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>2:30-3:30</td>
<td>11-12</td>
<td>1:30-2:30</td>
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</tbody>
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Class meeting time and place: Tuesday/Thursday 3:30pm-4:45pm  Mathematics Room 204

Course Description: Probability, statistical inference, rank tests, chi-square tests, linear regression and correlation, analysis of variance, multiple regression.

Reference Texts and Materials:

<table>
<thead>
<tr>
<th>Introduction to Linear Regression Analysis</th>
<th>Montgomery, Peck, and Vining</th>
<th>ISBN: 9781119578741</th>
<th>Wiley</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Statistical Learning in R</td>
<td>James, Witten, Hastie, Tibshirani</td>
<td><a href="https://www.statlearning.com/">https://www.statlearning.com/</a></td>
<td></td>
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<tr>
<td>R statistical software</td>
<td></td>
<td>Freely Available</td>
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Course Goals:

- Obtain fundamental understanding of the simple and multiple linear regression model in terms of its assumptions, theoretical implications, parameter estimation and inference
- Enable you to conduct diagnostics to identify problems with model fits and apply appropriate solutions to fix those assumptions
- Perform and communicate appropriate regression analysis to meet the goals of a specified study including making connections to simpler tools such as ANOVA and Pooled t-tests.
- Understand the difference between parametric and nonparametric regression and classification methods.
- Special Topics Selected from: Generalized Least Squares, Penalized Regression, Regression Trees, Random Forests, Logistic Regression, LDA/QDA, K-Nearest Neighbors, Support Vector Machines

Computer Access/Skills:

This course is all about application to real world problems, we live in an age where data sets are massive and statistical software is absolutely necessary. I will be providing R scripts and small R tutorial sessions during class. R and its friendly user interface RStudio is freely available to download. https://www.r-project.org/   https://www.rstudio.com/

R is a programming language, but this is not a programming course. I will provide you with as many example code snippets and tools as I possibly can so you can focus on the content of the course. The online community however is great, and once you start to see the power of R, you are simply a google search away from figuring out how to do some amazing things. I encourage you to learn as much as you can if time allows.
**Grading Policy:** Grades will be determined by the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>20%</td>
</tr>
<tr>
<td>Projects (2)</td>
<td>40%</td>
</tr>
<tr>
<td>Midterm (2)</td>
<td>30%</td>
</tr>
<tr>
<td>Cheat Sheet Final</td>
<td>10%</td>
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</tbody>
</table>

**Homework/Assignments**
I will assign conceptual and analysis problems made available via an R markdown file. Students will complete the assignment using R Studios notebook functionality. These will be assigned regularly throughout the semester. Some assignment may include small presentations that will happen during class.

**Presentations/Projects**
It is important that we not only be able to “DO” statistics but also communicate what we did, why we did it, and interpret results appropriately. The projects will be conducted in groups with a final presentation presented. Additional details will be provided later during the course.

**Exams**
The midterms will be conducted in-class portion of conceptual questions. The purpose of the midterms are not to verify you can write R code or make computations, but rather assess your ability to communicate fundamental concepts and model interpretations and discussions. The final exam cheat sheet assignment is a semester wide project where each students will provide summaries of the many methods covered in class this semester. A template of the report will be provided by Dr. Turner.

**Grading Scale:**

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

**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 (SFA Policy 4.1)**
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
- 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 your 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 an Internet source or another source
- incorporating the words or ideas of an author into one's paper without giving the author due credit.

**Withheld Grades Semester Grades Policy (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](http://www.sfasu.edu/disabilityservices).

**SFASU Mental Health Statement**
SFASU values students’ mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support students mental health and wellness. Many of these resources are free, and all of them are confidential.

**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 10.4), [https://www.sfasu.edu/policies/student-code-of-conduct-10.4.pdf](https://www.sfasu.edu/policies/student-code-of-conduct-10.4.pdf)). 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.

**Academic Integrity (4.1)**
Academic integrity is the responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways, including instruction on the components of academic honesty and abiding by university policy on penalties for cheating and plagiarism.

**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/student-academic-dishonesty-4.1.pdf](http://www.sfasu.edu/policies/student-academic-dishonesty-4.1.pdf).

**Withheld Grades Semester Grades 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 coursework 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 to compute the grade point average. For additional information, go to https://www.sfasu.edu/policies/course-grades-5.5.pdf.

**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 promptly may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

**Mental Health and Wellness**
SFA values students’ mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support students' mental health and wellness. Many of these resources are free, and all of them are confidential.

**On-campus Resources:**
SFA Counseling Service
www.sfasu.edu/counselingservices
Health and Wellness Hub (corner of E. College and Raguet)
936.468.2401

SFA Human Services Counseling
Clinic
www.sfasu.edu/humanservices/139.asp
Human Services, Room 202
936.468.1041

**Crisis Resources:**
Burke 24-hour crisis line: 1.800.392.8343S
National Suicide Crisis Prevention: 9-8-8
Suicide Prevention Lifeline: 1.800.273.TALK (8255)
Crisis Text Line: Text HELLO to 741-741
STAT 5342 – Statistical Analysis II
Course Syllabus

Course description: Analysis of variance, multiple comparisons, blocking designs, higher factorial experiments, unbalanced designs, fixed and random effects, nested designs, split-plot designs, analysis of covariance.

Credit hours: 3

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.

Course Prerequisites and Corequisites: STA 5340 or equivalent

Course outline:

- Analysis of Variance
  - One-way completely randomized design
  - Randomized complete block design
  - Latin Square Design
  - Multiple Comparisons
- Analysis of Covariance
  - Completely randomized design with one covariate
  - Multiple Covariates
- Factorial Models
  - Fixed, Random, and Mixed-Effects Models
  - Rules for obtaining Expected Mean Squares
  - Nested Designs
  - Split Plot Designs
  - Repeated Measures Designs
- Unbalanced Designs
  - Randomized Block Designs with Missing Values
  - Balanced Incomplete Block Designs

Approximate time spent

- Analysis of Variance: 25%
- Analysis of Covariance: 15%
- Factorial Models: 45%
- Unbalanced Designs: 15%

Student Learning Outcomes (SLO): At the end of STA 5342, a student who has studied and learned the material should be able to:

1. Apply appropriate statistical models to solve real-world problems. [PLO: 1,2,3]
2. State the assumptions on which statistical procedures are based. [PLO: 1,2,3]
3. Discuss design concepts for experiments and important factors that need to be considered prior to data collection. [PLO: 1,2,3]
4. Select the appropriate statistical models for a given study. [PLO: 1,2,3]
5. Formulate statistical hypotheses in terms of the parameters of populations, test them using the appropriate test statistics, and interpret the results. [PLO: 1,2,3]

Program Learning Outcomes (PLO): Students graduating from SFA with a M.S. Mathematical Sciences Degree will:

1. Written Communication - SFA Mathematics majors communicate mathematical ideas effectively in written form, integrating mathematical notation correctly and consistently.
2. Verbal Communication - SFA Mathematics majors communicate mathematics effectively to diverse audiences.
3. Mathematical Maturation - SFA Mathematics majors grow from a computational understanding of mathematics to an integrated approach which includes critical thinking proficiency, computational facility, conceptual understanding, and problem-solving persistence.

Academic Integrity

The Code of Student Conduct and Academic Integrity outlines the prohibited conduct by any student enrolled in a course at SFA. It is the responsibility of all members of all faculty, staff, and students to adhere to and uphold this policy.

Articles IV, VI, and VII of the new Code of Student Conduct and Academic Integrity outline the violations and procedures concerning academic conduct, including cheating, plagiarism, collusion, and misrepresentation. Cheating includes, but is not limited to: (1) Copying from the test paper (or other assignment) of another student, (2) Possession and/or use during a test of materials that are not authorized by the person giving the test, (3) Using, obtaining, or attempting to obtain by any means the whole or any part of a non-administered test, test key, homework solution, or computer program, or using a test that has been administered in prior classes or semesters without permission of the Faculty member, (4) Substituting for another person, or permitting another person to substitute for one’s self, to take a test, (5) Falsifying research data, laboratory reports, and/or other records or academic work offered for credit, (6) Using any sort of unauthorized resources or technology in completion of educational activities.

Plagiarism is the appropriation of material that is attributable in whole or in part to another source or the use of one’s own previous work in another context without citing that it was used previously, without any indication of the original source, including words, ideas, illustrations, structure, computer code, and other expression or media, and presenting that material as one’s own academic work being offered for credit or in conjunction with a program course or degree requirements.

Collusion is the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any provision of the rules on academic dishonesty, including disclosing and/or distributing the contents of an exam.

Misrepresentation is providing false grades or résumés; providing false or misleading information in an effort to receive a postponement or an extension on a test, quiz, or other assignment for the purpose of obtaining an academic or financial benefit for oneself or another individual or to injure another student academically or financially.

Withheld Grades

Semester Grades (SFA Policy 5.5)
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Student Wellness and Well-Being
SFA values students’ overall well-being, mental health and the role it plays in academic and overall student success. Students may experience stressors that can impact both their academic experience and their personal well-being. These may include academic pressure and challenges associated with relationships, emotional well-being, alcohol and other drugs, identities, finances, etc.

If you are experiencing concerns, seeking help, SFA provides a variety of resources to support students’ mental health and wellness. Many of these resources are free, and all of them are confidential.

On-campus Resources:
The Dean of Students Office (Rusk Building, 3rd floor lobby)
www.sfasu.edu/deanofstudents
936.468.7249
dos@sfasu.edu

SFA Human Services Counseling Clinic Human Services, Room 202
www.sfasu.edu/humanservices/139.asp
936.468.1041

The Health and Wellness Hub “The Hub”
Location: corner of E. College and Raguet St.

To support the health and well-being of every Lumberjack, the Health and Wellness Hub offers comprehensive services that treat the whole person – mind, body and spirit. Services include:
- Health Services
- Counseling Services
- Student Outreach and Support
- Food Pantry
- Wellness Coaching
- Alcohol and Other Drug Education

www.sfasu.edu/thehub
936.468.4008
thehub@sfasu.edu

Crisis Resources:
- Burke 24-hour crisis line: 1.800.392.8343
- National Suicide Crisis Prevention: 9-8-8
- Suicide Prevention Lifeline: 1.800.273.TALK (8255)
- Crisis Text Line: Text HELLO to 741-741

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 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.

Date of document: 08/23/2023