Course Syllabus: MSDS 6371

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| Lead Professor:  Live Session Instructor:  Office Hours:  Course Text:  Prerequisites: | Associate Professor Monnie McGee  Department of Statistical Science  Southern Methodist University, Dallas, Texas  E-mail: [mmcgee@smu.edu](mailto:mmcgee@smu.edu)  Bivin Sadler and Amy Nussbaum  TBA  Ramsey, F. L., and Schafer, D. W. (2013), *The Statistical Sleuth: A Course in Methods of Data Analysis* (3rd ed.), Boston, MA: Brooks/Cole, with associated website [www.statisticalsleuth.com](http://www.statisticalsleuth.com).  A previous introductory statistics course. |

**The text is available in electronic version from CengageBrain.com and is much less expensive this way!**

**Before taking this class, you should know**

* Statistical methods from an introductory statistics course: appropriate use of the mean and median, interpretation of boxplots and histograms, use of simple linear regression, probability calculations using the Normal distribution, applications of the central limit theorem, interpretation and calculation of confidence intervals for a population mean, interpretation and calculation of a *p*-value for any hypothesis test.
* If you have serious deficiencies in the material mentioned above, you must address these yourself on your own outside of class as soon as possible.

**Learning Objectives: The student will**

* Gain a better understanding of basic statistical methods covered in introductory statistics courses and problems that arise when these analytic methods are applied to real-life research problems
* Demonstrate understanding of the advantages and disadvantages of a given experimental design, particularly with respect to the type of conclusions that can be made
* Appropriately apply the methods discussed in the course to numerical and categorical data
* Communicate the findings of a statistical analysis in a clear, concise, and scientific manner

**Course Expectations**

* As a Data Scientist in Training, you need to learn to search out answers to questions for yourself before asking your instructor. It’s amazing what five minutes on the Internet can turn up! Please, train yourself to try to find an answer for yourself before asking someone else. Give yourself a time limit (i.e. I will search for one hour and if I can’t find anything, I will ask). It’s better for you in the long run!!
* Download SAS prior to the first live session meeting. Mac users must use the version at apps.smu.edu. If you have questions on obtaining SAS, please contact help.smu.edu. The live session instructors cannot help you with questions regarding downloading and installation of SAS.
* Play around with SAS. It is a very powerful software program. Asynchronous videos regarding the use of SAS are available in the LMS, but there is no way that they can cover every scenario! Please examine SAS help (available online or within the software itself) before asking your instructor a question about the use of SAS. You also have the Elliott and Woodward book at your disposal. And don’t forget Google!!!
* Watch all asynchronous material for the course. If you do not view required materials for a given week, the instructor has the right to refuse to answer any question over those materials until you have viewed them.

**Course Coverage**

The course will cover chapters 1–12 of the text. Much of the material may seem like a review to those of you who have had a previous course in statistics. That assessment is somewhat true; however, we will pay more attention to sample size calculation and experimental design than a first course typically does. Furthermore, we will concentrate on understanding WHY a particular technique is appropriate and HOW to interpret the results.

**Grading:** Midterm Exam (20%), Final Exam (30%), Homework (20%), Quizzes and BLTs (10%), Participation (20%)

**Homework (20%):** Homework from the text will be assigned each week. Homework questions will be due at a date specified by the live session instructor. Late homework will be accepted until solutions to the assignment are posted on the course website. However, late homework will be penalized at a rate of 3 points per day the work is late. It is up to you to weigh the risk of turning in an incomplete assignment on time versus turning in a complete assignment and taking a penalty. All data sets for cases studies and exercises are available at the text’s website, [www.statisticalsleuth.com](http://www.statisticalsleuth.com). Please do not ask your live session instructor for the data sets. When a data set that is not in the text is used, it will be posted on the LMS.

**Quizzes and BLTs (10%):** Each week there will be a short, online, multiple choice quiz over the videos and readings. Answers to the quizzes can be found directly in the videos and/or readings. Quizzes are due twelve hours prior to your live session. This allows time for the live session instructor to review quiz answers and tailor the class to address any difficulties with that week’s material. BLTs (Bi-directional Learning Tool) are questions asked during the asynchronous videos that require an answer before going on to the next part of the video.

**Participation (20%):** This component has three parts: viewing of asynchronous material (yes, we know what you have viewed, when you accessed it, and for how long), participation during live sessions, and participation on discussion boards. The course is structured with both synchronous and asynchronous sessions. In order to participate fully in the synchronous sessions, you must complete ALL of the material for the asynchronous sessions each week. Students are also required to start one thread per week to that week’s discussion board, and comment on a thread per week. For example, threads can be questions on videos, readings, or homework or examples of statistical techniques in the media or at work. Comments to threads must be substantive (i.e. comments such as “That’s cool” or “I don’t get it, either” don’t count).

**Midterm Exam (20%):** There will be a midterm exam at week 7 of the course. It will cover concept and hand-calculation questions, as well as a data analysis question.

**Final Exam (30%):** A final exam will be given the last week of the course. It will be comprehensive, containing concept and hand-calculation questions, as well as a data analysis question.

**Rescheduling Exams:** Life happens. Should you need to reschedule an exam, please give notice to your live session instructor at least 24 hours prior to the live session in which the exam review is discussed (Unit 7). The notice should be given via e-mail. You and your instructor will discuss the best course of action given your circumstances. Retakes of exams will not be allowed, and a missed exam cannot be made up if notification is received AFTER the exam has taken place.

**Weekly Breakdown of Course**

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| *Week* | *Chapter* | *Topic* |
| *1* | *1* | *Drawing Statistical Conclusions* |
| *2* | *2* | *Inference Using* t*-Distributions* |
| *3* | *3* | *Data Screening, Assumptions, and Transformations* |
| *4* | *4* | *Alternatives to the* t*-Tools for One, Two, and Multiple Samples* |
| *5* | *5* | *Comparisons Among Several Samples* |
| *6* | *6* | *Linear Combinations and Multiple Comparison Problem* |
| *7* | *1 - 6* | *Midterm Exam Week* |
| *8* | *Notes* | *Correlation and Scatterplots* |
| *9* | *7* | *Simple Linear Regression: Introduction* |
| *10* | *7* | *Simple Linear Regression: Prediction* |
| *11* | *8* | *Regression Diagnostics and Model Refinement* |
| *12* | *9* | *Multiple Linear Regression* |
| *13* | *10* | *Inference for Multiple Linear Regression* |
| *14* | *11-12* | *Model Selection and Validation* |
| *15* | *1 - 12* | *Review and Final Exam* |

**Best Practices for Success in MSDS 6371 (and other courses also)**

**Attendance**. Take responsibility for your commitment. Attendance means not only being there for synchronous sessions but also participating in asynchronous work.

**Citizenship.** You need to be actively engaged to succeed in this class. Talking on 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.** A lot of the graded work 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 proud or shy.

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

**Deadlines.** You will generally have a week to complete an assignment. Due dates and times will be clearly indicated. Late submissions will be penalized, but it is much better to turn in work late than not at all (or to turn in incomplete/sloppy work). Work turned in after solutions have been posted to the course website will receive no credit.

**Getting help.** If questions arise while doing assignments/exams, do your best to resolve these questions before the assignment is due, first by taking time to seek answers yourself, next by asking questions on the wall, and finally via e-mail to your instructor or other students. **I encourage you and expect you to seek help.** For questions during exams, please e-mail the live session instructor directly.

**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 homework 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 help!

**Looks do matter!** All assignments must be NEATLY executed and organized. You risk a zero on any assignment submitted in a sloppy manner. See submission guidelines for more detail.

**Submission guidelines for assignments**

* Your name must be at the top of the first page and on each successive page.
* Submit solutions in problem order.
* Use an easy-to-read variable-width font (I like Ariel, Helvetica, and Geneva fonts—this document is in Helvetica 11 point) with a minimum of 11 point font.
* Relevant SAS code and output from the SAS console must be included in-line at the appropriate point using Courier New (or other fixed width) font, in 10 point size. **Inclusion of irrelevant code or output will be penalized**.
* Any graphics from SAS must be electronically cut and pasted in-line at the appropriate point of the write-up. You can use Word to resize the graphics appropriately.
* Any mathematical notation must be provided with appropriate use of subscripts, superscripts, and symbols. Use MS Equation or another equation editor if you submit your work in Word.

University Policies

**Incompletes** will be given only 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.

**Religious Observance:** Religiously observant students wishing to be absent on holidays that require missing class should notify the live session instructor via e-mail, and should discuss with the instructor, 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).

**Professor’s Note:** The official university policy does not mention anything about working students. I include work in “officially sanctioned” activities. Therefore, I am including this sentence: For working students, the policy on extracurricular activities extends to any required or important work-related events that may prevent you from attending a live session (e.g., work-related travel).