Instructor: Jacob Turner, Ph.D.
Department: Mathematics and Statistics
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Phone: 936-468-1692
Office: 342 NM
Office Hours: TBD

Class meeting time and place: Minimum once a week in Dr. Turner’s Office. Day TBD. Occasionally, we will twice a week to address lingering questions or to clarify problems and tasks

Course Description: This course will take a deeper dive into some key theoretical results involving Mathematical Statistics. The course will be structured into 5, 3 week blocks. At the end of each 3rd week, the student will present various problems solutions and summarize key concepts and theorems from work assigned throughout the 3 week period. Topics will include multivariate random vectors, a closer look at transformations and conditional density functions. Additionally properties of estimators (sufficiency, completeness) and their relationship to MLE’s, and LRT’s, and the constructing of MVUE’s will be discussed. The topics during the fifth and final 3 week block is left as TBD to allow for extra time or covering additional topics the student finds interesting.

Text and Materials:

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<tr>
<td>Mathematical Statistics and Its App</td>
<td>Larsen and Marx</td>
<td>Already Owns</td>
<td>Pearson</td>
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Course Requirements:

5 in depth presentations and problem solutions across the 5 blocks

Course Calendar:

Course outline: Approximate time spent

BLOCK 1

- Multivariate densities 20%
  - Bivariate Case
  - Transformations
  - Correlation and regression connections
  - Discussion Challenge: Multivariate transformations and additional problems
BLOCK 2

- Multivariate Normality
  - Variance-Covariance
  - Linear Algebra Connections
- MTH360 review
  - Properties of an estimator (Unbiased, efficiency, MLEs and asymptotic properties)
  - Order statistics
  - Discussion Challenge: How to simulate multivariate normal data? Teach me what you learned from MTH 360 in terms of estimators (additional problems)

BLOCK 3

- Our search for MVUE’s
  - Sufficiency
  - Definition and how to show sufficiency
  - Rao-Blackwell Theorem
  - Relationship to MLE’s and LRT’s
  - Completeness Intro

BLOCK 4

- Constructing MVUE’s
  - More Completeness
  - How completeness paired with sufficiency gets us to MVUE’s
  - Lehmann-Scheffe Theorem
  - Constructing MVUE’s and logistics of building confidence Intervals

BLOCK 5

- TBD
  - Multiparameter Cases from Block 3 and 4
  - The notion of of MP and UMP tests

**Grading Policy:** Each deliverable across the 5 blocks will be equally weighted

**Homework and Group Exercises** There will be little assignments and problems assigned. These will not be taken up but will be integral in the understanding of the material and to build up each presentation.

**Quizzes and Group Exercises**
NA

**Exams**
NA

**Final Exam**
NA
Grading Scale:

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<tr>
<th>Letter Grade</th>
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<tr>
<td>A</td>
<td>90-100</td>
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<td>B</td>
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Academic Integrity (Policy 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 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

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp.

Withheld Grades Semester Grades Policy (A-54)

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 or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1 http://www.sfasu.edu/policies/student_conduct_code.asp). 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.

Program Learning Outcomes:
This is a general education core curriculum course and no specific program learning outcomes for this major are addressed in this course.

Student Learning Outcomes (SLO): At the end of MTH 220, a student who has studied and learned the material should be able to:
1. Exhibit an understanding of basic probability rules and concepts [CO:1,3]
2. Demonstrate an understanding of different probability models and ways they are used in statistical inference. [CO: 1, 2, 3]
3. Demonstrate an understanding of point estimation of population parameters. [PLO: 1,3]
4. Demonstrate an understanding of interval estimation about population parameters and inference that can be drawn from such techniques. [CO: 1,3]
5. Demonstrate an understanding of hypothesis testing concerning population parameters and inference that can be drawn from such techniques. [CO:1,3]