

**Math 448 - Probability and Statistics, Fall 2020**  
**Course Syllabus**

**Instructor:** Brian Leary

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**Office hours:** Social distancing guidelines necessitate that I will only be able to meet in-person in my office by appointment. I will be available for virtual face-to-face office hours on Google Meet using the meeting code TechMathLeary during the following times:

MON: 10am-11am, TUES: 1pm-2pm & 6pm-7pm, WED: 1pm-2pm, FRI: 10am-12pm

**Class Room/Time:** INN-B 201 & 203, MWF 9:00-9:50 am

**Course website:** [community.wvu.edu/~bal0018/math448F20.html](http://community.wvu.edu/~bal0018/math448F20.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.

**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 course grade will be based on your performance on exams. Your final course score will be computed as follows:

23% Exam 1 + 23% Exam 2 + 23% Exam 3 + 31% Cumulative Exam

There will also be an online exam given during final exams week. Provided that you have already passed the rest of the class with grade of D or better, this online exam will give you the opportunity to improve your grade by up to one letter grade.

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

**Homework:** Homework assignments will be posted on the websites, though you do not need to turn in anything and homework will not directly affect your grade. It is recommended that you do the assigned problems to solidify your understanding of the material and to improve your performance on exams.

**Exams:** There will be a total of five exams. The first three exams will be 50 minute exams taken during the regular lecture time, and are tentatively scheduled for Friday, September 18; Friday, October 9; and Friday, November 6. There will be a cumulative exam given on Monday, November 23. This cumulative exam will also be a 50 minute exam taken during the regular lecture time. The final exam time has been set by the university at 8:00am-9:50am on Wednesday, December 7. During this time, an online exam will be administered to students with a passing grade. Make-up exams will be given to students with excused absences, provided the student notifies the instructor of their absence and desire to make-up the exam in a timely manner, which is usually no later than 24 hours after 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.
- 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 virtually attend my 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.

### Special Notes:

- In ordinary circumstances, attendance of each lecture would be highly recommended. Regular attendance tends to lead to better understanding of the course material, which tends to lead to better performance on exams. However, the health and safety of everyone in our campus community depends largely on you making sure to stay away from campus if you feel symptoms of illness. If everything works the way it is supposed to work, every lecture will be streamed live online, so that you can still attend class remotely. While remote viewing of lectures is not quite the same as active in-person engagement in class, it's still a good way of learning the material and staying involved in the class.
- WVU is committed to maintaining a safe learning environment for all students, faculty, and staff. Should campus operations change because of health concerns related to the COVID-19 pandemic, it is possible that this course will move to a fully online delivery format. If that occurs, students will be advised of technical and/or equipment requirements, including remote proctoring software.

In a face-to-face environment, our commitment to safety requires students, staff, and instructors to observe the social distancing and personal protective equipment (PPE) guidelines set by the University at all times. While in class, students will sit in assigned seats when applicable and wear the required PPE. Should a student forget to bring the required PPE, PPE will be available in the building for students to acquire. Students who fail to comply will be dismissed from the classroom for the class period and may be referred to the Office of Student Conduct for further sanctions.

If a student becomes sick or is required to quarantine during the semester, they should notify the instructor. The student should work with the instructor to develop a plan to receive the necessary course content, activities, and assessments to complete the course learning outcomes.

**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>]