STAT 330: INTRODUCTION TO STATISTICAL SOFTWARE Section A75 SUMMER 2015

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COURSE HOURS

At your leisure – plan accordingly, and use your time wisely! Keep in mind that if this were a face-to-face class, you would spend 100 minutes per weekday in class alone. In addition to this, you would be expected to put in additional time outside of class for reading, completing assignments, and studying. I will expect you to do at least the same amount of work as if this course was meeting in person—I will not compromise the integrity of the course. Since we are not meeting in person, some students will find that they need to put in additional time to understand the material. Make sure you do not fall behind!

COURSE DESCRIPTION

Prerequisite: 3 hours of undergraduate statistics with a grade of "C" or better, or consent of instructor. Using proprietary and open-source statistical software for data analysis. Interactive techniques for data management, manipulation and transformation. Interactive techniques for data error checking, descriptive statistics, basic inferential statistics, and basic report generation such as tabular and graphical displays. Introduction to scripts and batch processing when applicable. Proper use and interpretation of the methods are emphasized.

REQUIRED TEXTBOOK

Delwiche and Slaughter (2012). The Little SAS Book: A Primer (5th edition), Cary, NC: SAS Publishing.

TECHNOLOGY

- **Reliable Internet Access** Since this is an online course, you must have reliable Internet access. I strongly suggest that you also have a back-up plan for when your Internet access is down. *Any equipment problems will not be considered a valid excuse for missing assignments*
- Blackboard We will be using Blackboard[®] for the course homepage. Class notes, assignments, and announcements will be posted there (some announcements will also be sent to your WKU e-mail). Information about Blackboard[®] and other campus computing resources can be found at <u>www.wku.edu/infotech</u>. It is assumed that all students are familiar with and are capable of using Blackboard.
- **SAS** We will be using the statistical software package SAS for this course. SAS is available for use in the open on-campus Student Technology Centers (see www.wku.edu/it/labs/locations hours.php for locations and hours). Additionally, SAS is also available in the Math Computer Lab in COHH 2125 (generally open M-F 8:00 4:30; however, it is sometimes reserved for a class). Students can download SAS to their personal computers for free from the WKU Software Center at https://asaweb.wku.edu/php/prod/elms/3lmslogin.php. Alternatively, students can access a version of SAS online via SAS OnDemand (details to be given). This will not be identical to what is presented in the class notes; however, students using SAS OnDemand can make the necessary modifications in order to complete much of the course material. Please note that there may be some topics for which SAS OnDemand and will not be useable and/or appropriate.
- **R** We will also be using the R software package for data analysis and exploration. R can be downloaded for free at <u>www.r-project.org</u>.

CONTACTING DR. AUTIN

- E-mail will generally be the best way to contact me. During normal business hours, I usually respond to email fairly quickly (unless I am in a meeting/class/etc.). Please keep in mind that I am not as quick to respond to e-mail in the evenings or during the weekends/holidays. Please consider e-mail as a method of *professional* correspondence. Thus, you should do your best to use correct grammar, punctuation, and capitalization.
- If you call me and I do not answer, please make sure to leave a message.
- You should always feel free to stop by my office, especially during my office hours.

ACADEMIC DISHONESTY

"Students who commit any act of academic dishonesty may receive from the instructor a failing grade in that portion of the coursework in which the act is detected or a failing grade in the course without possibility of

withdrawal." Plagiarism will not be tolerated. "To represent written work taken from another source as one's own is plagiarism. Plagiarism is a serious offense. The academic work of a student must be his/her own. One must give any author credit for source material borrowed from him/her. To lift content directly from a source without giving credit is a flagrant act. To present a borrowed passage without reference to the source after having changed a few words is also plagiarism."

(See http://www.wku.edu/undergraduatecatalog/documents/ugrad 14 15 files/academic information.pdf.)

ATTENDANCE

We will not have a set meeting time when everyone will be online; however, you are expected to be online for a period of time *every day* to check for communication from me and/or to check the discussion board.

STUDENT ACCESSIBILITY RESOURCE CENTER (FORMERLY OFFICE FOR STUDENT DISABILITY SERVICES)

In compliance with University policy, students with disabilities who require academic and/or auxiliary accommodations for this course must contact the Student Accessibility Resource Center located in DSU 1074. Contact them via phone at 270-745-5004 [270-745-5121 V/TDD] or email at <u>sarc@wku.edu</u>. Please do not request accommodations directly from the professor without a letter of accommodation (LOA) from the Student Accessibility Resource Center.

TIME ZONE

All times mentioned in this course (due dates, etc.) are in the central time zone.

GRADED WORK

- **Exams** (18% each) Four exams will be given during the course of the semester. The exact dates will be announced on Blackboard early in the semester. You will take each exam in an approved testing center. There will be a "window of opportunity" to take each exam. These "windows of opportunity" will be short (one week each), so it will be very important for to you to schedule your test as soon as you are able (I will send a detailed email about this once the first test is scheduled). Each student will schedule their testing time online with the appropriate testing center. All students will take these tests on one of the allotted days at the time in which they scheduled to be at the testing center. The only exceptions will be no planned make-up tests, and missing a test will result in a zero. Only under the most **extenuating** circumstances will a make-up test be considered if the instructor is aware of an issue in **advance**.
- Assignments (28%) There will be fourteen assignments for this course. For a variety of reasons, assignments must be turned in via the links provided on Blackboard. All submitted files must include the student's name in the filename as well as at the top of the first page of the document. If there is a problem uploading a document, then email me, and I will give you instructions on how to proceed. Acceptable file formats will be indicated for each assignment. Additionally, corrupted files will not be opened. WKU offers a free version of the Symantec antivirus software to all students (www.wku.edu/software). If I can't open the file, then I can't grade it and give you feedback!

GRADING SCALE

90% - 100% A 80% - 89% B 70% - 79% C 60% - 69% D 0% - 59%	90% - 100% A	80% - 89% B	70% - 79% C	60% - 69% D	0% - 59% F
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GRADEBOOK

Please consider the online gradebook as a courtesy to you, subject to errors given various upgrades and shifts in the software. I reserve the right to make gradebook corrections to keep it consistent with the syllabus so that your grade reflects true performance, not software or user error. If you see something that doesn't make sense, please alert me.

IMPORTANT DATES

June 10: Last day to add/drop classes July 3: Observance of Independence Day June 24: Last day to drop a class with a W (withdrawal); last day to change a class from credit to audit

TECHNICAL SUPPORT

WKU Students can call 270-745-7000 for technical support with Blackboard or general computer problems. Additionally, live chat support is available through <u>www.wku.edu/it/chat</u>. Other information can be found at <u>www.wku.edu/it</u>. A number of short videos on common questions about software and technology are available via the Video Tutorials link at <u>www.wku.edu/it/training</u>. Please note that they will *not* provide technical support for SAS or R.

GENERAL STATEMENT

This class will contain material that builds on previous material covered, so DO NOT FALL BEHIND! If you do not *carefully* go through the notes, you will find the assignments *very* difficult. If you do not do the assignments, you will find the exams *very* difficult. If you are having trouble with a topic covered, contact me as soon as problems arise (i.e., not the day before the exam). Also, it is your responsibility to check Blackboard regularly and to be aware of all due dates. "I didn't know" is not a valid excuse!

OUTCOMES

Statistics promotes quantitative critical thinking skills that should serve the student in the rest of their course of studies at WKU. Specific outcomes that should prove valuable include the ability to:

- Program in SAS proficiently and capably in R.
- Create and manage (small and large) datasets using computer software.
- Generate appropriate and meaningful graphics and statistics.
- Understand the syntax in order to perform standard statistical analysis techniques.
- Create macros in SAS and functions in R.
- Perform simulations using appropriate software.
- Identify and correct errors in syntax.

OBJECTIVES

A list of specific course objectives is given below. (Please note that some of these objectives may be removed/modified during the course of the semester.)

After an introduction to SAS students will be able to:

- Identify the Output, Editor, Log, and Graph windows.
- Edit and debug SAS programs based on information from the Log window.
- Use the SAS Online Documentation to look up information.
- Produce readable output using appropriate options.

After studying the material on data entry in SAS the student will be able to:

- Input data using the CARDS/DATALINES statement.
- Obtain data from a file using the INFILE statement.
- Use the Import and Export functions in SAS.
- Read-in data in various formats.
- Create and redefine variables.
- Use the LIBNAME statement to generate permanent datasets.
- Distinguish between permanent and temporary datasets in SAS.
- Print data to Output or Results Viewer window.

After studying the material on data management in SAS students will be able to:

- Create new variables using IF/THEN statements.
- Create new datasets using the SET and WHERE statements.
- Merge or subset datasets as necessary.
- Sort data when necessary.

After studying the material on data analysis in SAS students will be able to:

- Obtain descriptive statistics using the MEANS and UNIVARIATE procedures.
- Summarize the data using a variety of procedures such as FREQ, SUMMARY, CHART, and TABULATE.
- Generate appropriate graphical statistics using the PROC PLOT and GCHART and other procedures with appropriate options.
- Understand the syntax for t-tests and regression.
- Employ the CLASS and BY statements to generate descriptive statistics and analyses for subsets of data.

After studying macros in SAS students will be able to:

- Write macros when necessary.
- Run macros that are located in the same or separate files.
- Identify when it is advantageous to use a macro.

After an introduction to R students will be able to:

- Identify different types of objects (vectors, matrices, etc...).
- Use the appropriate search options to locate help information.
- Manage objects in the R workspace.

- Enter data using the concatenate function.
- Create simple sequences in a variety of ways.
- Read-in data from a separate file.
- Perform calculations as needed using objects in the workspace.
- Generate basic descriptive statistics.
- Subset the data using logical operations.
- Perform repetitive calculations using the apply statement or a for loop.

After studying graphing methods in R students will be able to:

- Produce histograms, stem-and-leaf plots, boxplots, scatterplots, etc.
- Produce well-labeled graphics by using appropriate symbols, colors, labels, and legends.
- Rescale axes appropriately.
- Label axes and include titles.
- Plot multiple objects in one graph.
- Plot multiple graphs in one window.
- Superimpose a graph of a function onto a plot.
- Save graphs in multiple formats.

After studying the material on data analysis in R students will be able to:

- Identify the appropriate built-in functions to perform linear regression and t-tests.
- Use the help functions to identify the appropriate arguments and options.
- Obtain the appropriate numerical results based on the R output.
- Use the appropriate distribution functions to find p-values for hypothesis testing and critical values for confidence intervals.

After studying the section on function and simulations in R students will be able to:

- Write functions.
- Evaluate user created functions for specified values.
- Edit and modify functions as needed.
- Incorporate debugging code into functions.
- Debug functions.
- Generate random data from various distributions.
- Understand the mechanics of a simulation.
- Generate a simulated sampling distribution for various statistics.
- Carry out a simulation study.