Statistics 3304: Introduction to Statistical Computing
May 2019 Syllabus

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Class Location:	TBA
Class Hours:	M-F 9.00am – 1.00 p.m.
Office Hours:	Each class day 1.00pm - 2.00pm

Course Overview

Statistics 3304 focuses on using statistical software to perform basic statistical analysis. In particular, we will use R, SAS, and SPSS to perform the same sorts of statistical analyses that you would have seen in an introductory statistics course (regression, t-tests, descriptive statistics). We will typically start with "clean" data and use standard techniques. The point is more to teach the software than it is to teach the statistical methods.

For each of the statistical packages mentioned above, the course will cover the following: language structure, simple descriptive statistics, visualization tools, measures of association, comparison of means and proportions, linear regression, parametric and nonparametric correlation, and smoothing techniques.

Course Objectives:

- To learn algorithmic thinking.

- To understand of the advantages and disadvantages of various statistical software packages, in particular SPSS, SAS, and R.

- To practice coding and documentation habits that make data reproducible.

- To interpret the output from any statistical software package.

- To communicate the findings of a statistical analysis in a clear, concise, and scientific manner

Prerequisites: Statistics 2331 or equivalent. No calculus is required. No previous statistical software experience is required. Statistics 2331 covers basic graphics, linear regression, probability, confidence intervals, and hypothesis testing. There will be brief reviews of introductory material throughout the semester as we encounter the material in class. Any deficiencies in this material need to be addressed on your own outside of class as early as possible in the semester.

Required Course Materials:

- **Computer:** This is a computer intensive course. You will need to bring a laptop to class every day. PC or Mac is acceptable.

- **Software:** Excel, R, SAS, and SPSS are required. You can obtain the latest version of R at http://www.r-project.org/. If you wish, you can download RStudio, a software package that facilitates the use of R, from http://www.rstudio.com/. R and RStudio are open source and work for Mac, Linux, and Windows.
- **SMU has a university site license for SAS and SPSS.** I recommend downloading the full packages. Go to the help desk near Starbucks in Fondren Library if you have trouble downloading SAS and SPSS. If you have a Mac, you will need to download and install the Citrix Server application from the instructional technology website. Neither SPSS nor SAS have versions for the Mac. We use SAS STUDIO.
- **Various Readings.** Articles will be posted on Canvas from time to time. You are responsible for the content in these articles in class, on exams, and for quizzes.

Recommended Materials (I will reference these from time to time):
- **Quick R:** (http://www.statmethods.net/interface/workspace.html). It's free! It's your choice as to whether you purchase the associated textbook at the Manning Publications website.
- **An Introduction to R:** http://cran.r-project.org/doc/manuals/R-intro.pdf
- **Alan Elliott and Wayne Woodward (2015). SAS Essentials, 2nd Edition.** Ebook and softcover available from Amazon: https://www.amazon.com/SAS-Essentials-Mastering-Data-Analytics/dp/111904216X). FYI: if you plan to take more courses in statistical science, you will need this book!
- **SAS 9.4 Online Documentation.** Bookmark this!
  http://documentation.sas.com/?docsetId=allprodsproc&docsetTarget=procedures.htm&docsetVersion=9.4&locale=en
- **SPSS Beginners Tutorials (https://www.spss-tutorials.com/basics/#introduction-to-spss)**

Other References (mostly online and free)
- Michael Friendly's List of SAS Resources:
  http://www.math.yorku.ca/SCS/StatResource.html#SAS
- **R in a Nutshell:** (https://visualization.sites.clemson.edu/reu/resources/RText.pdf). This text is really old (2010!), so some of the code may not work, but it is still good for understanding the structure of R.

Best Practices for Success in Stat 3304 (and other courses, also)

Attendance. Take responsibility for your commitment. In every class period, we will do something in class that you will need to turn in before you leave class. Your life will be much easier if you attend class. If you skip multiple class meetings, you risk being dropped at my discretion.

There is no acceptable excuse for missing class except for (1) your own illness (2) family emergency – does not include the death of a pet (3) school-sponsored activities. In those three instances only will you be allowed to make up work missed in class. **Note that job interviews, taking roommates to the airport, working on a service project (no matter how noble), etc, are NOT excused absences.** This course has ample ways to earn points without your having to make up work should such rare occasions arise.

Citizenship. The class moves at a fast pace, and **some sort of assignment will be turned in at the end of each class**. You need to actively be engaged to succeed in this class. Cell phones, texting, facebooking, tweeting or leisure web browsing are prohibited in class. I consider these to be a disruption (not to mention rude).

Integrity. For graded work that occurs outside of class, so I expect honesty and integrity in what you submit for evaluation. Evidence of academic dishonesty will minimally result in zeros for all involved parties, and perhaps University level disciplinary action. Don't risk your academic career.

Humility. Don't get lost! Ask questions in class. If something isn't clear to you, it probably isn't clear to others either. Questions may arise because I haven't made a connection clear or have inadvertently left out an important point. Your question gives me a chance to explain more clearly. Don't be shy.

Organization. Don't procrastinate! This is a technology-driven course. Count on your computer failing the night before a due date. Start early and give yourself a chance to succeed.

Hints for Navigating this Course

Before Class: Read any assigned readings and/or watch any videos (posted on Canvas when applicable) for the upcoming class.

During Class: The topic will be interactively discussed and practiced. To successfully participate, you must have already read the background material for the day. There will be a short assignment to turn in after each class.

After Class: Work on the practice problems at your own pace to hone your basic skills in preparation for the more involved homework assignments. Review material using the online notes provided; revise/clarify any in-class notes you took.

Grading Policy

Assignment Breakdown:

	Weight
Inclass activity (attendance)	20%
Homework	10%
Quizzes	5%
Mid Exam (May 23)	30%
Project/Presentations	5%
Final Exam (May 31)	30%

Explanations and Due Dates for Assignments

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Watching Videos:
There is no official textbook for this course. There are approximately few videos (plus lecture notes) that serve as a text. Ideally, they should be viewed prior to class meetings.

Midterm Exam:
The mid-term exam is given in class on May 23. Should we need to reschedule the exam, at least 2 days' notice will be given.

Final Exam
The final exam will be given on May 31.

Make-up exams will NOT be given. If you have to miss an exam, we will simply let the Final Exam count for that grade as well (Making the final exam worth 60%).

No exam grades will be dropped. **In the calculation of the course grade, <u>if class attendance is acceptable(1 OR LESS)</u> and the final exam grade is higher than your midterm exam grade, the final exam grade will be used both for the final exam grade and for the mid term exam grade.** Hence, if you have to miss an exam, we will simply let the Final Exam count for that grade as well (Making the final exam worth 60%).

Coding Challenges:
Some of you like to code, and you are good at it. I will ask you to code something, with very little guidance, in a particular language (SPSS syntax, SAS or R, since Excel technically isn't a computer language). Sometimes the coding will involve data wrangling, sometimes it will involve simulation, sometimes it will involve visualization – or all three!

Inclass Activity (every class period in which there isn't an exam)
This class will involve active learning. You are expected to read/watch material before coming to class and be ready to apply it in class. There will be a short assignment due at the end of EVERY CLASS other than exam days. If you are not in class, you cannot do the assignment later, unless your absence in excused. The type of assignment and the deliverable will vary from class to class. Sometimes it will be an assignment on Canvas. Sometimes it will be a paper to turn in. Be prepared!

CLASSROOM BEHAVIOR:
At all times a student's conduct and language is expected to be respectful of others. Any student who decides to disrupt the class or hinder the progress of any other student will be asked to leave. Conduct that distracts from the learning process includes but is not limited to talking, **ringing cell phones**, arriving late to class, leaving class early, reading magazines or newspapers, sleeping and eating. Disruptive behavior will be dealt with in the following manner; first offense results in a verbal warning, second offense results in a one day expulsion from the class. Each expulsion will count as ONE absence.

Other Policies

Deadlines: Due dates and times will be clearly indicated. Assignments will be submitted via Canvas. Late assignments will be penalized. It is up to you to weight the risk of turning in sloppy/incomplete work on time versus turning in complete work late. The definition of "late" is more than three hours after the the published due date of the assignment, unless otherwise specified. Assignments turned in between 3 hours after the due date and the earlier of the posting of assignment grades on Canvas or 48 hours will be graded.

Getting Help: If questions arise while doing assignments/exams, you must resolve these questions before the assignment is due by asking questions in class, collaborating other students, or by discussing the problem with me personally in office hours or by appointment. **I encourage you and expect you to seek my help.**

Collaboration: I encourage the formation of study groups and collaboration with your fellow students in tackling the assignments. Working together in groups on homework is permitted, even encouraged. **However, every student should write-up and complete his or her assignments independently. Students who chose to turn in exactly the same work will share the grade assigned.** Talking about problems with other people does help in learning, but just copying the solutions from one another doesn't.

From The Provost (i.e. University Policies over which I have little control)

Incompletes will only be given in the case of extraordinary circumstances that prevent you from finishing the semester. You must have completed at least 50% of the course with a passing grade to be eligible for an incomplete.

Disability Accommodations: Students needing academic accommodations for a disability must first contact Disability Accommodations and Success Strategies (dass@smu.edu or 214-768-1470) to verify the disability and establish eligibility for accommodations. They should then schedule an appointment with me to make appropriate arrangements. (See University Policy No. 2.4.)

Religious Observance: Religiously observant students wishing to be absent on holidays that require missing class should notify me in writing (e-mail is OK) by Tuesday, February 6, 2018, and should discuss with me, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)

Excused Absences for University Extracurricular Activities: Students participating in an officially sanctioned, scheduled University extracurricular activity will be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue)