Math 448 - Probability and Statistics, Spring 2020
Course Syllabus

Instructor: Brian Leary
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   Office: Learning Resource Center 323K
   Office hours: Mon 1-2, Tues 9:30-11, Wed 1-2:30, Thurs 1-3

Class Room/Time: CAR-B 206, MWF 9:00-9:50 am
Course website: community.wvu.edu/∼bal0018/math448S20.html (as a backup website, I will also try to keep the eCampus site updated)

Homework assignments will be posted on the course website. Course announcements may also be posted on the website or sent via email. Please be sure to check the website regularly, and to regularly check the email address you have on record. You are responsible for any information posted on the course website.
Textbook: Anthony Hayter, *Probability and Statistics for Engineers and Scientists*, 4th edition

Catalog Data: MATH 448. Probability and Statistics (3-0) Credits 3. Sample spaces; probability, definition and elementary properties; random variables, expectation; special distributions; estimation; hypothesis testing; linear regression.
Prerequisite: MATH 251; grade of B or better in MATH 315.

Course Material: This course develops some tools through which we make sense of a world that often unfolds randomly and chaotically. In analyzing an experiment, event, or game, we can think of probability as the pre-game analysis and we can think of statistics as the post-game analysis. In this course, we introduce major tools of both of these fields.
An outline of the topics covered can be found on the next page.

Course Objective: Upon completion of the course the student should have a basic knowledge of the rules of probability and the elementary probability distributions; and an understanding of estimation using point and confidence interval estimates, and hypothesis testing.

Learning Outcomes: Upon successful completion of the course, the student will be able to do the following:

1. Count, and use permutations and combinations.

2. Use the various discrete and continuous probability distributions.

3. Compute the mean, standard deviation and variance for various distributions.

4. Do estimation.

5. Test hypotheses.

Institutional Policies: Students are responsible for reviewing policies on inclusivity, academic integrity, incompletes, sale of course materials, sexual misconduct, adverse weather, as well as student evaluation of instruction, and days of special concern/religious holiday statements. [Available at: https://tlcommons.wvu.edu/qualitymatters/syllabus-policies-and-statements]

Topics:

1. Probability (8 days - Chapter 1):

   (a) Set Notation and Venn Diagrams

   (b) Definition of Probability

   (c) Counting Rules

   (d) Permutations and Combinations

   (e) Conditional Probability and Bayes Rule

2. Discrete Probability Distributions (7 days - Chapters 2-3):

   (a) Definitions

   (b) Expected Value

   (c) Combinations of Random Variables

   (d) The Bernoulli Distribution

   (e) The Binomial Distribution

   (f) The Geometric and Negative Binomial Distributions

   (g) The Poisson Distribution

   (h) The Hypergeometric Distribution

   (i) The Multinomial Distribution

3. Continuous Distributions (9 days - Chapters 4-5):

   (a) Definitions and Expected Value

   (b) The Uniform Distribution

   (c) The Exponential Distribution

   (d) The Normal Distribution

   (e) Approximation by the Normal Distribution

   (f) The t-Distribution

   (g) The Chi-Square Distribution

   (h) The F-Distribution

4. Displaying sets of data (2 days - Chapter 6):

   (a) Sample Mean, Mode, Variance, Standard Deviation, Lower and Upper Quartile, Range

   (b) Box Plots and Other Data Display

5. Using Computer Software (1 day, if time permits)

6. Point Estimation and Sampling Distributions (3 days - Chapter 7):

   (a) Point Estimation

   (b) The Sample Mean and Variance

   (c) The Sampling Distribution of the Mean and Variance

7. Inferences on Population Mean (6 days - Chapter 8):

   (a) Confidence Intervals of Mean and Difference of Means

   (b) Hypothesis Testing of Mean and Difference of Means

8. Discrete Data Analysis (5 days - Chapters 9-10)

   (a) Inferences on Population Proportion

   (b) Comparing Two Population Proportions

   (c) Goodness of Fit Test for One Way

   (d) Testing for Independence in Two-Way

Grading: Your final grade will be based on homework, quizzes, four exams during the semester, and the final exam. Your final course score will be computed as follows:
11% Homework + 16% Exam 1 + 16% Exam 2 + 16% Exam 3 + 16% Exam 4 + 25% Final Exam

If you maintain a 70% homework average or better in the course, you will be rewarded with the option of dropping one of the exams if it helps your grade. In that case, you will unlock the following alternate grading scheme:

10% Homework + 24% (highest grade of the four exams) + 20% (2nd grade of the four exams) + 16% (3rd grade of the four exams) + 30% Final Exam

Letter Grade Cutoffs: A: 90%, B: 80%, C: 70%, D: 60%, F: below 60%

Homework: Homework assignments will be posted on the websites. Homework sections assigned during the week will be due on Fridays. There will likely be about 12 total assignments, and your lowest 2 homework scores will be dropped from grade computation.

Exams: There will be four exams, tentatively scheduled for Wednesday, February 5; Friday, February 28; Wednesday, April 1; and Wednesday, April 22. These will be 50 minute exams taken during the regular lecture time. The final exam time has been set by the university, and will be Wednesday, May 6 from 8:00-9:50. Make-up exams will only be given to students with excused absences, and such make-up exams must be scheduled within 24 hours of the missed exam.

Class policies:

- Graphing calculators will never be allowed during any exams. Scientific calculators will be considered on an exam by exam basis. You may use any calculator to help you do the homework if you wish, but you should keep in mind that you may be required to solve similar problems without a calculator on the quizzes and exams.

- While class attendance does not directly factor into your grade computation, attendance of each lecture is highly recommended. Regular attendance will tend to lead to better understanding of the course material, which tends to lead to better performance on exams.

- If you believe a problem on a homework assignment or midterm exam has been graded incorrectly, you must notify the instructor of your complaint within 7 days of the date the exam is handed back. If you are unable to retrieve your graded material at the time it is handed back, it is your responsibility to make arrangements with the instructor to retrieve the material at another time.

Getting Help: Always remember: asking for help when you need it is not a sign of weakness, but a sign of strength! Please feel free to come to office hours or email me if you have questions about the course material. If you are unable to make it to my regularly scheduled office hours, I am willing to make an appointment to meet at another time if possible. Additionally, you can get help in the Math Tutoring Lab in LRC 323 from 8 AM to 4:30 PM. Free tutoring is also available through Student Support Services, located in Benedum 130, and the Student Success Center, located in the library on the second floor of LRC. Finally, I would also encourage the formation of study groups, to learn from each other and help each other learn.