MATH 1530-503/D15: PROB/ STATISTICS/ Non-Calculus-Fall 2020- (Syllabus)

PREREQUISITE: MATH 1710 with a minimum grade of C⁻ or an ACT MATH sub-score of at least 15.[G].

Students who have enrolled without satisfying the pre-requisites are subject to dis-enrollment by the Mathematical Sciences Department.

Class: MW   Room: Online via Zoom   Time: 9.10 AM to 10.35 AM
Instructor: Andrew Okimait.
Email: aokimait@memphis.edu;   **Office Hours: By appointment via Zoom**

Textbook: Textbook: *Statistical Reasoning for Everyday Life*, **5ᵗʰ edition, 2018 by Bennett, Briggs and Triola, Pearson publishing.**   ISBN: 9780135910474
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, stem plots
        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, y**ou 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 don't miss any labs.

Final Exam and Test Dates:
Final Exam: Wednesday, November 18, 2020
Test 1: Wednesday, September 2, 2020
Test 2: Wednesday, October 7, 2020
Test 3: Monday, November 2, 2020

COURSE MODE OF INSTRUCTION
Due to COVID-19 pandemic, this course will be conducted entirely online and will remain so until such a time when the University of Memphis administration deems it safe for students and staff to return on campuses. I will let you know if we can resume face-to-face classes.

RESOURCES AVAILABLE TO THE STUDENT:
If you need help in the course, please do not hesitate to contact me via email aokimait@memphis.edu
All communications to me must be conduct via your university of Memphis email account. Emails sent via private accounts such as gmail, yahoo are unacceptable. Free tutoring help is also available through the Educational Support Program (ESP) in Dunn Hall room 341 – In person tutoring currently unavailable due to COVID-19.

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 student's 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 test 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:
>   Four /4/ points off the attendance grade of /100/ will be deducted for each absence that is not excused.
>   example: if a student missed 2 classes without an excuse from the class, his/her attendance score will be 100- 2x4 = 100-8=92 /.

You must stay for the entire class period to be considered present during the class.
Excused absences will be approved by the Instructor. You should send me an email regarding **absences within one week of your absence** at aokimait@memphis.edu

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/miscondut.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 Instructor reserves the right to make any necessary changes to the information provided in the syllabus during the semester.

STUDENT USEFUL GUIDE ON COVID-19
https://www.memphis.edu/msci/news/covid.php This is a departmental webpage with detailed information about COVID-19 procedures.

Fall 2020

<div align="center">

CALENDAR

</div>

MW

Date	Section	Topic
17-Aug	Section 1.1	What is/are statistics?
19-Aug	Sec 1.2	Sampling
24-Aug	Section 1.3 & 1.4	Types of statist. studies & should we believe a statistical study?
26-Aug	Section 2.1	Data types and levels of measurement
31-Aug	Section 2.2 & 2.3	Dealing with errors and use of percentages in statistics
2-Sep	**Test 1**	**Chapters 1 & 2**
7-Sep		**Holiday**
9-Sep	**Excel Lab 1**	Introduction to Excel
14-Sep	Sec 3.1& Sec3.2	Frequency Tables &Picturing distributions of data
16-Sep	**Excel Lab 2**	**Sampling**
21-Sep	Section 4.1 & 4.2	What is average
23-Sep	Section 4.3 & 4.4	Measures of variation and statistical paradoxes
28-Sep	**Excel Lab 3**	**Explanatory Data Analysis**
30-Sep	Sec 5.1	What is normal?
5-Oct	Section 5.2 & 5.3	Properties of the normal distribution & central limit theorem

7-Oct	**Test 2**	**Chapters 3, 4, 5**
12-Oct	Section 6.1 & 6.2	The role of probability in statistics & Basics of probability
14-Oct	Sec 6.3 & Sec 6.4	The law of large numbers & ideas of risk and life expectancy
19-Oct	Section 6.5	combining probabilities
21-Oct	Sections 7.1 & 7.2	Seeking correlation and interpreting correlation
26-Oct	Sec7.3 & Sec 7.4	Best-fit lines and prediction & the search for causality
28-Oct	**Excel Lab 4**	**Correlation**
2-Nov	**Test 3**	**Chapters 6 & 7**
4-Nov	**Excel Lab 5**	Probability through simulation
9-Nov	Sec 8.1	Sampling Distributions
11-Nov	Sec 8.2&8.3	Estimating population means and population proportions
16-Nov	Sec 9.1	Fundamentals of hypothesis testing
18-Nov		**Final Exam**