

SYLLABUS – MATH 1530
PROBABILITY AND STATISTICS
Mr. Camden Harrell
MWF 8-8:55 am
Dunn 129

Office Hours: TBA

Textbook: *Statistical Reasoning for Everyday Life* by Bennett, Briggs and Triola, Pearson publishing.

Topics Covered:

Part I:

This section of the course will lay the foundation for why the study of statistics is important to everyone and provide some basic tools that consumers of statistics can use to judge the validity and quality of statistical information they receive. Emphasis will be on developing the concepts of random sample, designed experiments, observational studies, good survey practices, and looking for misleading components of an analysis. Topics include:

- Observational studies
- Experiments
- Data ethics
- Measurement mistakes
- Sampling methods
- Confounding variables
- Percentages in statistics
- Level of measure
- Data types – discrete and continuous

Part II:

In this section of the course you will learn to draw and interpret various graphs and learn which type of graph is appropriate for the type of data you have. You will also learn about measures of central tendency and variation and learn which measure is most appropriate for the level of measure of your data (nominal, ordinal, or numerical). This section is important in order for you to be able to perform exploratory data analysis on data you collect in order to understand what level of measure you have and what sort of further analysis might be most appropriate. Topics include:

- Histograms
- Frequency distributions
- Graphs – bar graphs, pie charts, line graphs, stemplot
- Numerical descriptions of data
- Measures of central tendency – mean, median, mode
- Measures of variation – five number summary, standard deviation

Part III:

This section of the course will focus on the various ways of defining probability and the rules that all probability assignments must follow. We will learn to compute probabilities for common models such as tossing a coin and rolling a die. The concepts of sample space, events, mutually exclusive events, independent events and conditional probability will be discussed. Also discussed will be the assignment of personal probabilities and why these are often distorted and how and why our intuition

can vastly differ from true probabilities. Properties of the normal distribution will be discussed as well as standardizing values and obtaining probabilities associated with the normal distribution. In addition concepts of correlation and best-fit lines for prediction will be discussed, including correlation versus causation. It is essential that you gain an understanding of the material in this section in order to understand the results of any analysis you choose to perform on your data. For this section there will be supplemental material to that presented in the textbook. Topics include:

- Normal distribution
- Central limit theorem
- Statistical significance
- Probability
- Risk
- Expected values
- Correlation

Part IV: Inference

In this section various types of analysis are discussed. The type of analysis that is appropriate depends on what you want to do with your data – whether estimate an unknown quantity or test a hypothesis. The type of analysis also depends on what level of measure you have in your data. We will discuss concepts such as the p-value which will rely heavily on the previous section's material, as well as how to set up a hypothesis test – which should be null and which should be alternative, and we will compute some confidence intervals and learn the correct interpretation of our results. This section is important in that it will demonstrate some basic concepts and techniques that will allow you to start thinking about appropriate analysis. Topics include:

- Variation in samples
- Estimating means
- Estimating proportions
- Confidence intervals
- Hypothesis testing
- Meta-analysis

REQUIRED EQUIPMENT:

The textbook is required and will come with an online access code that will allow the student to do the on-line homework assignments. Internet access will be required for on-line homework assignments.

REQUIRED EXCEL LABS:

There will be 5 excel labs during the semester. Since we will be using **Excel for Stat Labs**, you need to download and install Microsoft Office on your own personal devices free of charge at <http://memphis.edu/getoffice> Each lab will be during scheduled class time for this course. Each lab will have an assignment for the student to turn in. Labs cannot be made up so it is very important that you not miss any labs.

RESOURCES AVAILABLE TO THE STUDENT:

Free tutoring help is available through the Educational Support Program (ESP) in Dunn Hall room 143. Go to the Department of Mathematical Sciences' web page at www.msci.memphis.edu to find the hours of operation. The math department has made it a priority to have at least one graduate student studying statistics available at all times. This is a wonderful resource that is free to you. Take advantage of it or make arrangements to visit your instructor for more help.

EVALUATION:

There will be three in class tests plus a final exam worth 100 points each. In addition there will be on-line homework assignments that will count a total of 100 points. The excel labs will count a total of 100 points towards the final grade. There will be 100 points possible for attendance. The total possible number of points is 700. The students grade in the course will be based on the percentage of the possible 700 points obtained according to the following scale.

90-100% - A

80 - 89% - B

70 – 79% - C

60 – 69% - D

Below 60% - F

No makeup tests will be given. If you must miss a test for any reason, your final exam grade may be used to replace the test missed if approved by the instructor. If you miss more than one test you will receive a zero on each test missed after the first. If you miss the final exam you will receive a grade of zero on the final exam. Each homework assignment will have a due date assigned. If the homework is not completed by the due date, the student will receive a grade of zero on that assignment. No replacement grades will be possible for any homework assignments not completed by the due date. **It is very important that you do not miss any tests or homework assignments or excel labs.**

ATTENDANCE:

Attendance in the course is mandatory and will be given a score which will be considered as a part of the grade. The attendance grade will be computed according to the following rules:

Two and one half / 2.5 / points off the attendance grade / 100 / will be deducted for each absence that is not excused for classes that meet MWF.

Four /4/ points off the attendance grade of /100/ will be deducted for each absence that is not excused for classes that meet two times per week (either MW or TR).

Excused absences will be approved by the course coordinator for Math 1530, Dr. Dale Bowman and you may contact her regarding absences at ddb Bowman@memphis.edu.

/ example: if student missed 2 classes without excuse from a MWF class, his/her attendance score will be $100 - 2 \times 2.5 = 100 - 5 = 95$ /.

YOU MUST STAY FOR THE ENTIRE CLASS PERIOD TO BE CONSIDERED PRESENT DURING THE CLASS.

STUDENT DISABILITY POLICIES ACOMODATION AND SERVICES: Information available at www.memphis.edu/sas

ACADEMIC MISCONDUCT: The University policy is available at www.memphis.edu/studentconduct/misconduct.htm

The instructor has the right to remove anyone from the classroom for disruptive behavior at any time and has the right to have the student removed from the class. If you are removed from the class you will be considered absent for that class period. Behavior that might be considered disruptive includes but is not limited to:

Cell phones that ring in class

Talking during class

Interrupting the instructor during a lecture
Leaving before the class is over
Making rude sounds in class

The professor reserves the right to make any necessary changes to the information provided in the syllabus during the semester.

Course Schedule

24-Aug	Section 1.1	What is/are statistics
26-Aug	Section 1.2	Sampling
28-Aug	Excel lab 1	Intro to Excel
31-Aug	Section 1.3	Types of statistical studies
2-Sep	Section 1.4	Should you believe a statistical study?
4-Sep	Excel lab 2	Sampling
7-Sep	OFF	
9-Sep	Section 2.1	Data types and levels of measurement
11-Sep	Section 2.2	Dealing with errors
14-Sep	Section 2.3	Uses of percentages in statistics
16-Sep	TEST1	Chapters 1 & 2
18-Sep	Section 3.1	Frequency Tables
21-Sep	Section 3.2	Picturing distributions of data
23-Sep	Section 3.3	Graphics in the media
25-Sep	Section 3.4	A few cautions about graphics
28-Sep	Section 4.1	What is average
30-Sep	Section 4.2	Shapes of distributions
2-Oct	Excel lab 3	Exploratory data analysis
5-Oct	Section 4.3	Measures of variation
7-Oct	Section 4.4	Statistical paradoxes
9-Oct	TEST2	Chapters 3 & 4
12-Oct	OFF	
14-Oct	Section 5.1	What is normal
16-Oct	Section 5.2	Properties of the normal distribution
19-Oct	Section 5.3	Central limit theorem
Oct 21	Section 6.1	The role of probability in statistics: statistical significance
23-Oct	Section 6.2	Basics of probability
26-Oct	Section 6.3	The law of large numbers
28-Oct	Section 6.4	Ideas of risk and life expectancy
30-Oct	Excel lab 4	Probability through simulation
2-Nov	Section 6.5	Combining probabilities
4-Nov	Section 7.1	Seeking correlation
6-Nov	Section 7.2	Interpreting correlations
9-Nov	Section 7.3	Best-fit lines and prediction
11-Nov	Section 7.4	The search for causality

13-Nov	Excel lab 5	Correlation
16-Nov	TEST3	Chapters 5,6,&7
18-Nov	Section 8.1	Sampling distributions
20-Nov	Section 8.2	Estimating population means
23-Nov	Section 8.3	Estimating population proportions
25-Nov	OFF	
27-Nov	OFF	
30-Nov	Section 9.1	Fundamentals of hypothesis testing
2-Dec	Review for comprehensive	Final