Course Module
Stephen F. Austin State University
STAT 5340-001 Statistical Analysis I
Bush (Math) 214 TR 3:30-4:45PM
ZOOM Mtg#: 996 0147 9317; PC: 891241

Instructor
Robert (Bob) Henderson
Department: Mathematics & Statistics; Office: Bush (Math) 344
E-mail: hendersork@sfasu.edu
Phone: Office: (936) 468-1540; Cell: (936) 615-7796
BA in Math & History – Trinity University, San Antonio, TX (1978)
MS in Mathematical Statistics – Southern Methodist University, Dallas, TX (1980)
PhD in Mathematical Statistics – Southern Methodist University, Dallas, TX (1982)
MBA – University of Delaware, Newark, DE (1988)
Worked in industry for 27 years, 6 years with DuPont as internal consultant for a variety of businesses and staff groups, then 21 years in the semiconductor business, most with a supplier of a key enabling material for semiconductor production, and later with Samsung working primarily with engineers in process control efforts. The entire 27 years included many training delivery, as well as course development activities related to basic statistics, experimental design, and process control systems. Started at SFA in the fall of 2009.

Teaching Hours – TR 9:30-10:45AM, 2:00-3:15PM, 3:30-4:45PM
Office Hours – MW 10:00 to 11:30AM, 2:00 to 3:30PM, and by appointment. During these times, you can also send me an e-mail at the e-mail address above, and I will send you back a ZOOM Meeting Number and Passcode.

Course Goals
This course ideally will provide students with an introduction to and understanding of the most basic statistical analysis procedures.

Text
None.

Computer Access/Skills
This course is largely applied in nature; consequently, it will be helpful to have some facility in working with data using a computer. The course work will be greatly facilitated with the use of a statistical software package (R is one such package that is freely available and JMP is another that is available via MySFA). Knowledge of and ability to utilize Microsoft Office programs – Excel, Word, and Powerpoint – will also often be beneficial. Almost all workplaces expect some skills in working with these packages, and use them for reporting and/or presentation purposes.

Prerequisites
MATH 1342 or equivalent, while desirable, it is not entirely necessary.

Course Syllabus
The official course syllabus can be found at:
https://math.sfasu.edu/math/docs/syllabi/STAT5340Syllabus.pdf
Course Overview

Week 1-2: Introduction and Descriptive Statistics (including Workshop 1)
Week 2-4: Probability and Probability Distributions (including Class Exercise)
Week 4-5: Inferences about Population Central Values
Week 5-6: Inferences about Two Population Central Values
Week 6-7: Inferences about Population Variances (including Workshop 2)
Week 7-8: Inferences about >2 Population Central Values
Week 8-9: Multiple Comparisons (including Workshop 3)
Week 9-10: Categorical Data Analysis (including Class Exercise)
Week 10-11: Linear Regression and Correlation
Week 11-13: Multiple Regression and the General Linear Model
Week 13-14: Additional Regression Topics (including Workshop 4)

Grading
Grades will be determined by the following:

Workshop/Class Exercises 70%
Mid-Term 10%
Final 20%

About Assignments
There will be 5 to 6 in-class workshops/class exercises. Students will work in small groups on specific assigned projects, and then present their results/reports to the class. The presentations will be evaluated by the instructor. In addition, students will be asked to evaluate the contribution of their fellow group members (colleague evaluations). Finally, if possible, students will be asked to evaluate the presentations of other groups (peer evaluations).

Attendance
This is a graduate level class, and I do not expect attendance issues. Since a significant proportion of the evaluation is based on in-class activities, missing a class is not desirable. If you know you are going to have to miss a specific class, please let me know via e-mail or phone prior to the class.
Course description: Probability, statistical inference, rank tests, chi-square tests, linear regression and correlation, analysis of variance, multiple regression.

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: MATH 1342 or equivalent

Course outline:

<table>
<thead>
<tr>
<th>Course section</th>
<th>Approximate time spent</th>
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<tbody>
<tr>
<td><strong>Descriptive Statistics</strong></td>
<td>5%</td>
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<tr>
<td>• Graphical Methods</td>
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<td>• Measures of Central Tendency</td>
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<td>• Measures of Variability</td>
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<tr>
<td><strong>Probability</strong></td>
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<tr>
<td>• Probability Laws</td>
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<td>• Conditional Probability and Independence</td>
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<td>• Probability Distributions for Random Variables:</td>
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<tr>
<td>• Discrete</td>
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<td>• Continuous</td>
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<td>• Random Sampling</td>
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<td>• Sampling Distributions</td>
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<td><strong>Statistical Inference (Estimation and Hypothesis Tests)</strong></td>
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<tr>
<td>• Inferences about a single population parameter</td>
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<td>• Inference comparing parameters of two populations</td>
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<tr>
<td><strong>Statistical Inference Comparing Parameters for More Than Two Populations</strong></td>
<td>25%</td>
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<tr>
<td>• Analysis of Variance (ANOVA)</td>
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<td>• Kruskal-Wallis Test</td>
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<td><strong>Multiple Comparisons</strong></td>
<td>10%</td>
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<tr>
<td>• Fisher's Least Significant Difference Test</td>
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<td>• Tukey's Test</td>
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Student-Newman-Keuls Test
- Duncan's Test
- Dunnett's Test
- Scheffe's Test

**Chi-Square Tests**
- Goodness-of-Fit Test
- Tests for Independence and Homogeneity

**Regression**
- Correlation and Simple Linear Regression
- Multiple Regression

### Student Learning Outcomes (SLO):
At the end of STAT 5340, a student who has studied and learned the material should be able to:
1. Solve problems encountered in research projects and make decisions based on data and life experiences beyond the classroom and university setting. [PLO: 1,2,3]
2. Investigate the nature of independence and/or dependence among several variables. [PLO: 1,2,3]
3. Formulate statistical hypotheses in terms of the parameters of populations. [PLO: 1,2,3]
4. Test hypotheses using appropriate test statistics. [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)**
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. 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 in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices.

**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
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.

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