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MATH/STAT 380: Statistics and Applications

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MATH/STAT 380: Statistics and Applications

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Abstract

The portfolio is created for the course STAT/Math380: Statistics and Applications using backward design. It is a service course on introduction statistics for undergraduate students who are not majored in statistics at University of Nebraska-Lincoln. In this portfolio, I'll provide the detail plans on what I will teach, how it will be taught, and what is my expectation on students learning. Besides, I'll collect data from students to analyze whether students have achieved the course expectations, from where I'll adjust and improve the way I deliver the knowledge in the future. This portfolio will be used to help document my teaching, share with my colleagues, and prepare my promotion and tenure.

Keywords: Introduction statistics, course objectives, course portfolio

Contents

1 Objectives of Peer Review Course Portfolio

The portfolio is created for the course "STAT/Math380 Statistics and Applications". In this portfolio, I'll provide the detail plans on what I will teach, how it will be taught, and what is my expectation on students learning. Besides, I'll collect data from students to analyze whether students have achieved the course expectations, from where I'll adjust and improve the way I deliver the knowledge in the future. This portfolio will be used to help document my teaching, share with my colleagues, and prepare my promotion and tenure.

2 Course Description

2.1 Course basics

STAT/Math 380 is a service course on introduction statistics for undergraduate students who are not majored in statistics at University of Nebraska-Lincoln. The prerequisite of the course is MATH 107: Calculus II.

It is the second-level course in "undergraduate statistics and mathematics" sequence. This course lays the foundation for a number of 400, 800 and 900-level courses in Engineering, Mathematics and Statistics, such as MATH 428, STAT 462, CIVE 866, SCE 970, etc.. It is also offered for Honors credit.

It is accredited as Achievement Centered Education (ACE) course and satisfies ACE outcome 3: to use mathematical, computational, statistical, or formal reasoning (including reasoning based on principles of logic) to solve problems, draw inferences, and determine reasonableness.

It is taught in a large session with about 90 students coming from different majors with diverse backgrounds. It is challenging to find a way to help every student be more interested in and more engaged in the course, and eventually achieve effect learning in the class.

Hence, I believe preparing a detailed portfolio would be very useful to keep improving the quality of the course.

2.2 Course Goals

Students are expected to think and reason statistically, and to make decisions based on numerical evidence. The instructor will help students achieve the learning outcomes via regular class lectures, in-class activities, homework, quizzes, exams and group projects. Students are responsible to their own learning. They are expected to follow the lectures and to work out most problems by themselves. Meanwhile, discussions with the instructor and classmates are encouraged as well.

The objectives of the course are detailed below.

- Students will understand essential theoretical concepts (and logic behind them) including parameters, random variables, probability distributions, sampling distributions and data description techniques, hypothesis testing problems, and modeling approaches.

- Students will be able to recognize a classical distribution model when are presented with details of an experiment, translate a research question into a logical probability statement in terms of a mass/density or cumulative probability function, perform calculations, and comment on the result.

- Students will be able to state a hypothesis testing (or estimating) problem (out of the ones considered in the course) for a given research question, perform testing (construct the corresponding confidence interval) and draw statistical inferences.

- For a given data set, students will be able to fit a simple linear regression model (obtain regression coefficients), provide an equation of a fitted model, interpret the observed relationship in words, and use the model to make predictions.

2.3   Enrollment

There are 89 students enrolled in the course, of which forty-five are juniors, twenty-six are seniors, seventeen are sophomores, one is freshman and one is graduate student. Most of them are majored in actuarial science, mathematics, computer science and engineering. For those majored in math and actuarial science, they may take the mathematical statistics sequence (STAT462 and STAT463) after this class.

3   Teaching Methods

3.1   Teaching methods

The lectures are given twice a week. Each lecture lasts 75 minutes. The lecture slides are prepared by the instructor and are uploaded to canvas before each lecture. Usually, lectures are divided into three parts. First, the instructor will give a short review of what have been learned in the last lecture. Second, the instructor will introduce new concepts or methods with examples. Finally, students are asked to solve one or two exercises by themselves right after they learn something new. Students can use any notes, book materials to help them to answer these problems. And the discussion with classmates or the course instructor is encouraged. The instructor will explain and solve the problems afterwards. Besides, students are suggested to read more examples in the textbook after class.

When the instructor introduces a new concept or method, he always starts with a motivated example. Then, he gives the formal definition and explain how to use the new concept or method to solve the real world problems. This procedure turns out to be helpful for studying mathematical and statistical concepts, which otherwise is relatively abstract and not easy to be understood. Several sample slides are given in the appendix.

Homework, quizzes, exams and team project are used to help students achieve the learning objectives. Also, the instructor will use them to evaluate the students performance and adjust his teaching during the semester.

Beyond the lecture notes, homework problems are the main exercises for students to achieve the course goals. Students are expected to solve all the problems and take an online-test afterwards. Solutions will be posted on canvas right after the due time of each homework. In the following lecture, the instructor will spend some time on explaining those challenging homework problems.

Quizzes and exams are closed book and notes, both of which are designed to evaluate students' performance. Four quizzes are given during the whole semester. Usually, an in-class quiz is given after completing two chapters of the book. The feedback of quizzes is helpful for the instructor to know the students' learning outcomes so as to do necessary adjustment in the following lectures. It also helps students focus on the main contents of the class. There are three exams in this course. Exam 1 covers the basic concepts in statistics and probability. Exam 2 covers probability models which serve as the foundation of statistical inference. The final exam is cumulative. But the majority of problems focuses on statistical inference, that are hypothesis testing and confidence intervals.

Students are expected to do a team project using the statistical software R. The size of a team is limited to three. In this big data era, it is necessary for students to learn how to implement the statistical methods with a software even in their first statistics course. A basic calculator used in the traditional statistical course is no longer satisfies the demand in many applications. So a simple R project is designed in this class, in which students is expected to write their own R codes to implement the statistical methods.

3.2   Rationale for teaching methods

The instructor always start with a specific example prior to any formal definitions of theoretical concepts. This method is applied to a lot of statistics courses, especially for introduction level statistical courses. In this class, students come from varies of majors. If the instructor gives the definitions of abstract concepts straightforward, students may have difficulty to understand and even lose the interest in the course. On the other hand, if the instructor always starts with a daily life example that everybody can follow up easily, it has a higher chance to get students' attention on the topic. For example, before teaching any probability rules, the coin and poke cards examples are the good ones to start with.

Second, practice is the key to succeed in a statistics course. Regular homework and quizzes are given in this course. There are quite a few problems in each homework. In the opinion of the instructor, few people can do well in a math or statistics course without doing sufficient exercises. Only understanding the lecture notes or textbook problems is far away from achieving the learning objectives. Students should make sure they can solve the problems by themselves. The best way is to do more exercises.

Third, it is necessary to learn at least one statistical software. While applying the concepts

and methods of statistics to the real world problems, it is very helpful if students know how to use a statistical software, such as R, SAS and Python. In this introduction level statistics course, the instructor would like to have students get access to the R software in the team project. Hence, students get a chance to know how a data analysis problem can be implemented in the computer software. Though the analysis might be very basic, it does give students an idea how the real analysis can be done in the software.

3.3   Changes from previous years

Compared to the instructor's last teaching in 2017, there are two main changes in this class. First, a team project is added to the course, from which students learn to implement statistical methods in the R software. It turned out that students did great in the project. One of course goal is being able to apply the statistical methods in applications. This project experience definitely helps students achieve this goal. Second, course materials and on-line tests are posted on Canvas. The results of on-line tests are summarized well by the Canvas system, which helps the instructor easily identify the problems or knowledge that students have difficulty to solve or understand. Otherwise, it is difficult to collect those summarized statistics in such a big class.

3.4   Link to broader curriculum

STAT/Math 380 is a service course on introduction statistics for undergraduate students at UNL. It is a calculus based course. Students learn the essential theoretical concepts and methods in statistics and probabilities, such as probability distributions, confidence intervals, hypothesis testings, linear regression models. Moreover, students learn how to apply those concepts and methods to solving the real world problems. Thus, this course lays the foundation for a number of 400, 800 and 900-level courses in Engineering, Mathematics and Statistics, such as MATH 428, STAT 462, CIVE 866, SCE 970, etc.. It is a very important course for students who are majored in those areas.

More broadly, statistical methods are becoming more and more important in any quantitative science. In this big data era, having at least one introduction statistics course in the college study is beneficial for most student's career development. STAT/MATH 380 serves as one of the best calculus based introduction statistics courses at UNL.

4   Analysis of Student Learning

First, we'll take a look at students' exams performance.

According to the syllabus, each exam takes 20% of final grade. So we'll mainly look at students' performance via the three exams grades. The average grades of Exam 1, Exam 2 and the final exam are 0.8, 0.76, and 0.81 respectively, with standard deviations 0.12, 0.18,

and 0.14. The distributions of each exam are given below. It can be seen that students' performance in the second exam is relatively low and shows more variability. The second exam focuses on probability distributions and models, which are the most challenging part of the course.

Gaussian kernel density estimate

exam1

Gaussian kernel density estimate

exam2

Gaussian kernel density estimate

final exam
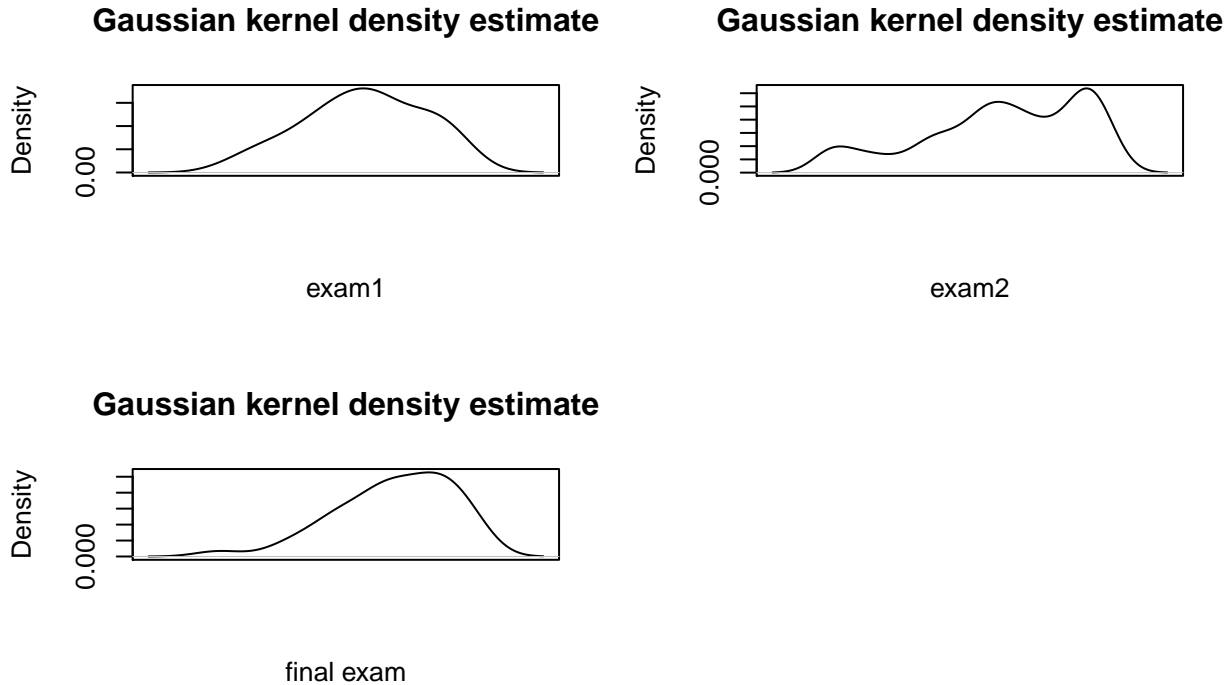
The exams include multiple choice questions and short answer questions. The multiple choice questions are designed to test students' level of understanding course materials. From the summarized results, it turns out that students have difficulty to solve problems that involve more probability theories. About 50% of students made mistakes on figuring out variance of sample means, variance of linear combinations of two random variables, concepts of cumulative distribution functions, and percentile of normal distribution with context.

Second, we'll check whether students' grades of exams are correlated with homework and quizzes or not. The scatter plots below show that exam grades are correlated to the quizzes grades and homework grades, which means it is essential to perform well in the regular assigned homework and the regular quizzes in order to succeed in this class. This is consistent with logic behind the proposed teaching methods. However, the average of homework grades are very high and the variability of the homework grades is relatively small. The homework grades are determined by the online tests which only ask answer keys of partial homework problems without detailed solutions. It indicates that the current online-test form might not be informative enough.

exams vs quizzes
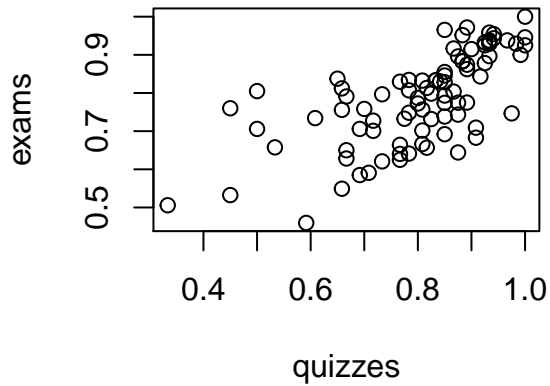
exams vs homework
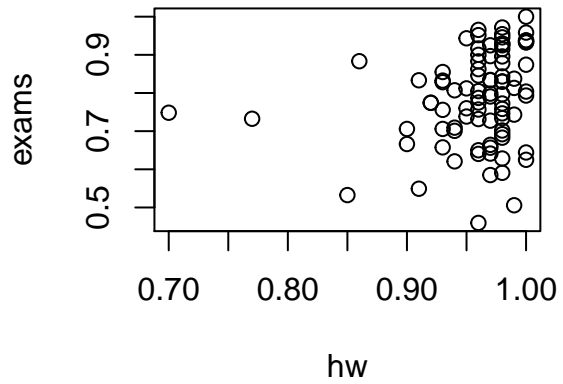
Third, we'll compare students' performance under different majors and under different college class standings. From the boxplots below, we can see that students who are majored in actuarial science or mathematics have relatively high median grades. Probably those students have better background in mathematics and statistics. Also, the median of sophomores is much higher than seniors and juniors. Yet, the variance of grades of sophomores is much larger than seniors and juniors.

grades vs majors

grades vs class standings
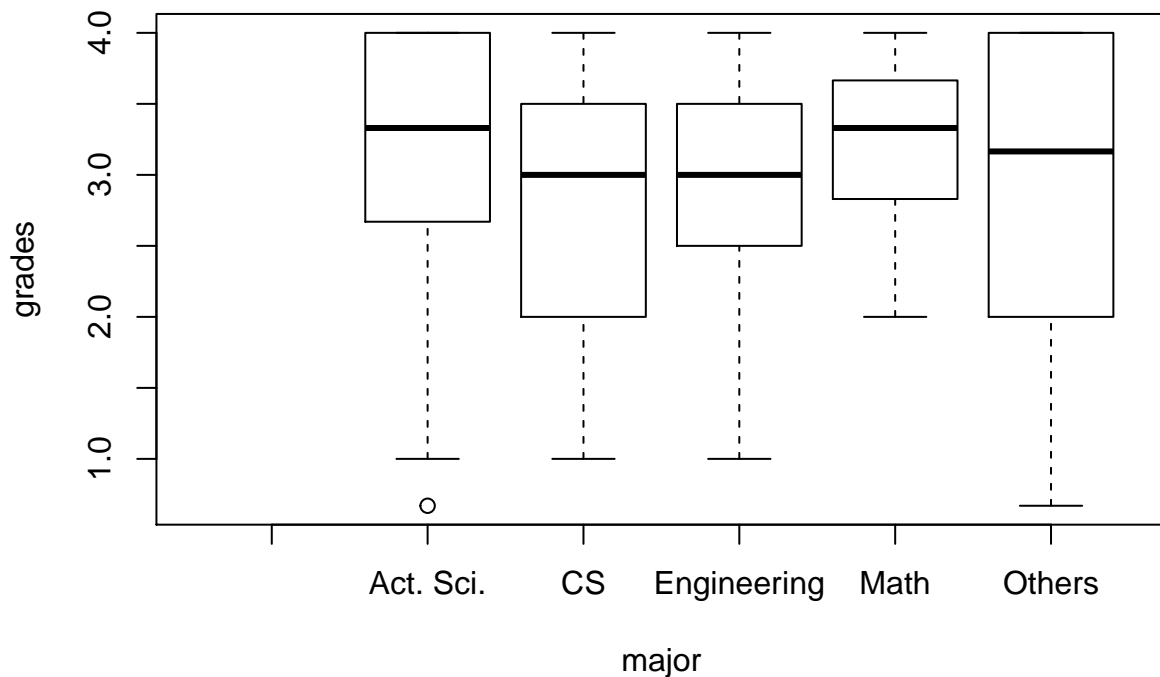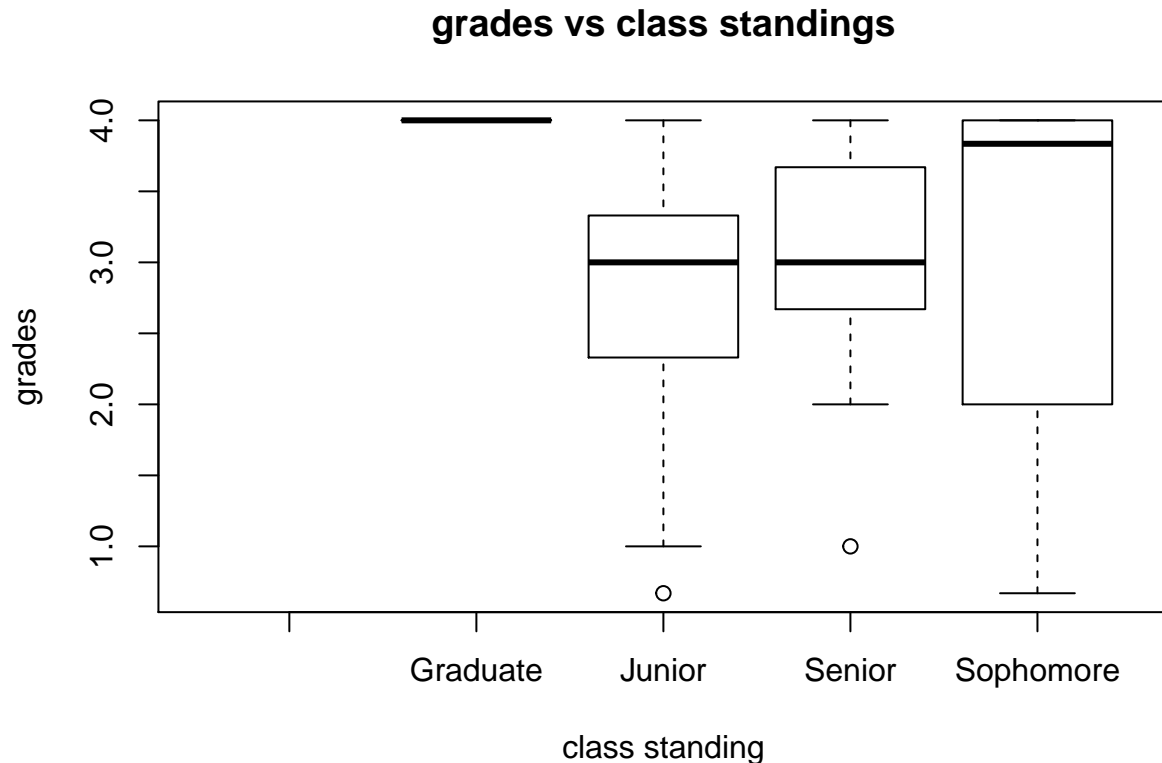
5 Reflection on the Course

Overall, students' performance in this course is satisfied. The average GPA is about 3.0/4.0. Students who did well in homework and quizzes tend to have higher grades in exams. Both indicate the proposed teaching methods are effective in general. Having regular homework problems and quizzes does help students achieve the learning objectives. Besides, via the team project, students get a chance to know how a data analysis problem can be implemented in the R software.

From the analysis of exam grades, we find that students do have difficulty to solve problem from the second part of the course, which mainly includes the probability distribution models. It will be great to distribute more time and effort on this part in the future.

We do see students from math and actuarial science majors perform better under the current teaching methods. It is worth to further investigate this phenomenon and try to figure out a way to improve the performance of other major students. The performance of students in different class standing varies as well. It should be helpful to do in-class survey during the semester in the future in order to figure out the actual reasons.

6 Summary

This portfolio is created for STAT/MATH 380 using backward design. First, the course goal and objectives were considered in detail. Then, the teaching methods and performance assessment were developed to fulfill the objectives. Finally, data of the course were collected and the analysis was done to evaluate the effectiveness of the proposed teaching. Both advantages and disadvantages of the current proposed methods were summarized at the end of this portfolio, which definitely will help improve the instructor's teaching in the future. The idea and procedure of building up the course portfolio will be applied to the instructor's other course design as well.

7 Appendice

7.1 Sample slides

Here are sample slides of introduction to simple linear regression model.

Example 11.1 (Ring size and shoe size) The following data are about the ring size and shoe size of 100 randomly chosen people from a blog: http://ringsizevsshoesize.blogspot.com/2011_06_01_archive.html. An interesting question: Is there a relationship between ring size and shoe size?

Ring Size	Shoe Size	Ring Size	Shoe Size	Ring Size	Shoe Size	Ring Size	Shoe Size
11	14	9.5	12.5	12	14	7	7.5
6	6.5	8	11	10	12	6.5	6
5.5	7	6	8	9.5	12	9	9.5
6	7	8	12	5	7	6	7
4	6.5	6.5	7	5.5	7	7	8
5	9	6	7.5	5	6	8	7
8	8.5	12	12.5	8	12.5	7	8.5
7.5	8.5	4	3.5	8	8	7	7

Ring Size	Shoe Size	Ring Size	Shoe Size	Ring Size	Shoe Size	Ring Size	Shoe Size
11	15	11	11.5	6	8	7	7.5
12	12.5	8	8	9	12	6	7
7	9.5	6	8.5	5.5	8	6	7
11	13	2.5	4	11	11.5	6	7.5
7	7.5	6.75	7	7.5	8	9	11
9	12.5	4.5	7.5	6.5	7.5	5.5	7
6	6.5	6.5	9	10.5	13.5	5	6.5
8	8.5	7	13	8	8	8	8
7	7.5	10	13.5	7	8	6	6
9	12	4.75	8.5	7	7.5	10	12
10	12.5	12	14	6	9	11	14
9	11.5	5.5	7	12	14	10	14
8	7	7	7	9	13.5	9	12
11.5	11	7	9.5	7	8	5	4
5	5.5	7	9	7	11	9	6
9.5	11.5	5	7.5	7	6.5	6	7
8	8.5	6	6.5	7.5	9	8	8

- **Scatterplots** plot one variable on the horizontal axis and plot the other variable on the vertical axis. Each pair of values is represented by a point.

- By convention, we use y to denote the response variable and x to denote the explanatory variable.
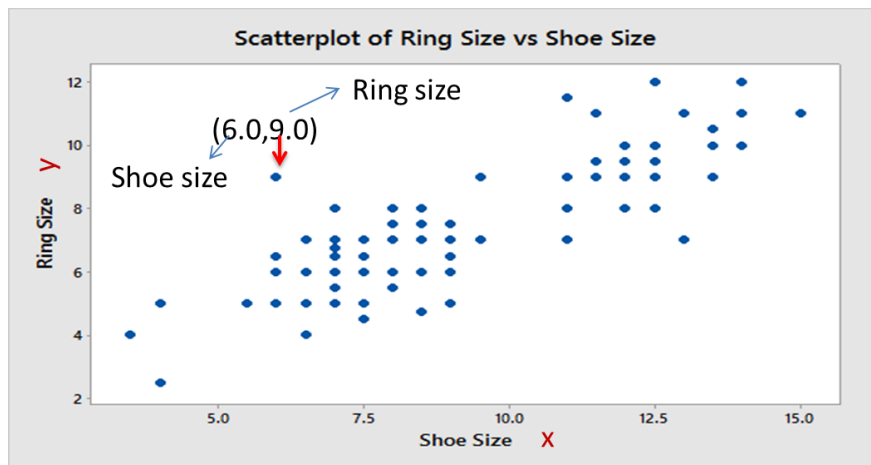
The data are about the ring size and shoe size of 100 randomly chosen people. Can we use the shoe size to predict ring size ?

Fitted Line Plot
Ring Size = 1.616 + 0.6550 Shoe Size

S	1.14455
R-Sq	70.7%
R-Sq(adj)	70.4%
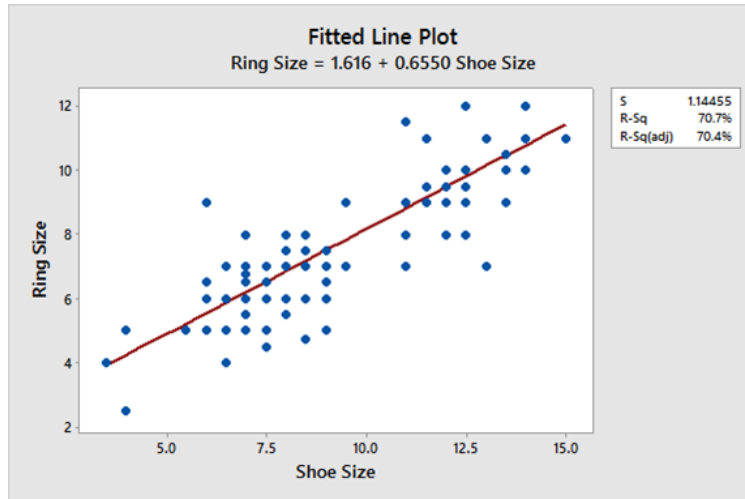
1. **The simple linear regression model:**

- The linear association between two quantitative variables x and y can be represented by a straight line, which is called **regression line**:

$$\hat{y} = \beta_0 + \beta_1 x.$$

$$\hat{y} = \beta_0 + \beta_1 x$$

$$\beta_1 = \text{slope} = \frac{\text{rise}}{\text{run}}$$

$$\beta_0 = \text{intercept}$$
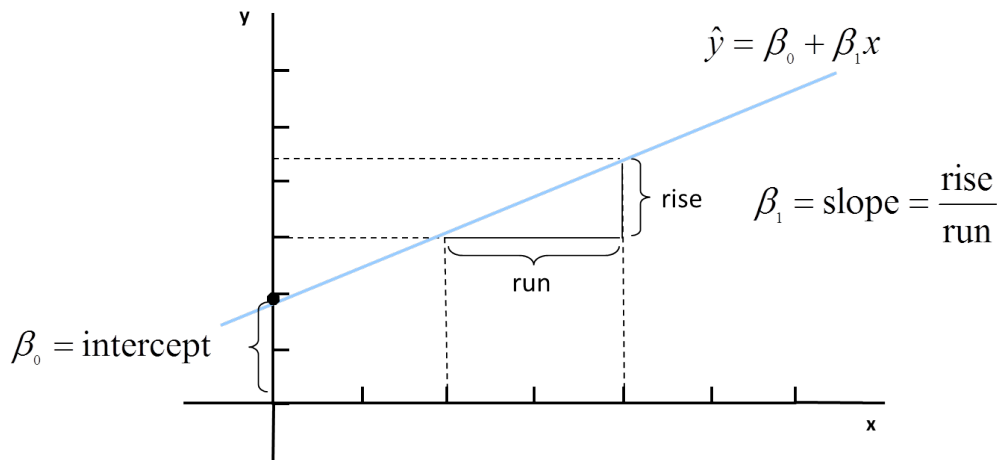
- The simple linear regression model: given the explanatory variable x, the response variable y has mean $\beta_0 + \beta_1 x$ and variance σ^2. Specifically,

$$y = \beta_0 + \beta_1 x + \epsilon,$$

where ϵ usually referred to as the random deviation or random error term in the model. Usually, ϵ is assumed to follow normal distribution with mean 0 and variance σ^2.

- The inclusion of the random error term allows (x, y) to fall either above the true regression line (when $\epsilon > 0$) or below the line (when $\epsilon < 0$).

12

Figure with y-axis and x-axis. Points labeled (x_1, y_1) and (x_2, y_2) with vertical distances labeled 1 and 2. True regression line $y = \beta_0 + \beta_1 x$. Tick marks at x_1 and x_2 on the x-axis.
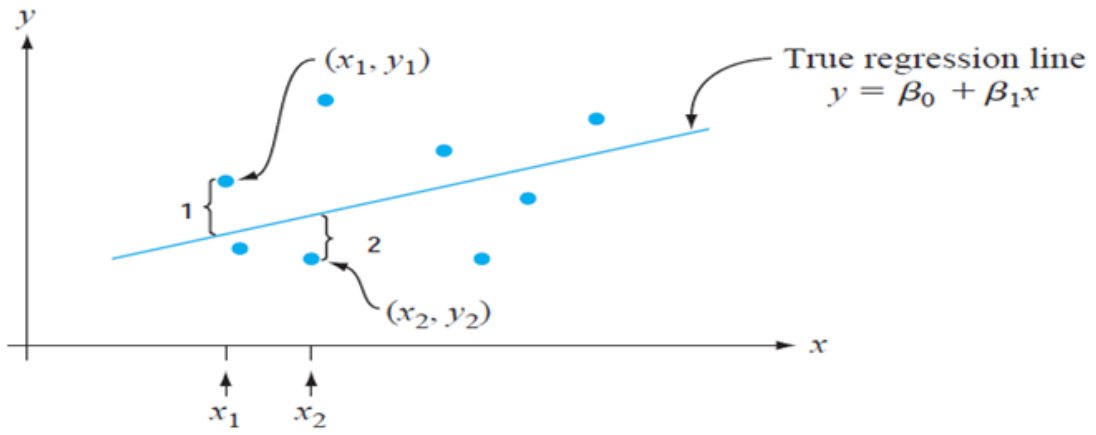
7.2 Syllabus

Statistics and Applications

Instructor:	Yuzhen Zhou
Email:	yuzhenzhou@unl.edu
Phone:	402-472-2991
Classroom:	09:30am - 10:45am TR @ HAH-102 City
Office Hours:	11:00am - 12:00pm Tue. @ 343F Hardin Hall North Wing or By appointment

TA:	James Clothier
Email:	james.clothier@doane.edu
Office Hours:	MW 01:00 PM - 02:00 PM @ 349C Hardin Hall North Wing or By appointment

TA:	Gayara Fernando
Email:	gayarafernando@gmail.com
Office Hours:	TF 03:00 PM - 04:00 PM @ 349 Hardin Hall North Wing or By appointment

Textbook: *PROBABILITY AND STATISTICS FOR ENGINEERS AND SCIENTISTS*, 9th edition; Walpole, Myers, Myers and Ye.

Prerequisites: MATH 107 (MATH 107H): Analytic Geometry and Calculus II

Course Description: The STAT/MATH 380: Introduction to Probability and Statistics Concepts is the second-level course in "undergraduate statistics and mathematics" sequence. The course provides an introduction to probability concepts, i.e., random variables, probability distributions, expectation, variance, covariance, correlation; and statistical concepts, i.e., fundamental sampling distributions and data descriptions, one- and two-sample estimation and testing problems, and simple linear regression. This course lays the foundation for many 400-level courses in Engineering, Mathematics and Statistics, and is also offered for Honors credit.

ACE Outcome 3: The STAT/MATH 380 course is accredited as Achievement Centered Education (ACE) course and satisfies ACE outcome 3: to use mathematical, computational, statistical, or formal reasoning (including reasoning based on principles of logic) to solve problems, draw inferences, and determine reasonableness. Therefore, the reinforced skill for STAT/MATH 380 is Critical Thinking.

Course Goals: This course will help you learn to think and reason statistically, and to construct arguments based on numerical evidence. My role as the instructor is to facilitate this type of learning by providing you with a variety of meaningful activities and opportunities to learn, as well as creating an environment conducive to learning. This will manifest in a variety of ways: group work, direct instruction, individual practice, exploration and discovery activities, writing, discussions and/or student-led instruction. Ultimately, **you are responsible for your own learning**, so please put into the class what you hope to get out of it.

- Students will understand essential theoretical concepts (and logic behind them) including common discrete and continuous probability distributions, sampling distributions and data description techniques, hypothesis testing problems, and modeling approaches.

- Students will be able to recognize a classical distribution model when are presented with details of an experiment, translate a research question into a logical probability statement in terms of a mass/density or cumulative probability function, perform calculations, and comment on the result.

- Students will be able to state a hypothesis testing (or estimating) problem (out of the ones considered in the course) for a given research question, perform testing (construct the corresponding confidence interval) and draw statistical inferences.

- For a given data set, students will be able to fit a simple linear regression model (obtain regression coefficients), provide an equation of a fitted model, interpret the observed relationship in words, and use the model to make predictions.

Course Content:

- Introduction to Statistics and Data Analysis (sample, population, observational and experimental studies, measures of location and variability, basics of data cleaning, graphical methods and data description)

- Probability

- Random Variables, Probability Distributions and Expectation

- Discrete and Continuous Probability Distributions

- Fundamental Sampling Distributions and Data Descriptions (random sampling, key statistics, sampling distributions of a sample mean and sample variance)

- One- and Two-Sample Estimation Problems (statistical inference, confidence intervals for the mean, difference between two means, proportion and the difference between two proportions: their derivations and applications)

- One- and Two-Sample Testing Problems (statistical hypotheses and their testing, tests for a single mean and the difference between two means: cases with known and unknown variances; large sample tests for a single proportion and the difference between two proportions, applications)

- Simple Linear Regression

Course Expectations:
In this course, you are expected to have professional behavior. You are expected to attend all class meetings, be curious, ask questions, seek opportunities to learn, and be open and responsive to constructive feedback. You are also expected to exhibit a professional demeanor (language, attitude) toward others. Disagreement during discussions is welcome and often productive in developing a deeper understanding of the concepts being discussed. However, disagreement does not warrant yelling or disrespectful language or behavior. Unprofessional behavior will not be tolerated, and appropriate actions will be taken to prevent future occurrences.

Lectures:
Lecture slides are used in all lectures and will be available on Canvas. I will try to have them available the night before each lecture. Students are expected to make notes to supplement the slides. If a student plans to miss a lecture then he/she should notify the instructor in advance.

Grading:	Homework	15%	Exam 1	20%
	Quizzes	15%	Exam 2	20%
	Project	10%	Final Exam	20%

A final average of 90% will guarantee an A-, 80% a B-, 70% a C- and 60% a D-.

Homework: Each student should print out and complete each homework assignment, and also take an on-line homework test. Answer keys are posted on Canvas after the due date. Students are expected to compare their solutions with the answer keys and discuss their questions and concerns with the instructor or TAs. Homework tests are equally weighted. All assignments should be submitted before the deadline. There is **no makeup possible** for any assignments unless prior arrangements with the instructor have been made.

Project: There will be 1-2 project(s) during the semester. At least one project needs to be done with R.

Quizzes: All quizzes will be in-class (unless otherwise is stated by the instructor). The instructor does reserve the right to give pop quizzes at any time. Any missed quiz is given 0 points. All quizzes are equally weighted. There is **no makeup possible** for any quizzes unless prior arrangements with the instructor have been made.

Exams: Exams are closed book and notes. Students are allowed to use a formula sheet (in addition to distribution tables and a calculator) but no lecture notes, slides or texts are allowed. The formula sheets are to be prepared individually by each student. You are expected to take exams at the scheduled times. If this is impossible due to extreme circumstances (illness, death in the family, previously scheduled activities vital to academic program), please notify me. **No make-up exams will be given if I am not notified prior to the examination.** You will be required to obtain a note from your physician or adviser explaining the nature of the conflict.

Note: All work must be legible, and when appropriate all work must be shown to receive credit. No late work will be accepted unless other arrangements have been made before class. If you miss class, it is your responsibility to obtain the information missed. All exams and quizzes must be taken at the scheduled time. A missed exam or quiz will result in a zero unless you contact me ahead of time with adequate documentation (instructor, physician, or organization note).

Calculator: You will need a calculator for in-class activities, quizzes, and exams. You may use any calculator that contains basic statistical functions; an advanced calculator is not needed to be successful in this course. However, cell phones and computers may not be used to perform calculations on quizzes and exams.

Department Grade Appeal Policy:	Students who believe their academic evaluation has been prejudiced or is capricious have recourse for appeals to, in order: their instructor; the Chair of the Statistics Department; the undergraduate academic grading appeals committee; and lastly, the college grading appeals committee.
Disabilities:	Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.
Academic Integrity:	You are encouraged to work together on problems and exercises, but the work you turn in must be your own (unless the assignment specifically states otherwise) Work on exams must be your own. University policy will be followed in cases of academic dishonesty:

In cases where an instructor finds that a student has committed any act of academic dishonesty, the instructor may in the exercise of his or her professional judgment impose an academic sanction as severe as giving the student a failing grade in the course. Before imposing an academic sanction the instructor shall first attempt to discuss the matter with the student. If deemed necessary by either the instructor or the student, the matter may be brought to the attention of the student's major adviser, the instructor's department chairperson or head, or the dean of the college in which the student is enrolled.

For additional details see http://stuafs.unl.edu/ja/code/three.shtml.

Emergency Response:

- Fire Alarm (or other evacuation): In the event of a fire alarm: Gather belongings (Purse, keys, cellphone, N-Card, etc.) and use the nearest exit to leave the building. Do not use the elevators. After exiting notify emergency personnel of the location of persons unable to exit the building. Do not return to building unless told to do so by emergency personnel.

- Tornado Warning: When sirens sound, move to the lowest interior area of building or designated shelter. Stay away from windows and stay near an inside wall when possible.

- Active Shooter

  - Evacuate: if there is a safe escape path, leave belongings behind, keep hands visible and follow police officer instructions.
  - Hide out: If evacuation is impossible secure yourself in your space by turning out lights, closing blinds and barricading doors if possible.
  - Take action: As a last resort, and only when your life is in imminent danger, attempt to disrupt and/or incapacitate the active shooter.

- UNL Alert: Notifications about serious incidents on campus are sent via text message, email, unl.edu website, and social media. For more information go to: http://unlalert.unl.edu.

- Additional Emergency Procedures can be found here: http://emergency.unl.edu/doc/Emergency_Procedures_Quicklist.pdf

Important Dates:

Class Begins .... Jan. 8
Last day for late registrations and adds .... Jan. 14
Last day to drop with 100% refund .... Jan. 14
Last day to file a drop to remove course from student's record .... Jan. 18
Exam 1 9:30 AM-10:45 AM .... Feb. 12
Exam 2 9:30 AM-10:45 AM .... Mar. 14
Last day to withdraw .... Apr. 5
Class Ends .... Apr. 25
Final Exam 10:00 AM-12:00 PM .... Apr. 30

Disclaimer: Information contained in this syllabus was, to the best knowledge of the instructor, considered correct and complete when distributed at the beginning of the term. However, the instructor reserves the right, acting within the policies and procedures of UNL, to make changes in course content or instructional technique without notice or obligation. However, any changes will be explained to the class as a whole including reasons for the change.

Table 1: TENTATIVE COURSE OUTLINE

Week	Topic
1	Syllabus, Chapter 1
2	Chapter 2
3	Chapter 3
4	Chapter 3, 4
5	Chapter 4; Review
6	Exam 1; Chapter 5
7	Chapter 5, Chapter 6
8	Chapter 6, 8
9	Chapter 8
10	Review; Exam 2
11	Spring Vacation
12	Chapter 9
13	Chapters 9, 10
14	Chapter 10, Chapter 11
15	Chapter 11
16	Project;Review
17	Final Exam