	
Feb 27	F	3	Normal Distributions	
Mar 2-6			NO CLASS - SPRING BREAK	
Mar 9	M	3	Normal Distributions	
Mar 11	W	3	Normal Distributions	
Mar 13	F	11	Sampling Distributions	QUIZ #3
Mar 16	M	11	Sampling Distributions	
Mar 18	W	11	Sampling Distributions	
Mar 20	F	13	Binomial Distributions	
Mar 23	M	13	Binomial Distributions	
Mar 25	W	13	Binomial Distributions	
Mar 27	F	14; 20	Confidence Intervals	QUIZ #4
Mar 30	M	14; 20	Confidence Intervals	
Apr 1	W	14; 20	Confidence Intervals	
Apr 3-6			NO CLASS - EASTER BREAK	
Apr 7*	**T**	14; 20	Confidence Intervals ***Monday schedule**	
Apr 8	W		REVIEW FOR TEST 2 – probability through Binomial distributions	
Apr 10	F			TEST 2
Apr 13	M	15 - 16	Hypothesis Testing	

DATE	DAY	CHAPTER	TOPIC	NOTES
Apr 15	W	15 - 16	Hypothesis Testing	
Apr 17	F	18 - 19	Hypothesis Testing: A Single Population Mean	
Apr 20	M	18 - 19	Hypothesis Testing: A Single Population Mean	
Apr 22	W	20	Hypothesis Testing: A Single Population Proportion	QUIZ #5
Apr 24	F	20	Hypothesis Testing: A Single Population Proportion	
Apr 27	M		REVIEW FOR FINAL	
Apr 29	W		READING DAY	
Apr 30 – May 6			FINAL EXAMS Tuesday, May 5 from 1:30 PM to 3:30 PM	

Course Map

Data Gathering	
Goals of Statistics	• Exploratory data analysis • Data analysis and inference • Observation vs. experiment
Classify Data	• Quantitative data • Categorical data
Sampling	• Simple random sample • Sampling errors and techniques • Stratified random sample
Experiments	• Subjects, factors, treatment • Randomized comparative experiment • Completely randomized experimental design

Data Exploration	
Picturing Distributions with Graphs	• Pie charts • Bar charts • Histograms • Stem plots
Describing Distributions with Numbers	• Mean and median values • Quartiles and five number summary • Box and whisker plots • Data variation and standard deviation
Scatterplots and Correlation	• Explanatory and response variables • Scatterplots • Relationships—pattern, direction, form, and strength • Correlation
Regression	• Sum of squares and the regression line • Outliers and influential points • Prediction • Cautions about regression

	**Probability and Distributions**	
	Introducing Probability	• Randomness • Sample space and probability models • Probability rules • Random variables
	General Rules of Probability	• Independence • Addition and multiplication rules • Conditional probability
	Normal Distributions	• Density curve and normal distributions • 68-95-99.7 rule • Standard normal distribution
	Sampling Distributions	• Parameters and statistics • Estimation • Law of Large Numbers • Sampling distributions • Central Limit Theorem
	Binomial Distributions	• Binomial distributions • Binomial probabilities • Binomial mean and standard deviation • Normal approximation to Binomial distributions
	**Inference**	
	Confidence Intervals	• Statistical inference • Estimation • Margin of error and confidence level • Confidence interval for population mean & proportion
	Hypothesis Testing	• Stating hypotheses • Significance and p-value • Conditions for inference • Sample size • Power • Type I and II errors
	Inferences about a Population Mean	• Conditions • t distributions • One-sample t confidence interval and t-test • Matched pairs t-test • Two-sample t-test
	Inferences about a Population Proportion	• Sample proportion • Sample size • Significance tests