MTH 360 Course Syllabus  
2019 / Spring  
Statistical Inference

Instructor: Jacob Turner, Ph.D.  
Department: Mathematics and Statistics  
Email: turnerja2@sfasu.edu  
Phone: 936-468-1692  
Office: 342 NM  
Office Hours:

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>9am-10:30am</td>
<td>9am-10:30am</td>
<td>By Appt.</td>
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<td>By Appt. / TBD</td>
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<tr>
<td>By Appt.</td>
<td>9:20am-10:30am</td>
<td>2:30pm-3:30pm</td>
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Class meeting time and place: 1:00 pm – 2:15 pm, MW, Mathematics 357

Text and Materials:

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<tbody>
<tr>
<td>R statistical software</td>
<td>Free Download</td>
<td></td>
<td></td>
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<tr>
<td>TI-83 Calculator</td>
<td>Wouldn’t Hurt</td>
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Course Description:  
To familiarize the student with core mathematical underpinnings of statistical inference and estimation while retaining an emphasis on making analytical decisions with real world data. This includes the mastery of joint densities, covariance and correlation, transformations, sampling distributions, development and data analysis concerning: one/two/many sample location tests and confidence intervals. Analysis of variance and simple linear regression, chi-square tests for categorical data. I will bring in some statistical software such as R or JMP occasionally to emphasize certain topics/concepts as needed.

Course outline (Approximate time spent)

More on Single Random variables  
- Poisson/Poisson Process  
- Exponential, Gamma, ChiSquare  
- Normal, Uniform  
- Transformations  

Multiple Random Variables  
- Big picture statistical inference discussions  
- Joint, marginal and conditional distributions  
- Expected value and variance of sums  
- Properties of the sample mean and variance  
- Calculation and interpretation of correlation and covariance  
- Moment Generating Functions Continued  
- Transformations of multiple random variables  

15%  
20%
Sampling and Sampling Distributions 15%
- Central Limit Theorem
- Properties of Normal, t, chi-squared, and F distributions

The Need for Estimation and Testing: 15%
- Use of experimental conditions in order to identify a parametric family
- Maximum Likelihood Estimation, Method of Moments
- Various Properties of Estimators
- Building Confidence Intervals

Elements of Hypothesis Testing 15%
- Terminology associated with testing
- Likelihood ratio tests (Time permitting)

The Popular One Sample Location Tests and Confidence Intervals 10%
- Mathematical development of one sample t and z tests (and associated confidence intervals)
- Paired data as a one-sample problem
- Testing for the variance

The Popular Two Sample Location Tests and Confidence Intervals 10%
- Mathematical development of the two-sample independent t-test (and associated confidence interval)
- Analysis of data for two-sample independent t-test procedures

Grading: The final average will be computed using the following weights:
- Regularly Assigned Homework 20%
- Midterm 1 20%
- Midterm 2 20%
- Midterm 3 20%
- Final Exam 20%

Homework
This semester I will be providing HW sets that will be due either weekly or biweekly depending on the material. Some homework assignment will utilize the statistical software R to help visualize key concepts and perform tedious computations. This is not meant to be a programming class. I will provide you with skeleton codes that get the job done. Having said that, issues can and will creep up and highlights the importance of starting your assignments as soon as they are assigned.

Exams:
We will have three midterm exams this semester each with a take home and in class portion. This semester, the in class portion will be taken outside of our class times. I will provide sign-up sheets well in advance and tests will be administered in the testing room on the third floor of the Math building.

Final Exam
The final exam is comprehensive and counts 20% toward the final grade. The final exam schedule is 1:00 p.m. - 3:00 p.m., Wednesday, May 15, 2019.
Grading Scale:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>% Scale</th>
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<tbody>
<tr>
<td>A</td>
<td>90-100</td>
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<tr>
<td>B</td>
<td>80-89</td>
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<tr>
<td>C</td>
<td>70-79</td>
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<tr>
<td>D</td>
<td>60-69</td>
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<tr>
<td>F</td>
<td>below 59</td>
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Expectations and Class Rules:

ALL cell phones are to be turned OFF and put away. If someone violates this rule (texting, playing games, etc.), then the person must leave the class room for that class period without any further delay according to the professor’s instructions. No food in the classroom. Don’t leave the classroom in the middle of the lecture.

Attendance Policy

Attendance is expected and will be reflected in everything you submit. It will be increasingly difficult to get a good grade or even pass if you miss class regularly. When a student misses class, s/he is expected to proactively and promptly acquire the missed information before the next calendar class day and meet all requirements administered by the instructor and the student must: Submit an official, dated note from attending doctor, parent, or supervisor, depending on the nature of the absence. Documentation must be submitted promptly.

The following is an excerpt from SFA Policy 5.4:

The federal definition of a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates:

1. Not less than one hour of classroom or direct faculty instruction and a minimum of two hours out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time, or;
2. At least an equivalent amount of work as outlined in item 1 above for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

To this end, all students in courses offered by the Department of Mathematics and Statistics that wish to be successful should plan to spend a minimum of two hours outside of class for every credit hour associated with this course. Expected activities to be completed in the time outside of class include reviewing notes from previous class meetings, reading assigned course resources, completing all assigned exercises and projects, and performing periodic assessment preparation.

Academic Integrity (A-9.1)

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

The penalty for a student found cheating on any part of an assignment, quiz, or exam in this class will range from a grade of zero on the work up to a grade of F in the course, and may result in additional, more severe
disciplinary measures. A student who allows another to copy his work and the student copying the work are both guilty of cheating. Do your own work. Do not show your completed work to others. Do not allow others to copy your work.

Definition of Academic Dishonesty (SFA policy 4.1): Academic dishonesty includes both cheating and plagiarism. Cheating includes, but is not limited to:

- using or attempting to use unauthorized materials on any class assignment or exam
- falsifying or inventing of any information, including citations, on an assignment
- helping or attempting to help other student(s) in an act of cheating or plagiarism

Plagiarism is presenting the words or ideas of another person as if they were one’s own. Examples of plagiarism include, but are not limited to:

- submitting an assignment as one’s own work when it is at least partly the work of another person;
- submitting a work that has been purchased or otherwise obtained from the Internet or another source
- incorporating the words or ideas of an author into one’s paper or presentation without giving the author credit

Withheld Grades Semester Grades (SFA Policy 5.5)
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average. The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/

Acceptable Student Behavior
Classroom behavior should not interfere with the instructor’s ability to conduct the class of the ability of other students to learn from the instructional program (see the Student Conduct Code, policy 10.4). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic, or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.