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McCoy College of Business Administration
TEXAS STATE UNIVERSITY
Department of Computer Information Systems and Quantitative Methods
QMST 5334—ADVANCED STATISTICAL METHODS FOR BUSINESS
Spring 2017

INSTRUCTOR: Dr. Tahir Ekin **TEL:** 512-245-3297
OFFICE: Avery 464 L (Mondays)- McCoy 451
OFF. HOURS: M: 3:50 - 6:20 pm (Round Rock)
TR: 12:35-1:50 pm (San Marcos) or by appointment
E-MAIL: t_e18@txstate.edu

SCHEDULE

Section	Time	Room
252	M 18:30 – 21:20	Avery 313

COURSE DESCRIPTION

The course provides the quantitative foundation for business analysis and decision-making. Topics include: regression analysis, mathematical programming, simulation and other analytical/modeling techniques with wide applicability in decision-making and problem solving in all functional areas of business.

COURSE MATERIALS

Required:

- **Access to TRACS:** Lecture notes and required readings will be posted in TRACS
- **Microsoft Office** (Word, Excel)
- **RStudio Desktop** (Free open-source software)
- **Access to a laptop:** Having access to lecture notes, RStudio and Excel will be helpful.

Recommended:

The textbook is **not required**, but recommended. Additional readings may be assigned if necessary.

TEXTBOOK: *Probability and Statistics with R* by Maria Dolores Ugerte, Ana F. Militino, Alan T. Arnholt; Second Edition, Chapman and Hall & CRC, ISBN 9781466504394 - CAT# K14521

Additional textbook resources:

- Open Intro Statistics 3rd edition (free) https://www.openintro.org/stat/textbook.php
- Business Analytics: Data Analysis & Decision Making, Fifth Edition, Authors: Christian Albright and Wayne L. Winston, Publisher: Cengage Learning, ISBN-10: 1133629601, ISBN-13: 9781133629603
- Discovering Statistics Using R https://us.sagepub.com/en-us/nam/discovering-statistics-using-r/book236067
- Learning Statistics Using R https://us.sagepub.com/en-us/nam/learning-statistics-using-r/book240908
- Online Statistics Handbook: http://www.itl.nist.gov/div898/handbook/index.htm
- McGraw Hill Custom Textbook (Color E-Book). ISBN: 9781121553996 https://create.mcgraw-hill.com/shop/#/catalog/details/?isbn=9781121553996
- Introduction to Linear Programming: http://www.mhhe.com/engcs/industrial/hillier/etext/PDF/chap03.pdf

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LEARNING OBJECTIVES

- Understand regression techniques and other popular statistical procedures and know when they can be useful to business problems;
- Understand mathematical modeling (optimization) techniques and be able to formulate applicable business problems using appropriate mathematical modeling techniques and solve the problems;
- Be able to read, understand and interpret properly the statistical analysis results and optimization models and solutions;
- Be able to do straightforward statistical analyses and mathematical modeling yourself.

SKILLS AND KNOWLEDGE YOU ARE EXPECTED TO BRING INTO THIS COURSE

- Knowledge on the basic statistical concepts and methods to include descriptive analysis, probability distribution, expected value, variance, standard deviation, normal distribution, sampling distribution, confidence intervals and hypothesis testing for one population
- Knowledge of MS Office products
- Knowledge of use of functions, formulas and graphing capabilities in MS Excel
- Ability to familiarize yourself with the MS Excel Add-ins

PREREQUISITES: BA 5353 or equivalent

COURSE POLICIES

A. INSTRUCTIONAL METHODOLOGY:

Lecture, class discussion, self-directed learning

B. ATTENDANCE:

Regular class attendance is expected. While class attendance will not be taken every class, students who come to class will receive information during lecture that will assist in performing well on exams and homework. Being on time for class is also expected. It is your responsibility to find out what material was covered, should you miss a class.

C. COURSE REQUIREMENTS:

1) **Required reading**: Prior to every session the student needs to review the material discussed during the previous class. For every lecture, corresponding lecture slides and the textbook chapters are listed in the course outline.

Group formation: For assignments and projects; every student is strongly recommended to be a part of 3-5 people group. Working in groups will help you to come up with different perspectives. There will be a peer-evaluation at the end of the semester, so be aware that your grade out of group based requirements can be affected by your contribution to the group work. All group members are expected to understand the assignment and their submission thoroughly as some portions of the assignments may be used in the exams. Each group is required to email the group members to the instructor by **January, 30th, 2017 11:59 PM**. One email per group is sufficient.

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2) **Assignments (25%):** The assignments are group-based. There are 6 assignments. For these assignments, a hard copy (print-out) of the written report that summarizes the results and includes the supporting graphs is due to the beginning of class. Your submission that results with your lowest grade will not be considered for the final grade computation. And the rest of each five will be counted for 5 % of your overall grade. Please note that late submissions will not be accepted. So if you have only part of the assignment completed prior to the due date, its submission may result with partial credit.
3) **Project (25%):** The project is group based. You are expected to select a topic of your preference, explore data, utilize a statistical method with the software and communicate your findings via well-written report and a presentation. Periodically, you will be asked to complete tasks. There will be certain check points in project evaluation, which are listed in the outline page of the syllabus. For the final report, a hard copy (print-out) of the written report that summarizes the results and includes the supporting graphs is due to the beginning of the lecture on the due date. You will also communicate your findings to your classmates in a presentation. The due date of the final reports and the date for the presentations are listed in the outline page of this syllabus. This will account for 25 % of your overall grade. You need to be present during each checkpoint and work coherently within your group. Please see *Project Guidelines* page of this syllabus for more details.
4) **Midterm Examination (25%):** This is individual. The midterm examination will cover material for the first half of the course. It will be a take home exam.
5) **Final Examination (25%).** This is individual. The final exam emphasizes the material discussed after the midterm. It will be a take home exam.

Test conduct: Breaking any of the following exam rules could result in a grade of zero (0) for the test or the entire course.

- The proctor of the test may ask you to show your student ID card.
- You may not consult other people, classmates during the exam.
- Any sort of communication is not allowed.

Absence: If an absence is due to medical reasons, emergencies or school related activities, the student is required to provide appropriate written documentation within three business days of the absence. An absence that cannot be documented is unlikely to be approved. Unless the absence is due to approved reasons, missed test will result with a grade of zero.

Make-up Examinations: Check the schedule and make your arrangements. As a rule, make-up exams will not be given unless the student has a **valid and verifiable** excuse that result in an approved absence. If absence is approved, the instructor will decide the date, place and content of the make-up examination. Exams missed due to school sponsored activities, such as athletics, etc., will be excused, per university policy.

Grade Evaluation: The student's overall performance will be determined using the weights below from each respective area:

Assignments	**25 %**
Midterm	**25%**
Project	**25%**
Final Exam	**25%**

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The student's total score is the final weighted average score and the letter grade will be assigned according to the following table:

Range	Grade
[90%, 100%]	A
[80%, 90%)	B
[70%, 80%)	C
[60%, 70%)	D
[0%, 60%)	F

The instructor holds the right to consider overall performance and make adjustments to the letter grades that would be in the favor of students. The grades will be posted in TRACS. Borderline grade situations will only be considered if the student has excellent attendance, and has observed the civility rules presented on section D.

Extra credit work is not appropriate at the graduate level. Each student is responsible for material covered in class and on handouts, emails, or web postings whether or not it is in the recommended textbook.

D. **CLASSROOM CIVILITY:**

Disruptive behavior in the classroom is prohibited in Section 2.02 of Texas State's Code of Student Conduct and includes behavior that substantially or repeatedly interferes with the conduct, instruction, and education of a class. The complete Conduct of Classes policy is available at http://www.provost.txstate.edu/pps/policy-and-procedure-statements/4-teaching/pps4-02.html.

- A professional attitude and bearing is expected. Students who deviate from the expectation will be asked to abandon the course. The instructor reserves the right to ask you to leave the class or abandon the course if your behavior is considered to be a disturbance to the class.
- If you need to pay attention to your cell phone, leave the classroom.
- If you must read the newspaper or materials from other classes, leave the classroom.

E. **OTHER**:

COURSE WEBSITE:

TRACS will be used for posting of relevant course materials throughout the semester. You need a Texas State NetID to use TRACS. If you don't have one, you may want to request one as soon as possible. The website "http://www.tr.txstate.edu/itac/netid.html" has the details about how to obtain a Texas State NetID.

TRACS FORUMS:

All course related questions should be posted in **TRACS-Forums-Course Material Related Questions** instead of communicating via email so that everyone can benefit from the discussion. There is another discussion forum thread created in which you can collaborate with each other regarding your profiles and class matters. For personal issues and confidential matters, you are more than welcome to email me.

SOFTWARE:

You are expected to use Excel and RStudio to perform all analysis in the class. I will demonstrate the use of this software during each class period.

The McCoy College Student Responsibilities on Learning is available at http://advising.mccoy.txstate.edu/about/learningpolicy.

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UNIVERSITY/COLLEGE POLICIES:

A. **DROP:** Dropping means that the student will remain enrolled in at least one hour in the current semester. A "W" will be automatically assigned if the drop procedure is completed on or before **11:59 p.m. on March 28, 2017**. After this deadline the student will be unable to drop individual classes and will receive the grade earned in the course (see AAPPS 4.07 for a list of grades). It is suggested that students consult the instructor prior to dropping from the class.

WITHDRAWAL: Withdrawal means that the student is going to zero hours for the current semester. A "W" will be automatically assigned if the withdrawal procedure is completed on or before **11:59 p.m. on March 28, 2017**. After this deadline, the student may withdraw on or before **5:00 p.m. on April 20, 2017**. If the student is passing the class on the official date of withdrawal, a "W" grade will be assigned. If the student is failing the class on the date of withdrawal, a "U" grade will be assigned.

B. ACADEMIC HONESTY: Submission of any work for a grade for which unauthorized help has been received is termed academic dishonesty and will be grounds for a failing grade in the course. "Unauthorized" is a term used here to designate stealing, copying (with or without permission), collaboration with other individuals, or sharing programming code outside of sanctioned group activities. Students are strongly encouraged to refer to the Texas State student handbook, available at http://www.dos.txstate.edu/handbook.html for policies related to academic dishonesty. **This instructor views any such act as a clear violation of ethical standards and will take appropriate disciplinary and punitive action.**

C. HONOR CODE: All students are required to abide by the Texas State University Honor Code found in UPPS 07.10.01 under attachment I. The pledge for students states:

> **Students at our University recognize that, to insure honest conduct, more is needed than an expectation of academic honesty, and we therefore adopt the practice of affixing the following pledge of honesty to the work we submit for evaluation:**
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> **I pledge to uphold the principles of honesty and responsibility at our university.**

D. FINANCIAL AID: Federal regulations require students to meet certain minimum academic and attendance standards in order to remain eligible for financial aid assistance. Other program-specific requirements may also exist. Additional information is available at www.finaid.txstate.edu.

E. STUDENTS WITH DISABILITIES: A student with a disability may require an accommodation(s) to participate in the course. They must contact the instructor as soon as possible, typically within the first two weeks of the semester. They will be asked to provide documentation from the Office of Disability Services (ODS) at that time. Failure to contact the instructor in a timely manner will delay any accommodations they may be seeking. Ongoing care by a physician does not automatically qualify you as an ODS special needs student. Students are required to file paperwork for accommodations with ODS each semester. Accommodations granted one semester do not automatically carry forward to the next. See UPPS No. 07.11.01 for additional information.

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PROJECT GUIDELINES

(1) GROUP FORMATION

One member of the group is required to email the instructor the group members (3-5 members) by **January 30th, 2017 11:59 PM.** One email per group is sufficient. Grade 1 or 0

(2) PROJECT OUTLINE:

In this part of the project, you will prepare a one-page outline describing the data set and the problem to be analyzed. You are expected to use an analytical method of choice such as regression. You will list the variables of interest and their relevance in the analysis. Be ready to show your data. In case you need some ideas, a number of data sources will be posted in TRACS. The due date for the hard copy of the outline is **February 27th, 2017 6:30 PM**. Grade 1 or 0

(3) PROJECT MID EVALUATION

At this checkpoint, you are required to have done a preliminary analysis. The instructor will answer questions and help with the potential challenges. There will be a discussion with each group in class time on **April 17th, 2017**. Grade 1 or 0

(4) FINAL REPORT

A sample report may include the sections such as

a) Executive Summary of your findings which will be discussed in detail in your report
b) Introduction that describes your problem and your approach
c) Data description including a discussion of the data pre-processing and descriptive statistics
d) Steps of your analysis
e) Discussion of the regression modeling assumptions
f) Model selection and evaluation steps: validation analysis
g) Conclusion that summarizes your findings

The maximum number of pages for the report is 15 pages. The print out of the final report is due to **May 1st, 2017 6:30 PM**. Grade out of 17.5.

(5) PRESENTATION

You are expected to present your findings and a summary of your report at the end of the semester, on **May 1st, 2017**. You will be assessed with respect to organization, content, delivery and professionalism. Grade out of 7.5.

(6) PEER EVALUATION

The feedback of your group members about your performance in your group will affect your final grade. This will be conducted on **May 1st, 2017** . Grade between (0.5 and 1) out of 1

Your final grade will be the product of the three grades from (1), (2), (3), (4+5) and (6).

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COURSE OUTLINE

*This is a tentative schedule. Everything is subject to change if circumstances warrant. Additional reading will be assigned as necessary. T=textbook chapter, HW=homework

WEEK	DATE	TOPIC	MATERIAL	DUE
1	23-Jan	Introduction & Data Visualization	HW1, T1, T2	
2	30-Jan	Sampling & Hypothesis Testing	T6.1-6.4	GROUP FORMATION
3	6-Feb	Hypothesis Testing, ANOVA	HW2	HW1
4	13-Feb	Regression	T9.1-7	
5	20-Feb	Regression	HW3	HW2
6	27-Feb	Regression	T12	PROJECT OUTLINE
7	6-Mar	Regression & Time Series Analysis	MIDTERM EXAM	HW3
8	13-Mar	NO CLASS/ SPRING BREAK		
9	20-Mar	MIDTERM EXAM		MIDTERM EXAM
10	27-Mar	Probability & Decision Analysis	HW4, T3	
11	3-Apr	Decision Analysis		
12	10-Apr	Introduction to Optimization Modeling	HW5	HW4
13	17-Apr	Optimization Modeling & Applications		PROJECT MID
14	24-Apr	Optimization & Simulation	HW6	HW5
15	1-May	Simulation & Presentation of Final Projects	FINAL EXAM	PROJECT REPORT and PRESENTATION
16	8-May	FINAL EXAM		HW6, FINAL EXAM