Math 113 – Introduction to Course

Math 113 is an Applied Statistics course. That means that we will be doing lots of hands-on activities, gathering real data, and using the computer to analyze it. We will not focus on the formulas although we will look at them some to help show the relationship between all of this and how it all fits together. The purpose of this portion of the course is to get an overview of the different parts of the course and get an idea of what the "big picture" of statistics is. Then we will go through and fill in the details throughout the rest of the course. At the end of the semester, you will do another project where you select the groups and topics and carry the process through all the way on your own. There will be a written paper and classroom presentation about your topic. This semester project will serve as your final exam for the course.

You will be expected to read in this course. There are detailed explanations available on the website for using the computer, but you will need to read them carefully and comprehend them.

At times, it will seem that this course is about using the computer. That is not what this course is about. It is about statistics, but the computer and a program called Minitab will be used extensively to prepare graphs, describe data, and make inferences. We are going to concentrate on the interpretation of the computer output, but you will be expected to be able to generate that output.

The Big Picture – What is Statistics

The definition of statistics is that it is a collection of methods for planning experiments, obtaining data, and then organizing, summarizing, presenting, analyzing, interpreting, and drawing conclusions based on that data.

That is a very nice definition, but what does it mean?

In statistics, we hope that you will learn to become critical thinkers. We want you to question things that you hear and see. If you read that "100% of mother's think their relationships with their kids is good or excellent"[1], it's okay to go "that ain't right!" This course will provide you with some of the tools that you need to determine whether or not those claims are right.

Statistics is about determining how close is close enough. For example, if you flipped a coin 100 times and 47 of them were heads, you would probably continue to believe that you will get a head half the time you flip a coin. But if you were to flip a coin 100 times and only get 10 heads, then you would probably think something strange is going on. Somewhere between 47 heads and 10 heads, you stop believing that it's just luck of the flip and start thinking something else is going on. Understanding that line between normal random chance and something unusual involves an understanding of probability and how likely something is to happen, so we will spend a lot of time examining probabilities.

Statistics is about taking a small group of items called a sample and using it to make generalizations, conjectures, or inferences about a larger group called a population. There is no way that you could ask every U.S. adult whether or not they were in favor of the Roe vs. Wade decision that legalized abortion in 1973. But, you could ask 1,016 people in a good randomized survey and find that 49% of your sample favor Roe vs. Wade, then about 49% of everyone will favor Roe vs. Wade[2]. On the other hand, a sample of 128,000 people that claimed to define community standards and showed 93.1% of people oppose partial nudity on television during children's viewing hours is worthless at estimating how most people feel if it is collected poorly[3]. Another survey that was conducted using proper statistical

techniques only sampled 1,505 people but showed that only 30% of adults are "bothered a lot" by sexual content on television[4]. Another study of 1,001 parents found that 60% are "very" concerned about the amount of sex their children are exposed to on TV[5].

Statistics provides you with a set of tools to make informed decisions. However, there is some terminology that you'll need to learn and some words that you'll need to re-learn. For instance, "deviation" and "error" are usually bad things, but in statistics, they just describe how far something is from what you expected to get. "Total" doesn't always mean sum, but often means all things combined, and if you don't understand this and just add the values, you will get the wrong answer.

Introductory Project

This first portion of the class will involve taking a topic, gathering data about that topic, describing the data graphically and numerically, and making inferences about the population based on your sample.

Topic: Global Warming

Environmentalists are up in arms about the global warming situation. The EPA's website claims that the Earth's surface temperature has risen about one degree Fahrenheit in the past century[6]. While we won't be able to test that claim, we can test to see whether the temperature in Decatur, IL, is different than it was in previous years.

Written Paper (70 points)

Part of this project will involve writing a paper explaining what you have found. Most of this will involve copying and pasting from Minitab into Word. However, you should always include an explanation of what people should look for when you copy the computer output. There is no minimum length or maximum length, but the instruction sheet will give some specific information that should be included. Email this document to the instructor at james@richland.edu when you are finished.

PowerPoint Presentation (10 points)

There will be an oral presentation and you should create a PowerPoint presentation to be used during that presentation. Include the context of the data and some of the more interesting graphs and charts and definitely include the descriptive statistics and inferential statistics. You do not need to get fancy and include animations or other transitions, although if you have time and know how to do that, you are certainly welcome to do so. Not everything that goes into your paper needs to go into the PowerPoint presentation, but you may want to borrow information from the written paper when creating the slide show.

Oral Presentation (10 points)

There will be a short oral presentation of your results to the class. This presentation should use the PowerPoint presentation that you have created. This should only be 3 to 5 minutes in length and focus on the main points. Be sure to tell people who you are and what topic you explored. Show some graphs and provide responses to the claims under the inferential statistics section.

Peer Evaluations (10 points)

For each person in the group, including yourself, write a few sentences detailing what they contributed to the group effort. Then award each person a score of between 0 and 10 for their participation. This is the only part of the group project that is individual. You should email the evaluations to the instructor. The evaluations do not need to be attachments, they can just be in the text of the email. Your grade will be an average of all of the team's evaluations and my evaluation of your evaluation.

Context of the Data

The context of the data answers the questions who, what, where, when, why, and how. It refers to the data, not to the person collecting the data. Not all of the context is always available, but you must always have the who and what to have meaningful data. Always include a context with your projects.

Who was the data collected about? This does not have to be a person, even though that is what *who* would imply. The who becomes a row in the data table.

What information was collected? Describe each variable as a category or a number and include any units. The what becomes a column in the data table.

Where was the data collected? This isn't the website where you got the information, but the location where the data were collected like the airport in Decatur, Illinois.

When was the data collected? If you are getting information from a website, give the dates when the information was originally collected, not the date when you gathered it from the Internet.

Why was the data collected? What was the purpose in gathering the data?

How was the data collected? Was it a telephone survey, a phone-in survey, etc?

Works Cited

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3. Bozell, L. Brent, III. "Inaction at the FCC". *Media Research Center*. May 28, 2003.
    <http://www.mediaresearch.org/BozellColumns/entertainmentcolumn/2003/col20030528.asp>

4. "Support for Tougher Indecency Measures, But Worries About Government Intrusiveness" *The Pew Research Center for the People and the Press*. April 19, 2005.
    <http://people-press.org/reports/display.php3?ReportID=241>

5. "Parents, Media and Public Policy: A Kaiser Family Foundation Survey." *Kaiser Family Foundation*. September 23, 2004. <http://www.kff.org/entmedia/entmedia092304pkg.cfm>

6. "Global Warming - Climate" *U.S. Environmental Protection Agency*. January 7, 2000.
    <http://yosemite.epa.gov/oar/globalwarming.nsf/content/climate.html>