Course Module
Stephen F. Austin State University
STAT 5344-001 Applied Multivariate Analysis
Math 216 MTWR 10:30AM-12:35PM
ZOOM: Mtg# 991 9687 4260, PC: 116275

Instructor
Robert (Bob) Henderson
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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. Fall of 2009 was first semester at SFA.

Teaching Hours – MTWR 10:30AM-12:35PM
Office Hours – MTW 2-4PM and by appointment

Course Goals
The name of this course is Applied Multivariate Statistics, and the emphasis in this course will be on the “applied” aspect of the material. Ideally, the student will leave the course with some experience in the application of a variety of multivariate statistical analyses. In addition, it will be desirable for the student to be able to identify which types of analyses might be most appropriate for a given problem.

Text

Computer Access/Skills
It will be helpful to have access to a statistical software package, such as JMP, R, or SAS. Many of the analyses discussed in the course can be executed using such software. In addition, it will likely be helpful to have access to Microsoft Office programs – Excel, Word, and Powerpoint. Almost all workplaces expect some skills in working with these packages, and use them for reporting and/or presentation purposes.

Prerequisites
STAT 5340 Statistical Analysis I and MATH 4195 Linear Algebra
Course Rationale
With the increasing connectivity and computing power in the world today, there is also an ever-increasing array of multivariate data sets available for evaluation. Ideally, these data sets can be effectively analyzed to extract meaningful and useful information for furthering understanding of the populations from which the data are obtained.

My experience in industry has suggested that a significant challenge in such endeavors will be the ability of the statistician involved to be able to clearly and concisely summarize such evaluations for the relevant decision-makers. Most of these individuals will be very sharp people, but are very likely to not have much patience for the mathematical details behind a specific analysis.

This course ideally will convey to students the ability to identify an appropriate approach (or approaches) to evaluating multivariate data sets, the knowledge of how to execute the identified approach(es), and the skills to communicate the salient results to the decision-maker involved. In addition, some attention will need to be given to the inherent assumptions behind the various analysis approaches, and how these may influence the various alternatives suggested by the relevant evaluation.

Course Overview
Sessions 1-2: Introduction and Multivariate Normal Distribution
Sessions 3-5: Analysis of Mean Vectors
Sessions 6-8: Multivariate Analysis of Variance
Sessions 9: Multivariate Regression
Sessions 10-11: Principal Components & Factor Analysis
Sessions 12-14: Discrimination and Classification
Sessions 15-17: Cluster Analysis
Sessions 18-19: Final Exam

Course Objectives
By completing the assigned work and projects, students will demonstrate their knowledge of and be able to:

1. Use data reduction or structural simplification to represent phenomenon being investigated while minimizing loss in information
2. Create groups of “similar” objects or variables based upon measured characteristics
3. Be aware of techniques for classifying objects into well-defined groups
4. Investigate the nature of dependence among several variables
5. Formulate statistical hypotheses in terms of the parameters of multivariate populations and test them using multivariate test statistics
6. Effectively communicate results of evaluations of multivariate data sets

Grading
Grades will be determined by the following:
Assignments 80%
Final Exam 20%
About Assignments
Assignments will generally be homework problems and assigned to groups of students. It is not necessarily a given that all homework assignments will be collected, nor when collected that all problems originally assigned will be scored.

Attendance
This is a graduate level class, and I do not expect attendance issues. If you know you are going to have to miss a specific class, there is an assignment due for that period, and I have indicated that it will be collected, then to get credit for it, please get it to me prior to the class.
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**

_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](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
- 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.

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