Patrick & Henry Community College

MTH 245 G2 Statistics I

Fall 2024 INSTRUCTOR: Shannon Harrell

OFFICE LOCATION: P&HCC West Hall, 2nd Floor, Room 202

OFFICE HOURS: M-F 12:30 – 3:00 P.M., or by appointment

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CLASS MEETING TIME: T/TH 7:45 – 9:15 a.m.

CLASSROOM LOCATION: P&HCC West Hall, Room 124

COURSE CREDITS: 3

PREREQUISITE(S): Completion of MTH 154 QR with a grade of "C" or better, or completion of MTH 161 or 167 with a grade of "C" or better accepted.

COURSE DESCRIPTION

This course is a dual enrollment college level course that presents an overview of statistics, including descriptive statistics, elementary probability, probability distributions, estimation, hypothesis testing, and correlation and linear regression. Applications of real-life data are used with Microsoft Excel, Minitab, and TI 84 Plus software.

COURSE INTRODUCTION

Because today's advances in technology make information and data readily available, effective analysis and interpretation are crucial. Critical thinking and interpretation are essential in understanding and evaluating information. The field of statistics meets these needs by preparing students to make informed and purposeful decisions. The concepts in this course will strengthen students' understanding of how statistics—as well as the underlying research and data—impact their perspectives and their everyday lives.

A. COURSE OBJECTIVES

Upon successful completion of this course, the student should:

- Develop effective study skills in order to master course content and objectives.
- Demonstrate an understanding of the basic mathematical skills used in statistics.
- Communicate clearly and effectively the principles of statistics using proper vocabulary.
- Apply the statistical concepts to solve applied problems in statistics, as well as in other disciplines.
- Use statistics in a technological environment.
- Develop effective study skills in order to master course content and objectives.

Content Covered

I. Graphical and Numerical Data Analysis

a. Identify the differences between qualitative, discrete quantitative, and continuous quantitative data.

b. Construct and interpret graphical displays of data, including frequency tables, box plots, line charts, histograms, and bar charts.

c. Compute measures of center (mean, weighted mean, median, mode), measures of variation (range, interquartile range, standard deviation, variance), and measures of position (percentiles, quartiles, standard scores).
d. Apply the Empirical Rule

II. Sampling/Experimental Design

a. Recognize a representative sample and describe its importance.
b. Identify methods of sampling.
c. Explain the differences between observational studies and experiments.
d. Recognize and explain the key concepts in experiments.

III. Probability Concepts

a. Describe the difference between relative frequency and theoretical probabilities and use each method to calculate probabilities of events.
b. Determine whether two events are mutually exclusive or independent.
c. Determine probabilities of composite events using the complement rule, the addition rule, and the multiplication rule.
d. Apply the Law of Large Numbers.
e. Distinguish between discrete and continuous random variables.
f. Use the binomial, normal, and t distributions to calculate probabilities.
g. Recognize or restate the Central Limit Theorem and use it as appropriate.
h. Identify when the use of the normal distribution is appropriate.
i. Identify when the t distribution is preferable to the normal distribution in statistical inference.
j. Distinguish between the distribution of a random variable and the sampling distributions of its associated sample statistics.
k. Identify the sampling distributions of the sample mean and the sample proportion and use them to make statistical inferences.

IV. Univariate Statistical Inference

a. Explain the difference between point and interval estimates.
b. Describe the concepts of best estimate and margin of error.
c. Construct confidence intervals for population means and proportions.
d. Interpret the confidence level associated with and interval estimate.
e. Distinguish between a two-tailed, left-tailed, and right-tailed hypothesis test.
f. Conduct hypothesis tests for population means and proportions.
g. Interpret the meaning of both rejecting and failing to reject the null hypothesis.
h. Describe Type I and Type II errors in the context of specific hypothesis tests.
i. Use a p-value to reach a conclusion in a hypothesis test.
j. Identify the interrelationship between hypothesis tests and confidence intervals.

V. Two-Sample Statistical Inference

a. Construct and interpret a confidence interval for the difference between two population means where the samples are independent and the population variances are assumed unequal.
b. Construct and interpret a confidence interval for the difference between two population means where the data consists of matched pairs.
c. Conduct a hypothesis test for the equality of two population means where the samples are independent and the population variances are assumed unequal.
d. Conduct a hypothesis test for the equality of two population means where the data consists of matched pairs.

VI. Correlation and Regression

a. Analyze scatterplots for patterns, linearity, and influential points.
b. Determine the equation of the least-squares regression line, and interpret its slope and intercept.
c. Calculate and interpret the correlation coefficient and the coefficient of determination.
d. Conduct a hypothesis test for the presence of correlation.

VII. Technology

a. Construct statistical tables, charts, and graphs using appropriate technology.
b. Calculate descriptive and inferential statistics using an appropriate statistical software package.
c. Complete statistical project.

B. VCCS CORE COMPETENCIES

Degree graduates will demonstrate the ability to

1.1 Understand and interpret complex materials;
2.6 Use problem solving skills;
4.1 Determine the nature and extent of the information needed;
4.2 Access needed information effectively and efficiently;
6.1 Use logical and mathematical reasoning within the context of various disciplines;
6.2 Interpret and use mathematical formulas;
6.3 Interpret mathematical models such as graphs, tables and schematics and draw inferences from them;
6.4 Use graphical, symbolic, and numerical methods to analyze, organize, and interpret data;
6.5 Estimate and consider answers to mathematical problems in order to determine reasonableness; and
6.6 Represent mathematical information numerically, symbolically, and visually, using graphs and charts.

C. METHOD OF INSTRUCTION

A variety of instructional methods will be utilized throughout this course. Students will be introduced to the mathematical concepts in the classroom via lecture, cooperative learning, and exploration. As a group we will work extensively on study habits, appropriate use of the graphing calculators, and student communication – both oral and written. Students will be encouraged to actively participate in the learning process to help ensure that they understand the material. Many examples will be provided through lecture and class activities. The use of e-mail and Canvas is essential.

D. TEXTBOOK(S) AND REQUIRED TOOLS OR SUPPLIES

Understandable Statistics: Concepts and Methods Eleventh Edition
Charles Henry Brase, Corrinne Pellillo Brase
Cengage Learning Inc., 2015

- Pencils
- Loose-leaf notebook paper (lots!)
- Colored Pencils
- 3" 3-ring binder (A little baby binder will not survive in this class. No, seriously….it won't survive because you are going to add to your statistical reasoning notes from last year)
- Dividers for 3-ring binder (one set with 4 tabs **labeled** notes, quizzes, tests, and projects)
- TI-84 Graphing calculator (you can borrow one from the school with a completed loan form)

E. STUDENT EVALUATION

Grades will be calculated using the points system (i.e. $\frac{points\ earned}{points\ possible}$ x 100). Each assignment will be worth a certain point value depending on the level of difficulty. Students will be assessed in various ways, including, but not limited to, homework assignments, activities, assessments, and projects.

- **Homework:**
  - For each lesson, students will be provided a note sheet and practice problems to complete for homework.
  - Students will discuss homework daily with a study partner. This will be followed by a class discussion led by the instructor.
  - Homework should be kept in a three-ring binder and should be organized chronologically. The student's name should be on the top right corner of every page.
  - There are no points associated with completing homework, but feedback will be provided to ensure that students understand the content. **Completing practice problems is essential to learning and understanding the content for this course.**

- **Assessments:**
  - One or two closed-book quizzes will be given in each unit, usually covering two or three sections of the chapter. These quizzes will be announced and will be a combination of multiple choice and free-response questions.
  - Quizzes will be completed in class and will be taken individually without the use of notes or other resources.
  - **Quizzes will be worth 50 points**.

  - A test will be given at the end of each unit. Tests are a combination of multiple choice and free-response questions.
  - Tests will be completed in class and will be taken individually without the use of notes or other resources.
  - **Tests will be worth 100 points**.

- **Projects:**
  - Students will be assigned projects throughout the semester to assess students' mastery of course content.
  - Depending on the level of difficulty, projects will be worth 50 points or 100 points as specified on the grading rubric provided with the project guidelines.
  - Projects not submitted by the due date will incur a 20% deduction per day after the due date.

- **Exam:**
  - An exam will be given at the end of the semester and will count 20% of the semester grade.

There are a few policies regarding final exams found in the Governor's School student handbook:

Semester Exam Policy

All students are expected to take semester exams on the day scheduled. Only in a rare case, such as illness confirmed by a physician, death in the family, or a required base school activity confirmed by a student's principal will a make-up be allowed. **All exceptions to the examination schedule must be approved ahead of time by the Director.** If a student does not report for a semester examination due to an emergency, the Governor's School office must be notified on the day of the exam by the student's parent/guardian. Failure to follow this policy may result in a grade of zero (0) for the exam.

F. GRADING SCALE:

A	90 - 100
B	80 - 89
C	70 - 79
D	60 – 69
F	59 – below

Final grade for the course is calculated as follows:
Grading Quarter 1: 40%
Grading Quarter 2: 40%
Final Exam: 20%

A student earning a grade of C or higher will earn college credit for this course.

G. EXPECTATIONS FOR STUDENT SUCCESS

Attendance

- **Students should email the instructor when missing a class to obtain the notesheet and/or any missed assignment(s).**
- Students should see the instructor the day he/she returns from a missed class to ask questions pertaining to the lecture and/or assignment.
- Students should make arrangements to make up any assessment that is missed due to absence.
- Students should submit a note to Mrs. East within 24 hours of the student's return with a valid reason for student's absence. **No make-up work will be allowed for unexcused absences and any assignment for that day will receive a zero**.

Submitting Work

- All assignments should be saved as "last name_first initial_assignment name".
- Students should submit all work by the due date. **If absent for any reason, the assignment should be scanned in as a pdf and emailed to the instructor.**
- All assignments that must be submitted electronically, i.e. projects or activities, should be turned in as **one document**, Microsoft Word or PDF. **The document can contain multiple pages if necessary, however, it should not be multiple attachments. If multiple attachments are submitted, then only the content in the first attachment will be graded.**

Check Grades

- Although all course content is delivered and posted using Canvas, grades will be entered in ThinkWave. Please make sure to check these every day. If there is a problem, see me immediately. DO NOT wait until the end of the grading quarter to discuss a problem.
- If you are caught cheating, the grade for that assignment will be a zero.

Class Atmosphere

- **Students should show respect for classmates and the instructor, listen carefully, and not interrupt someone who is talking.**
- **Cell phones and smart watches may not be used in class and must be placed on the silent mode setting before entering the classroom. All students will place their cell phones and smart watches in the "cell-phone holder" each day upon entering the classroom.**
- **Students should abide by all rules as outlined in the student handbook.**
- **Students may have food and drinks in the classroom; however, students must leave their area clean.**
- **Students should respond to any emails that you receive from the instructor (individual or group emails should be answered).**

WHAT A STUDENT CAN EXPECT FROM THE INSTRUCTOR

- Continuous support, assistance, and encouragement.
    - **Access to all lessons**. Lessons will be recorded, uploaded to YouTube, and the link will be posted on a Google Doc. Access to the Google Doc is available on Canvas.
    - **One-on-one tutoring**. The instructor will be available between classes and after governor's school for tutoring. Tutoring is available at other times by appointment. Please email if you would like to set up a time to meet to work on specific questions or topics/concepts.
    - **Timely responses to emails**. Students should **email the instructor using their pgsmst email accounts and emails should be sent to sharrell@pgsmst.com.** I check my email frequently each day, Monday – Friday, to answer any questions about homework, assignment clarification, etc., and I will answer within 24 hours. I check my email sporadically on Saturday and Sunday and will respond within 48 hours.
- Feedback
    - The instructor will evaluate routine assignments within 72 hours. For more involved projects or assignments, expectations will be communicated with students regarding grading and feedback.

H. EMERGENCY INFORMATION

In case of emergency students should exit the classroom, turn left, and then turn left to exit the building through the automatic doors. Students should proceed quickly and quietly to the far end of the parking lot adjacent to Stone Hall.

I. STUDENT SUPPORT/DISABILITY STATEMENT:

Patrick & Henry Community College makes every effort to accommodate individuals with disabilities for all programs, services, and activities available to the public.

J. IMPORTANT DATES TO REMEMBER:

The school calendar is available in the student handbook and at the following link: www.pgsmst.com.

*****Henry County/Martinsville work days do not impact classes at Piedmont Governor's School.*****

K. SPECIFIC COLLEGE POLICIES

Academic Honesty

Students are expected to abide by the code of conduct and academic integrity found in the student handbook. Students will be required to sign a pledge on any take-home quizzes/tests stating *"On my honor, I have neither given nor received aid on this assignment."* Infractions of the honor code will not be tolerated and will be reported to the director and will be addressed with the student and his/her parent(s)/guardian(s). All violations of academic integrity will also be reported to each student's honor organization.

Inclement Weather

If Henry County Schools are delayed one hour, Governor's School will open one hour late. One common question asked is "If my base school is closed but roads in my residential area are clear, should I come to Governor's School?" The decision to attend under those circumstances should be made by the parent(s)/guardian(s). If Henry County Schools are delayed two hours, Governor's School classes will be canceled. If Henry County Schools are closed, Governor's School is closed and classes do not meet. If Patrick Henry Community College is closed, Governor's School will be closed. Assignments and/or lectures may be posted on Canvas on days when Governor's School classes are affected by inclement weather. It is the student's responsibility to check Canvas and complete the assignments before their next class meeting.

L. RESOURCES

- BRAIN FUSE is an online tutoring service and is embedded into Canvas. Click on the course and select "Brainfuse tutoring" from the main screen, left sidebar, to have access to a live tutor.

  brainfuse empower learning is an online tutoring service which gives students 24/7 access to highly qualified, experienced, and specially trained tutors. Virtual whiteboard technology lets students and tutors share the same screen. Students may submit writing assignments to be evaluated / proofread. All live sessions with tutors and submitted questions are saved so students can view or print them out. Any PHCC student can access Brainfuse ***free*** of charge. Brainfuse can only be accessed through Canvas. Further information may be obtained from your instructor or the Writing Center Tutors.
- P&HCC Math Lab

  The P&HCC Math Lab is located in the LRC. Hours for this lab change each semester and are posted in the lab and on the P&HCC website (academics>math resources). Experienced math tutors are always available in the math lab to assist students with their math. In addition, the math lab has computers available for student use. The P&HCC tutoring coordinator can be reached at 276-656-5496 to schedule free, individual tutoring.
- Some other resources for tutoring are as follows:
  - Zoom meeting with instructor
  - Youtube
  - Khan Academy
  - Teacher Tube
  - Canvas – Teacher instructional videos on Google Doc

M. AFFIDAVIT

My signature below indicates that I have read and understand this syllabus.

Student Name _____ Parent/Guardian Name _____

Student Signature _____ Parent/Guardian Signature _____

Date _____ Date _____

Note: *This syllabus is subject to change at the discretion of the instructor. It is the responsibility of the student to keep abreast of these changes.*

This syllabus conforms to the Patrick & Henry Community College syllabus guidelines.