

INTRODUCTION TO STATISTICS

For Today's Graduate, Just One Word:
Statistics - NY times

Syllabus

Meeting Information

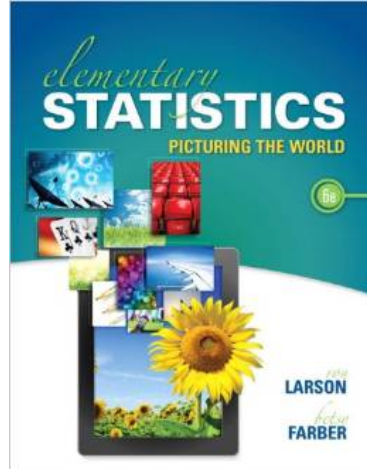
Instructor: **Keshav P. Pokhrel, Ph.D.**

Meeting Times: MWF 10:30AM - 11:35AM

Meeting Location: Old Main Lab Room

Office: Old Main 403 (Tower)

Office Hours: Monday 1:30- 3:30 PM, Wednesday 1:30 - 3:30 PM,
Tuesday 9:00 AM-10:00 AM, Thursday 9:00 AM -10:00 AM and by
appointments.



Course Objectives:

Upon successful completion of the course, the students should be able to:

1. Demonstrate understanding of the following statistical concepts: sampling techniques, experimental design, mean and standard deviation, probability, normal distribution, confidence intervals, and hypothesis testing.
2. Study basic statistical analytical methods and employ those methods on quizzes and tests.
3. Recognize the use of statistics in real life situations and also its misuse in the news surveys.
4. Visualize the data using statistical techniques.
5. Explore the concepts of basic probability theory in decision making processes.
6. Explain uncertainty with statistical learning

Textbook

Elementary Statistics: Picturing the World 6th edition, Larson Ron and Farber Besty, 2012; ISBN: View Larger Image 9780321911216, Prentice-Hall. We will be covering chapters 1, 2, 3, 5, 6, 7, 8 and 9. Apart from text book we will use different resources for the classroom activities and homework. However, We will strictly follow a website **Openintro** (<http://www.openintro.org/stat/>) for R labs.

Homework

Homework problems from each chapter are assigned. Some addition homework problems will periodically be assigned during the lecture. For better quiz/exam results you need to master all the homework problems. I strongly encourage you to see me for help if you are unable to solve the assigned problems. The single most important part of this course is doing your homework. Your focus should not be answers rather be the procedure to get the answers.

Exams

There will be three mid-term exams, five quizzes, and a final exam. To answer the exam questions, you are expected to have clear idea to interpret the numerical outputs of the statistical methods.

Extra Credit

A semester project is available to each student. It requires the student identifying an existing data source, posing a reasonable hypothesis, selecting an appropriate statistical test, computing the test results, and explaining the results in both statistical terms and in plain English. All projects must be pre-approved on or before Monday, November 03, 2014. The project is due on or before WEDNESDAY, DECEMBER 10, 2014. The project is worth up to five additional points and it will be added to your semester average (normally the equivalent of improving your grade by 1/2 grade (i.e., B to B+). Guidelines for the project and other details including datasets will be posted on course web page after Exam I.

Software

We will use a software called "R". R is free software which can be downloaded from <http://www.r-project.org>. In particular, we will use a package R Commander (**Rcmdr**) for regular classroom activities. For downloading R click **here for windows** (<http://cran.r-project.org/bin/windows/base/>) and **here for Mac** (<http://cran.r-project.org/bin/macosx/>). After Installing R: click **Rcmdr** (<http://jekyll.math.byuh.edu/other/howto/R/Rcmdr.shtml>) for the instructions to run R commander.

Important Dates:

Exam I Friday, September 26
Exam II Monday , October 27
Exam III Wednesday, November 19
Final Exam Wednesday, December 10 (11:00AM-1:00PM)

Evaluation

Your performance is measured by the sum of the points in three in class exams, 5 in class quizzes and a final exam. Lowest quiz grade will be dropped.

- 300 points - Mid-Term Exams
- 100 points - Quizzes
- 150 points- Final Exam

Grade Distribution

F	D	D+	C	C+	B	B+	A
0-59	60-64	65-69	70-77	78-83	84-89	90-93	94-100

Tutoring

For one-on-one tutoring help, the Academic Support Office offers peer tutoring: Academic Support Programs provide free peer tutoring in major subjects and the core curricula. These tutors have demonstrated mastery of the subject matter and maintain a high cumulative grade point average.

Learning Differences

In keeping with college policy, any student with a disability who needs academic accommodations must call Learning Differences Program secretary

at 824-3017, to arrange a confidential appointment with the director of the Learning Differences Program during the first week of classes.

Learning Outcomes

The following Student Learning Outcomes will be assessed through in class exams, quizzes and a final exam.

1. Collect data using appropriate statistical techniques.
2. Visualize the data through diagrams and tables.
3. Understand normal distribution and its properties with real life applications.
4. Find significantly contributing factors for the subject response variable.

Mission

This course supports the mission of Mercyhurst University by creating students who are intellectually creative. Students will foster this creativity by: applying probabilistic thinking and statistical reasoning techniques to new disciplines; developing, analyzing, and synthesizing scientific ideas; and engaging in innovative problem solving strategies to the real world problems.

Core Fulfilment Statement

Click [Here](#)

(http://math.mercyhurst.edu/~kpokhrel/teaching/Fall2014/MATH_109_Statistics.pdf)

for core assessment information.

Tentative Academic Calender

Date	Section	Topics covered	Remarks
August 27	1.1	Introduction of Statistics	

August 29	1.3	Random Sampling	
September 1	No Class	Labor Day	
September 3	2.1	Frequency Distribution	
September 5	2.2, 2.3	Descriptive Statistics	
September 8	2.4	Measures of Dispersion	Quiz 1
September 10	2.5	Measure of Position..	
September 12	5.1	Introduction to Normal Distribution	
September 15	5.2	Normal Distribution Contd..	
September 17	5.3	Normal Distribution Contd..	
September 19	5.4	The Central Limit Theorem	Quiz 2
September 22	6.1	Confidence Interval for Population Mean	
September 24	6.2	Confidence Interval for Population Mean	
September 26		Exam 1	
September 29	7.1, 7.2	Hypothesis Testing	
October 1	7.3	Hypothesis Testing Contd..	
October 3		Review: Estimation	
October 6	8.1	Testing Difference of Means	
October 8	8.2	Testing Difference of Means Contd..	Quiz 3
October 10	8.3	Testing Difference of Means Contd..	

October 13		Review: Hypothesis testing	Rlab
October 17		Hypothesis testing	Rlab
October 20		Comparison of Paired Samples	
October 22		Relative Risks and Odds Ratio	Quiz 4
October 24		Review for Exam 2	Rlab
October 27		Exam 2	
October 29	9.1	Correlation	
October 31	9.2	Linear regression	
November 3	9.2	Linear regression contd ..	
November 5	9.3	Prediction Interval	
November 7		Data Visualization	Quiz 5, Rlab
November 10	9.4	Multiple Linear regression	
November 12	9.4	Multiple Linear regression Contd ...	
November 14		Model Diagnostics	Rlab
November 17		Interpretation of Linear Model	Rlab
October 27		Exam 3	
November 21		Transformation of Variable	Rlab
November 24-28		Thanksgiving Holidays	
December 1		Probability Theory	
December 3		Conditional Probability and Bayes Rule	

December 5		Review	
Wednesday, December 10		Final Exam (11:00AM-1:00PM)	

Selected Homework Problems

Section	Selected Problems	Remarks
1.1	1, 3, 4, 6, 8, 10	
1.2	11, 12, 13, 14, 15, 16, 17, 18, 19, 20	
1.3	21, 23, 26, 28, 29, 32, 35, 36, 40	
2.1	7,8, 9, 10,15, 18, 19,21, 24, 25, 28, 33, 35, 40, 47	
2.2	3, 5, 7, 10, 12, 13, 14, 15, 19, 30, 32, 34	
2.3	5, 7, 8,10, 12, 14, 17, 18, 19, 22, 24, 29, 32, 35, 38, 40, 41, 42, 44, 47, 49, 52, 55, 58	
2.4	5, 8, 11, 14, 19, 21, 24, 26, 28, 33, 34, 35, 37	
2.5	1, 3, 5, 7, 10, 13, 14, 21, 30, 35, 36, 39, 40, 42, 44, 48, 50, 53, 54, 56	
5.1	1, 3, 4, 6, 10, 11, 12, 14, 19, 20, 22, 24, 25, 26, 29, 30, 33, 37,39, 43, 45-50, 51, 54, 56	
5.2	1, 4, 6, 7, 11, 13, 15, 16, 17, 20	
5.3	1, 7, 11, 15, 16, 19, 20, 22, 24, 27, 31, 33, 34, 35, 37	
5.4	1, 7, 9, 10, 13, 15, 18, 22, 24, 25, 27, 31, 33, 35, 37, 38	
	Exam 1	

6.1	1, 3, 5, 9, 12, 17, 21, 23, 25, 28, 32, 35, 37, 39, 43, 46, 50, 54	
6.2	1, 4, 6, 8, 9, 12, 17, 20, 27, 29	
7.1	1, 2, 5, 7, 10, 21, 23, 24, 27, 29, 33, 37, 40, 43, 46, 49, 50, 51	
7.2	1, 2, 3, 6, 8, 11, 14, 17, 20, 22, 23, 27, 28, 29	
7.3	1, 3, 6, 8, 9, 13, 15, 16, 18, 21, 25	
8.1	1, 4, 7, 9, 10, 13, 16, 17, 18, 21	
8.2	3, 5, 6, 9, 11, 13, 15, 17	
8.3	3, 4, 6, 9, 11, 13, 19	
	Exam 2	
9.1	1-18, 22, 24, 27, 29, 30	
9.2	7, 8, 9, 11, 12, 17, 19, 20, 22, 24, 30, 31	
9.3	1, 2, 4, 5, 7, 12, 13, 15, 16, 17, 18	
9.4	1, 3, 4, 5, 6, 7	
	Exam 3	

Extra Resources

StatSci.org. (<http://www.statsci.org/index.html>) A good resource for varieties of data sets. These data sets are open to public and you can use these data sets for your own projects. If you happen to use these data please do not forget to mention the source.

Online Statistics Education (<http://onlinestatbook.com/2/index.html>) This a very helpful resource for introductory statistics.

OpenIntro (<http://www.openintro.org/stat/>) This is an excellent resource for introductory statistics. Apart from lecture notes they also have well

explained examples with R code.

Distribution Calculator (http://spark.rstudio.com/minebocek/dist_calc/) An excellent Apps to understand binomial distribution normal approximation to binomial

Install R and R Commander

(<http://www.ics.uci.edu/~jutts/8/ShahbabaAppendix.pdf>) Guideline to download and install R

R commander (<http://socserv.mcmaster.ca/jfox/Misc/Rcmdr/>) Perhaps one of the most valuable R-alternative to other statistical packages like SPSS.

Data Sets (

http://media.pearsoncmg.com/ph/esm/statistics_datasets/stats_datasets.html#samuels)

Data sets from MATH 139 book. You can download and save data sets in your system.

Exploratory Data Analysis (

<http://www.wekaleamstudios.co.uk/supplementary-material/>) Wide range of statistical topics are covered in this web page with video lectures and other supplementary materials.

Statistics Online Computational resources

(<http://www.socr.ucla.edu/htmls/>) interactive apps to calculate different statistical measures.

More Stat Apps (<http://stat.duke.edu/~mc301/shiny/applets.html>) Wonderful collection of Statistics Apps for data visualization

Unlocking the power of data (<http://www.lock5stat.com/>) a very rich resource for introductory statistics with apps.
