



**AG 506.01B – ADVANCED STATISTICAL METHODS IN AGRICULTURE
COLLEGE OF AGRICULTURAL SCIENCES AND NATUAL RESOURCES
SPRING 2024**

COURSE SYLLABUS

Instructor

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Class Time (Hybrid course, in-person attendance is optional.)

This is a hybrid course (in-person and online mandatory). Students will be required to complete ALL course assignments online (myleoonline.tamuc.edu). In-person attendance is optional.

Office Hours

For immediate consultation, I will be available in my office Tuesdays and Thursdays from 8:00 a.m. – 9:30 a.m. (noon) and 2:00 p.m. – 3:00 p.m. or by appointment. If I am unable to meet with you at that time, send me an email and we will schedule an appointment. The best way to contact me is via email at Jose.Lopez@tamuc.edu. You can also email me from D2L (myleoonline.tamuc.edu). I generally answer emails within 48 hours. Students who email me after 5:00 PM can expect to receive a reply within 48 hours starting at 8:00 am of the next business day (M-F). Students who email me during holidays or over the weekend should expect a reply within 48 hours from 8:00 AM of the next regularly scheduled business day.

COURSE INFORMATION

Recommended Text

Little SAS Book: A Primer, Fifth Edition, by Lora D. Delwiche and Susan J. Slaughter. Cary, NC: SAS Institute Inc., 2012. (ISBN 9781612903439)

Required Software

Statistical Analysis System (SAS), Version 9.4 or latest version.

Student SAS Order Form

Students need to fill out the Student SAS Order Form below and email it to sell@tamuc.edu or mail it to Texas A&M Software Center, 735 Lamar Street, MS 3363, College Station, TX 77843-3363.

Student SAS Order Form

<https://sell.tamu.edu/files/studentSASform.docx>

There is additional information on how to order SAS Student Software Licenses in the following website.

https://sell.tamu.edu/Personal/Student_Software_List/SAS_Student_Software_License.php

Please be aware that if you may have to download the 28 GB set of files, or provide the Texas A&M Software Center with 7 blank DVDs or a flash drive.

If you have any questions regarding how to fill out the form, please do not hesitate to contact me. Once you submit your Student SAS order form, please follow up directly with the Texas A&M Software Center at 979.845.8300 or sell@tamu.edu.

Prerequisites

None

Teaching Philosophy

1. A course must deliver information, concepts and methods that will be useful in the student's professional life. However, learning analytical reasoning skills and improving the ability to process and use information efficiently is more important than memorizing facts and formulas and performing procedures repeatedly.
2. Students learn best when theories, concepts and procedures are explained in plain language as well as formally, and are complemented with examples or applications that are relevant to the students.

Character Formation

It is important during your graduate education to learn the values and rewards of hard work, responsibility, and honesty. The professor will promote character formation while teaching the course.

Course Description

Students will learn to work with various probability distributions as well as hypothesis tests, including tests for normality, correlation, advanced regression analysis, CRD, ANOVA, and non-parametric statistics. The course covers commonly used features and advanced statistical analysis using Statistical Analysis System (SAS) programming, including summarizing, combining, visualizing, and analyzing data.

Student Learning Outcomes

Upon satisfactory completion of the course the students will be able to use SAS programming to:

- Prepare, organize, and manipulate data sets
- Summarize data sets
- Graphically analyze data sets
- Analyze data sets through descriptive statistics and correlation analysis
- Conduct regression analysis
- Conduct hypothesis testing
- Perform analysis of variance, multivariate analysis of variance, and repeated measures analysis of variance for balanced and unbalanced designs

- Perform mixed model analysis of variance and repeated measures analysis of variance

Topics

Chapter 1: Getting Started Using the SAS Software.

Chapter 2: Getting Your Data Into SAS.

- The Viewtable Window, the Import Wizard, telling SAS where to Find Your Raw Data, the INFILE Statement, Temporary versus Permanent SAS Data Sets, the LIBNAME Statements

Chapter 3: Working with Your Data.

- Creating and redefining variables; SAS Character Functions; SAS Numeric Functions; the IF-THEN Statements; the IF-THEN/ELSE Statements; Subletting Your Data; Date Informats, Functions, and Formats; the RETAIN and Sum Statements

Chapter 4: Sorting, Printing, and Summarizing Your Data

- Subsetting Your Data with the WHERE Statement; PROC SORT;, PROC PRINT; PROC MEANS; PROC FREQ, PROC TABULATE; PROC REPORT

Chapter 6: Modifying and Combining SAS Data Sets

- The SET Statement, One-to-One Match Merge, One-to-Many Match Merge, Merging Summary Statistics with the Original Data, Using SAS Data Set Options, PROC TRANSPOSE

Chapter 8: Visualizing Your Data

- Bar Charts, Histograms and Density Curves, Box Plots, Scatter Plots, Series Plots, Fitted Curves, Controlling Axes and Reference Lines, Controlling Legends and Inserts, Customizing Graph Attributes

Chapter 9: Using Basic Statistical Procedures

- PROC UNIVARIATE, PROC MEANS, PROC TTEST, PROC FREQ, PROC CORR, PROC REG, PROC ANOVA

Linear Models and Matrix Algebra

- Matrices and Vectors; Matrix Operations; Notes on Vector Operations; Commutative, Associative, and Distributive Laws; Identity Matrices and Null Matrices; Transposes and Inverses

The Multiple Regression Model

- Assumptions; The Model; Model Estimation; Interpretation of Coefficients; Regression Statistics such as SER, standard error estimators of the parameter estimators, t-tests for population parameters; TSS, ESS, and RSS; F test; R^2 ; Adjusted R^2 ; Model Specification; Multicollinearity; Symptoms of Multicollinearity; Detecting Multicollinearity; Addressing Multicollinearity; Calculation of Matrices; PROC REG; PROC IML

Analysis of Variance Procedures

- Analysis of Variance Procedures, including Selective Procedures that Perform Sum of Squares ANOVA, Selective Procedures that Perform General Analysis of Variance; Analysis of Variance for Fixed-Effect Models, including PROC GLM for General Linear Models, PROC ANOVA for Balanced Designs, Comparing Group Means, PROC TTEST for Comparing Two Groups; Analysis of Variance for Categorical Data and Generalized Linear Models; Nonparametric Analysis of Variance

The GLM Procedure

- Analysis of Completely Randomized Designs vs. Regression Analysis; PROC GLM Features, PROC GLM Contrasted with Other SAS Procedures, PROC GLM Statement, Positional Requirement for PROC GLM Statement, Statements in the GLM Procedure; Statistical Assumptions for Using PROC GLM, Specification of Effects, Types of Effects,

The Bar Operator, Specification of ESTIMATE Expressions, Specification of CONTRAST Expressions
 Additional Procedures
 ○ PROC MODEL, PROC MIXED, PROC GLIMMIX

GRADING

Grading

Exams 1-4	80.00%
Assignments	20.00%
	<hr/> 100.00%

Note: There would be an optional final comprehensive exam (Exam 5). The lowest Exam 1-5 grade will be dropped. If you decide not to take Exam 5, that is the one that will be dropped. All your grades will be available in MyLeoOnline (D2L), the learning management system used by Texas A&M University-Commerce.

Grading Scale

<u>Range</u>	<u>Grade</u>
90-100.00	A
80-89.99	B
70-79.99	C
60-69.99	D
Less than 60	F

Exams

No makeup exams will be offered. A grade of zero will be assigned to any missed exams. Make sure you arrive in time.

Lab Assignments

Computer lab assignments will be graded and discussed. Computer lab assignments will test your understanding of SAS programming. In these computer labs, you will learn the use SAS to solve practical problems and make informed decisions using data. Students will be required to submit their individual answers via eCollege.

Class Participation

Students should come to class prepared by reading and completing course assignments prior to class. It is the students' responsibility to be familiar with and understand all previously covered material prior to each new lecture.

TECHNOLOGY REQUIREMENTS

This is a hybrid course (in –person and online). The online portion will delivered using D2L, the learning management system used by Texas A&M University-Commerce. Students will be required to download PDF Handouts of the PowerPoint presentations and other important class materials and upload programs and other assignments in the D2L website for the course.

LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:

<https://community.brightspace.com/s/article/Brightspace-Platform-Requirements>

LMS Browser Support:

https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

Zoom Video Conferencing Tool

https://inside.tamuc.edu/campuslife/CampusServices/CITESupportCenter/Zoom_Account.aspx?source=universalmenu

Panopto

<https://inside.tamuc.edu/facultyStaffServices/academicTechnology/educational-technology/panopto.aspx>

ACCESS AND NAVIGATION

This is a hybrid course (in –person and online). The online portion will delivered using D2L, the learning management system used by Texas A&M University-Commerce. To log into the course, go to: myleonline.tamuc.edu

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

COMMUNICATION AND SUPPORT

Student Support

If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

<https://community.brightspace.com/support/s/contactsupport>

Interaction with Instructor Statement

The primary form of communication with the class will be in class. Occasionally, I will post Announcements in D2L website for the course and/or contact students via email. Any changes to the syllabus or other important information critical to the class will be announced in class.

I generally answer emails within 48 hours. Students who email me after 5:00 p.m. can expect to receive a reply within 48 hours starting at 8:00 a.m. of the next business day (M-F). Students who email me during holidays or over the weekend should expect a reply within 48 hours from 8:00 a.m. of the next regularly scheduled business day.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures

Academic Honesty

Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including (but not limited to) receiving a failing grade on the assignment, the possibility of failure in the course and dismissal from the University. Since dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. In **ALL** instances, incidents of academic dishonesty will be reported to the Department Head. Please be aware that academic dishonesty includes (but is not limited to) cheating, plagiarism, and collusion.

Cheating is defined as:

- Copying another's test or assignment
- Communication with another during an exam or assignment (i.e. written, oral or otherwise)
- Giving or seeking aid from another when not permitted by the instructor
- Possessing or using unauthorized materials during the test
- Buying, using, stealing, transporting, or soliciting a test, draft of a test, or answer key

Plagiarism is defined as:

- Using someone else's work in your assignment without appropriate acknowledgement
- Making slight variations in the language and then failing to give credit to the source

Collusion is defined as:

- Collaborating with another, without authorization, when preparing an assignment

If you have any questions regarding academic dishonesty, ask. Otherwise, I will assume that you have full knowledge of the academic dishonesty policy and agree to the conditions as set forth in this syllabus.

Attendance Policy

Students are expected to attend class and actively participate. Student participation/activity will be monitored by the professor. Students should plan to dedicate approximately 15-20 hours/week of time to this course.

APA Citation Format Policy

It is very important that you learn how to cite properly. In some ways, citations are more important than the actual text of your paper/assignment. Therefore, you should take this task seriously and devote some time to understanding how to cite properly. If you take the time to understand this process up front, it will save you a significant amount of time in the long run (not to mention significant deductions in points).

In the social and behavioral sciences, we generally follow the APA (American Psychological Association) formatting style. As a rule of thumb, one cites whenever they are paraphrasing other people's words or when they quote other's words directly. You may learn to cite from a variety of different sources including the APA Tutorial and the sources listed below and in the Getting Started section of your course.

www.apastyle.org

<http://owl.english.purdue.edu/owl/resource/560/02/>

www.library.cornell.edu/resrch/citmanage/apa

It is the student's responsibility to understand how to cite properly. If you have questions, feel free to ask.

Late Work

It is the student's responsibility to plan accordingly and submit their assignments in a timely manner. Class assignments will be announced. The instructor reserves the right to assign a grade of zero to any late assignment.

Drop Course Policy

Students should take responsibility for dropping themselves from the course according to University policy should this become necessary.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance

University Specific Procedures

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the [Student Guidebook](#).

<http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx>

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: <https://www.britannica.com/topic/netiquette>

TAMUC Attendance

For more information about the attendance policy please visit the [Attendance](#) webpage and [Procedure 13.99.99.R0.01](#).

<http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx>

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf>

Academic Integrity

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

[Undergraduate Academic Dishonesty 13.99.99.R0.03](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf>

[Graduate Student Academic Dishonesty 13.99.99.R0.10](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.pdf>

Counseling Center

A student that faces a crisis or a serious and unforeseeable event that affects his/her class performance must contact the Counseling Center, Halladay Student Services Building, Room 204, Phone (903) 886-5145. If important class material or course assignments are missed because of such crisis or event, the student must contact the instructor as soon as possible.

Students with Disabilities-- ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services

Texas A&M University-Commerce
Gee Library- Room 162
Phone (903) 886-5150 or (903) 886-5835

Fax (903) 468-8148

Email: studentdisabilityservices@tamuc.edu

Website: [Office of Student Disability Resources and Services](#)

<http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/>

Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the [Carrying Concealed Handguns On Campus](#) document and/or consult your event organizer.

Website:

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf>

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

AI Use Policy

Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course.

Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

IMPORTANT DATES

Date	Description
Jan 29, Mon.	First day of this class.
Mar 11-15	Spring Break
May 3, Friday	Last day of classes.
May 4-10	Week of final examinations.

COURSE CALENDAR

Every effort will be made to adhere to the course calendar below. However, unforeseen circumstances may require changes to the course calendar. In that case, changes will be announced during regular class time. The professor reserves the right to change the course calendar if necessary and depending on the progress of the class. I highly recommend that you follow the calendar outlined below **VERY CAREFULLY** so that you are sure to complete readings as assigned and turn your assignments in on time.

AEC 506.01B – ADV STAT METHODS IN AGRICULTURE
Course Calendar, Spring 2024
Hybrid Class

Week of	Subject/Material Covered
Week 1 Jan 29 – Feb 4	Syllabus, D2L Tutorial (MyLeo Online Student Resource Course) CH01: Getting Started Using the SAS Software Example 1.1 CH02: Getting Your Data Into SAS. Examples 2.1, 2.2, 2.3, 2.5, 2.6, 2.7
Week 2 Feb 5 – 11	CH02: Getting Your Data Into SAS. Examples 2.8, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 2.16 CH03: Working with Your Data. Examples 3.1
Week 3 Feb 12 – 18	CH03: Working with Your Data. Examples 3.2, 3.3, 3.4, 3.5 CH04: Sorting, Printing, and Summarizing Your Data. Examples 4.1, 4.1.a, 4.1.b, 4.1.c, 4.2.a, 4.2.b, 4.2.c, 4.3 (up to Part c)
Week 4 Feb 19 – 25	CH04: Sorting, Printing, and Summarizing Your Data. Examples 4.3, 4.4, 4.5, 4.6
Week 5 Feb 26 – Mar 3	Exam 1 (CH01 + CH02 + CH03 + CH04 up to Section 4.6)
Week 6 Mar 4 – 10	CH04: Sorting, Printing, and Summarizing Your Data Example 4.7, 4.8, 4.9
Week 7 Mar 11 – 17	SPRING BREAK (No Class)
Week 8 Mar 18 – 24	CH08: Visualizing Your Data Examples 8.1, 8.2, 8.3, 8.4, 8.5, 8.6
Week 9 Mar 25 – 31	Exam 2 (CH01 through CH08)

Week 10 Apr 1 – 7	CH09: Using Basic Statistical Procedures Examples 9.1, 9.2, 9.3, 9.4, 9.5
Week 11 Apr 8 – 14	CH09: Using Basic Statistical Procedures Examples 9.6, 9.7., 9.8, 9.10, 9.11
Week 12 Apr 15 – 21	Exam 3 (CH01 through CH09)
Week 13 Apr 22 – 28	Multiple Regression AT01 Calculus and Matrix Algebra Review Examples 3, 4, 5, 6, 9, 10, 13, 15, 16, 17, and 18 AT02 Multiple Regression Example 7
Week 14 Apr 29 – May 5	Proc GLM AT03 ANOVA Procedures Review Questions in Last Slide AT04 Proc GLM Examples 1, 2, 3, 4, and 5
Week 15 May 6 – 10	Exam 4 (Multiple Regression)
Week 15 May 6 – 10	Exam 5 - Optional Final Comprehensive Exam