Math 1530 Probability and Statistics Uni

Course Description: (3 credit hours.) Underlying ideas of statistical and quantitative thinking; randomization in sample survey methods and design of experiments; double blind experiments and observational studies; descriptive and summary statistics; measurement errors; probability models; normal approximation; tests of significance and *p*-values, basic concepts of correlation and regression analyses; MINITAB. **Note:** Math majors may not use this course as part of the major.

Prerequisites: <u>Math 1100</u> or <u>Math 1420</u> or <u>Math 1710</u> with a minimum grade of C-, or a minimum score of 46 on the <u>ALEKS math assessment test</u>. Students who have enrolled without satisfying the prerequisites are subject to disenrollment by the Mathematical Sciences Department.

Student population: Lower Division Students. This course will fulfill a mathematics general education requirement in some degree programs.

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

Required equipment: The textbook is required and will come with an online access code that will allow the student to do the online homework assignments. Internet access will be required for online homework assignments. The login site for the online homework is http://www.pearsonmylabandmastering.com/northamerica/mystatlab/

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.

Tutoring: Free tutoring is available through the University's Education Support Programs. They offer a drop-in tutoring service in the <u>Math Learning Center</u> in DH 341 and <u>online</u> <u>assistance</u>. 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.

Disabilities: Any student who anticipates physical or academic barriers based on the impact of a disability should contact <u>Disability Resources for Students (DRS)</u> at 110 Wilder Tower, 901.678.2880 at the earliest opportunity. DRS coordinates access and accommodations for students with disabilities. You must give your instructor a copy of any accommodation memos provided by the DRS within the first week of class.

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, stemplots 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

Evaluation: There will be three in class tests plus a final exam worth 100 points each. In addition there will be online 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 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 (out of 100) will be deducted for each absence that is not excused for classes that meet MWF.

Four (4) points off the attendance grade 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 ddbowman@memphis.edu. Example: if student missed 2 classes without excuse from a MSF 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.

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