Statistical Methods in Research I
MATH 6315.001 & 211
Department of Mathematics & Statistics
Spring 2016

A. COURSE INFORMATION

Course number/section: MATH 6315-001 & 211
Class meeting time: M 5:30-7:20, Lab W 5:30 – 7:20
Class location: Lecture at CS 111 and Lab at CCH 204
Course Website: Blackboard (bb9.tamucc.edu)

B. INSTRUCTOR INFORMATION

Instructor: DR. LEI JIN
Office location: CI 307
Office hours: M 9:20 -11:00 AM, MWTR 2:35-3:25 PM; other times by appointment
Telephone: 361-825-2099
E-mail: lei.jin@tamucc.edu
Appointments: Via Email

C. COURSE DESCRIPTION

Catalog Course Description
This course is for graduate students in disciplines other than MATH in the College of Science and Technology, and is designed to prepare them to use statistical methods in their research. This is a non-calculus exposition of the concepts, methods and usage of statistical data collection and analysis. Topics include descriptive statistics, the t-test, one and two-way analysis of variance, multiple comparison tests and multiple regression. Students also learn how to conduct these analyses using computer software, how to read other people’s statistical work, and how to properly report their findings.

D. PREREQUISITES AND COREQUISITES

Prerequisites
MATH 1442, other undergraduate statistics course, or equivalent.

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)

much more extensive coverage of statistics than Gotelli and Ellison, and is the text we use for Stats II, if you’re heading for that course. It is probably a good reference book.

Software: We will be using the statistical package R, JMP and probably SAS. JMP will be provided at the computer lab. I will let you know how to get SAS (in case that we need it). To get your own copy of R: go to www.cran.rproject.org. While there, go to the Manuals link on the left and also download the Introduction to R.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

Probability and distributions
• Students will analyze experimental situations to determine which discrete distribution is applicable, and will be able to diagnose and adjust for erroneous choices
• Students will decide if given samples can be successfully modeled with normal distributions, and will be able to choose among several elementary transformations to increase normality

Summary statistics and confidence intervals
• Students will use graphs and summary calculations to make preliminary investigations of datasets
• Students will compute confidence intervals using classical methods based on the Central Limit Theorem and using bootstrapping techniques

Conceptual framework for design and analysis of experiments
• Students will be able to analyze descriptions of experiments to determine appropriate statistical experimental design.

Three important types of statistical analysis:
Regression
• Students will be able to diagnose situations in which regression is the appropriate statistical tool.
Students will be able to use software to perform all relevant statistical calculations for a regression.

Students will be able to diagnose and correct problems with regression models.

ANOVA

Students will be able to diagnose situations in which ANOVA is the appropriate statistical tool.

Students will be able to use software to perform all relevant statistical calculations for an ANOVA.

Students will be able to diagnose and correct problems with ANOVA models.

Students will be able to perform and interpret post-hoc tests for one-way ANOVAs.

Analyzing categorical data

Students will be able to diagnose situations in which contingency table and goodness of fit tests are appropriate statistical tools.

Students will be able to use software to perform all relevant statistical calculations for contingency tables and goodness of fit tests.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Methods for instruction include the following:
• Lecture
• Use of computer resources, including statistical software, spreadsheets, and the Internet for data location, data organization, and data analysis
• During a few weeks, “lab” time may be replaced by additional lecture

H. MAJOR COURSE REQUIREMENTS AND GRADING

The following assessments will be given during the semester:

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<th>Homework or Projects</th>
<th>Two class semester tests</th>
<th>Final</th>
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<td>40%</td>
<td>15% each x 2 = 30%</td>
<td>30%</td>
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Grade Scale:
From these evaluations, your grade will be computed using the standard scale: A = 90-100; B = 80-89; C = 70-79; D = 60-69; F = below 60.

I. COURSE CONTENT/SCHEDULE

Week 1 Introduction to course and software; Gotelli and Ellison, Chapter 1
Week 2 Lecture: Gotelli and Ellison, Chapter 1; Lab: Basics of Software
Week 3 Lecture: Gotelli and Ellison, Chapter 2; Lab: Handling data, Distributions
Week 4 Lecture: Gotelli and Ellison, Chapter 2 (continued); Lab: Graphical and Numerical Description
Week 5 Lecture: Gotelli and Ellison, Chapter 3; Lab: Confidence Intervals
Week 6 Lecture: Gotelli and Ellison, Chapter 4; Lab: Test 1
Week 7 Lecture: Gotelli and Ellison, Chapter 5; Lab: t-tests
Week 8 Lecture: Gotelli and Ellison, Chapter 5 (continued); Lab: t-tests
Week 9 Lecture: Gotelli and Ellison, Chapters 6 & 8; Lab: Monte Carlo methods
Week 10 Lecture: Gotelli and Ellison, Chapter 9; Lab: Monte Carlo methods (continued)
Week 11 Lecture: Gotelli and Ellison, Chapter 9 (continued); Lab: Test 2
Week 12 Lecture: Gotelli and Ellison, Chapters 9 (continued) & 10; Lab: Regression
Week 13 Lecture: Gotelli and Ellison, Chapter 10 (continued); Lab: Regression (continued)
Week 14 Lecture: Gotelli and Ellison, Chapter 10 (continued); Lab: ANOVA
Week 15 Lecture: Gotelli and Ellison, Chapter 11; Lab: ANOVA (continued)
Week 16 Lecture: slush factor; Lab: N/A

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

Attendance/Tardiness
Talking during class time and tardiness are often disruptive to the whole class and are not appreciated. If you are delayed and arrived late please do so quietly. Excessive tardiness, disruptive talking, disruptive behavior or performing activities not related to the class will be counted as absences and cancel bonus points for attendance. The instructor is NOT responsible for informing absent students what was covered in previous classes, homework or any other announcements.

Late Work and Make-up Exams
It is your responsibility to keep track of course deadlines and due dates. NO late HW/Quizzes will be accepted without some valid excuse.

All students should plan to take their tests at the scheduled times. If you do not have a valid written excuse and you miss a test, you will NOT be allowed to make up the test and you will score a zero for that test. To request a make-up test, a valid written excuse must be provided within ONE DAY after the missed test. The make-up test must be taken in three days after the scheduled test time. In the case that you have a valid written excuse and you are not able to take a makeup test in time, your score of the test will be replaced by the score on your final exam with some adjustment (according to the medians of two tests).
Test 1 is scheduled on Feb 24th.
Test 2 is scheduled on March 30th.
Cell Phone Use
Cell phones and such must be turned off before class.

Final
Final exam will be administered on Wednesday, May 11 from 4:30 p.m. to 7:00 p.m. It is a comprehensive examination over all material covered during the semester. ABSOLUTELY NO EARLY final examination, so make travel arrangements accordingly. A missed final exam will result on a score of 0 points.

K. COLLEGE AND UNIVERSITY POLICIES

- Academic Integrity (University)
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- Classroom/Professional Behavior
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- Statement of Civility
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- Deadline for Dropping a Course with a Grade of W (University)
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of
action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.

- **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

  If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

  http://disabilityservices.tamucc.edu/

- **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a
secondary means of contacting each student.

GENERAL DISCLAIMER

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.