Abilene Approval Chart for Curriculum Changes

A = Approve I = Information Item R = Respond In Writing

Course Number: SDS 479 - Multivariate Analysis **or Degree Plan(s):**

	Campus-Level Academic Review[1]	Dept./School	College	Dean	TEC	AUAC/Grad	Provost
	Change to a Course Include signatures from all chairs/program directors for cross-listed courses.[1]						
1.	Title (description unchanged)	A	A	A	I	I	I
2.	Description (not affecting content)	A	A	A	I	I	I
3.	Course term(s)	A	I	A	I	I	I
4.	Content (change of course outcomes)	A	A	A	I	I	A
5.	Number of credit hours	A	A	A	A	A	A
6.	Course number within the hundred	A	A	I	I	I	I
7.	Course number beyond the hundred	A	A	A	A	A	A
8.	Prerequisites	A	A	A	I	I	I
9.	Course restriction (e.g., majors only, junior standing)	A	A	A	A	A	A
10.	Level change (U to G *or* G to U)	A	A	A	A	A	A
11.	Cross list course	A	A	A	A	A	A
12.	Department of record	A	A	A	A	A	A
13.	Open or close a course	A	A	A	A	A	A
	Change to a Degree Plan						
14.	Educational Program — Revise	A	A	A	A	A	A
15.	Educational Program — Adopt/revise admission requirements	A	A	A	A	A	A
16.	GPA — Revise program-required GPA	A	A	A	A	A	A
17.	Minor — Revise	A	A	A	A	A	A

	Full Review	Dept./School	College	Dean	TEC	AUAC/Grad	Provost	Campus Faculty	Senior VPAA	President
	Change to Catalog Information (for Campus)									
18.	General requirements for Bachelor's and Associate Degrees	–	–	–	–	A	A	A	A	I
19.	Policies governing academic probation and suspension	–	–	–	–	A	A	A	A	I
20.	Requirements for graduating with honors	–	–	–	–	A	A	A	A	I
	Change to a Degree Plan									
21.	Educational Program — Add or Discontinue[2] [3]	A	A	A	A	A	A	A	A	I
22.	Educational Program — Discontinue (Provost-proposed)	R	–	R	A	A	A	A	A	I
23.	Minor — Add or Discontinue	A	A	A	A	A	A	–	A	I
24.	Minor — Discontinue (Provost-proposed)	R	–	R	A	A	A	–	A	I
25.	Degree — Add or Discontinue	A	A	A	A	A	A	A	A	I
26.	Degree — Discontinue (Provost-proposed)	R	–	R	A	A	A	A	A	I

	Change to General Education Requirements for Undergraduates (System)	Dept./School	College	Dean	AUAC	Provost	UGEC	University Faculty	Senior VPAA	President
27.	Change course outcomes of an included course	A	A	A	A	A	A	–	A	I
28.	Add or drop a required course from the General Education Requirements	A	–	A	–	A	A	A	A	I
29.	Add or drop a course from a menu within the General Education Requirements	A	–	A	–	A	A	–	A	I
30.	Comprehensive revision of General Education Requirements	–	–	–	–	A	A	A	A	I

Notes

[2] Any change to a cross-listed course requires the signature of both department chairs or program directors overseeing the course to ensure that the courses stay in sync. This includes courses taught at other campuses (e.g. BIBL 101 and BIBO 101).

[3] For undergraduate majors, a minimum of 30 hours is required. These programs must have a minimum of 6 elective hours, unless the requirements of external accrediting bodies make it impossible. Master's programs must include a minimum of 30 hours, and doctoral programs must include a minimum of 30 hours beyond the master's.

[4] When a department/school or dean proposes closing a program, approval routing follows the typical process beginning with the department/school. An administrative proposal by the provost or senior vice president for academic affairs would follow the "provost-proposed" routing on the chart.

Updated 8/1/2023

Department/School(s)

John Ehrke 02/06/2026

Chair Signature Date

Chair/Program Director Signature Date

College Academic Council(s)

Kathleen Lee 03/19/2026

Chair Signature Date

Chair Signature Date

Dean(s)

Charles S Mimbs 3/30/2026

Signature Date

Signature Date

Teacher Education Council

Signature Date

Campus Academic Council:
Abilene Undergraduate or Abilene Graduate

Signature Date

Provost

Signature Date

University General Education Council

Signature Date

University Faculty

Abilene Faculty Senate Chair signature Date

Dallas Faculty Council Chair signature Date

Senior Vice President for Academic Affairs

Signature Date

President

Signature Date

Abilene New Course Application

You may delete the preceding instructional pages before submitting an application.

Course ID (*Subject Code and Number)*	SDS 479

1. Systems and Catalog Information Complete each item.

A	Course Developer	Randy Nguyen
B	Course Instructor	Randy Nguyen
C	Course Title	Multivariate Analysis
D	Course Abbreviation for Banner if title is more than 30 characters	
E		OSE - Onstead Science and Engineering
F		MATH - Mathematics
G	Number of Credit Hours	3
G1	Number of Lecture Contact Hours	3
G2	Number of Lab Contact Hours	0
H	Is the course for a fixed or variable number of credit hours?	Fixed If variable, explain rationale:
I	Is the course repeatable for additional credit?	No
J	Maximum total number of credit hours a student can earn for this course	3
K		Lecture (LEC) See Schedule Type definitions in the Reference section.
L	Number of Faculty Workload Hours	3
M	Grading Mode	Standard
N	Maximum Enrollment	24

O	**Catalog Description** (50 words or less)	Introduces statistical models and procedures for describing, visualizing, and analyzing random vector response data. Generalizes classical test statistics from univariate to multivariate. Examines linear and quadratic dimension reduction, the multivariate normal distribution, inference on multivariate parameters, and supervised and unsupervised classification methods for high-dimensional data.
P	List any prerequisites (course/s, test scores, class standing, major, etc.)	MATH 325 and MATH 377
Q	List any corequisites (these *must* be taken at the same time; note that a single requirement cannot be both a prerequisite *and* a corequisite)	
R	If the course is cross-listed, specify the subject code and course number of the other course	
S	Does this course require any additional student course fees?	No If yes, attach a completed course fee form.
T1	Will the course be offered in **fall** terms?	Yes, odd years
T2	Will the course be offered in **spring** terms?	No
T3	Will the course be offered in **summer** terms?	No
U	First semester this course will be offered under a new Course ID. *May not be earlier than the coming fall semester.*	Fall 2027
V	Is this course required for a program(s)?	Yes If yes, attach a completed curriculum proposal to change the program(s).

W	Should the addition of this course be retroactively applied to the degree plan it supports? *This is rare, and rationale should explain compelling extenuating circumstances.*	No If yes, provide rationale:
X	Has this course been offered as a Special Topics course? *New courses are not required to be taught as Special Topics courses prior to approval.*	No If yes, provide course ID, term, and enrollment:
Y	List any courses in which the content overlaps the proposed course. (Course ID and Name). *Attach a statement from the instructor/dept chair of the existing course justifying the new offering.*	

2. Curriculum

A. Explain any effects of this course on any degree plans. If the addition of the course alters program requirements, submit a separate Approval Chart for Curriculum Change to update the program.

This course is only required in the SDS degree. It may attract some students in the BS MASC degree, but it can count as an elective or advanced math selection in that degree.

B. Justify the addition of this course to the current curriculum, explaining the gap it meets.

Our current offering of statistics courses focus on descriptive univariate statistics. This course broadens that to multivariate statistics and includes predictive analytics as well. This is cornerstone material for expanding the reach of data science to supervised and unsupervised learning associated with modern ML and LLM models.

3. Course Design

A. Audience and Course Goal

1. Describe the intended audience, including prerequisite skills.

Intended for Mathematics or SDS majors and minors. Strong background in programming, MATH 325 and MATH 377 are required. This is an advanced course.

2. State the overarching course goal(s) in performance terms.

The goals of the course are to

- introduce methods to describe, graph, and analyze multivariate data,
- introduce the multivariate normal distribution and related distributions,
- introduce Wilk's λ and Hotelling's T^2 as extension of the univariate hypothesis testing procedures,
- introduce key supervised and unsupervised statistical methods and criteria used in classification,
- introduce basic model diagnostics, model selection procedures, criteria, and the bias-variance tradeoff in regression,
- increase statistical problem-solving abilities,
- increase communication and presentation skills,
- increase basic matrix algebraic manipulative skills, and
- introduction to multivariate analysis of variance (MANOVA) and repeated measures.

B. Student Learning Outcomes and Measurements

	Student Learning Outcome	**Measurement Instrument**	**Measurement Standard**
1	The student will be able to describe, graph, and analyze multivariate data.	homework, quizzes, and tests	• computes descriptive statistics for multivariate data, including correlation matrices • performs vector and matrix computations • performs exploratory data analysis for multivariate data • conducts multivariate analyses using the multivariate normal distribution and related distributions • computes probabilities of multivariate normal distributions • computes Wilk's λ and Hotelling's T^2
2	The student will be able to train models using supervised and unsupervised learning methods to classify data.	homework, quizzes, and tests	• classifies multivariate data using naive Bayes classifier, K nearest neighbors, and random forest • understands the bias-variance trade-off • uses model selection methods to appropriately select parsimonious models based on various criteria • understands and performs model cross-validation using training and testing data sets • applies post-hoc model diagnostic procedures to address variance inflation and heteroskedasticity issues • applies dimension reduction techniques to a variety of problems to avoid underfitting and overfitting
3	The student will be able to analyze multivariate	homework, quizzes, and tests	• understands the importance of exploratory data analysis for multivariate data

	data sets in real-world applications.		• expands key hypothesis testing and interval estimation ideas from univariate to multivariate • computes joint and marginal probabilities • determines whether a linear, multiple, or multivariate regression model should be used • analyze data using multivariate analysis of variance (MANOVA) • identify and analyze data with repeated measures

C. **Text and Resources**

Give the full publication information of the textbook/s and other required resources and outside readings. For **combined undergraduate/graduate** courses, make two lists:

A. full publication information; label **Undergraduate**.

An Introduction to Statistical Learning with Applications in R/Python, 2nd edition. Link to the textbooks (one for R and one for Python) https://www.statlearning.com/

B. full publication information; label **Graduate**.

4. Supporting Documentation

Required of all applications	
1	**Approval Chart for Curriculum Changes**
2	**Syllabus** — **Attach** the syllabus for the course based upon the anticipated first-semester offering.
4	**Library** — Submit new course application and syllabus to the Library dean's office. **Attach** the Library's memo.
Attach if applicable	
5	**Content Overlap** — Include one document for each course you listed in Section 1Y. **Attach** statement from instructor/dept chair of existing course justifying the new offering.
6	**Departmental Resources** — List the resources that support the course and are available only through the department, if applicable. **Attach** the list of the holdings and the location(s).
7	**Resources** — List resources (other than library or departmental resources) that are needed to support this course (computers, lab equipment, other technology, etc.).

	Attach a complete list of all items and indicate possible sources or estimated cost of each. List the sources of any needed funds.
8	**Expenses** — List additional expenses needed to implement this course (full-time or part-time faculty, graduate or lab assistants, student employees, travel, special student costs, room renovation, storage facility, etc.). **Attach** a complete list of all items, the estimated cost of each and the source of the funds.
9	**Justification** — **Attach** any documents to which you refer in Section 2B.

ABILENE CHRISTIAN UNIVERSITY

Onstead College of Science and Engineering
Department of Mathematics

Course ID and Section:	SDS 479-01
Course Title:	Multivariate Analysis
Course Time:	TBD
Course Room:	TBD
Semester:	Fall 2027
Course Credit:	3 semester hours
Final Exam:	TBD

Contact Information

Instructor:	Dr. Randy Nguyen Assistant Professor of Mathematics
Email:	randy.nguyen@acu.edu
Office:	Onstead Science Center, Room 161D (OSC 161D)
Office Telephone:	325-674-2461
Office Hours:	Mon-Fri 1:30–3:00 pm If these times are not convenient, please let me know and we can find a time that fits your schedule.

Mission Statements

This course supports ACU's mission statement of preparing students for Christian service and leadership throughout the world by providing students a foundational understanding of the mathematical principles such as problem solving and decision making, as well as exposing students to the role of mathematics in a Christian worldview.

The mission of the Onstead College of Science and Engineering is to explore and understand God's creation in the natural world and apply the acquired knowledge and principles to address its issues and challenges.

The mission of the Department of Mathematics is to educate students to be quantitative and analytical thinkers in preparation for Christian service and leadership throughout the world.

Course Resources

Required Textbook: *An Introduction to Statistical Learning with Applications in R/Python*, 2nd edition. Link to the textbooks (one for R and one for Python) https://www.statlearning.com/

Required Electronic Access: You are required to have access to a laptop.

Online Resources: Canvas will be used to manage course documents, notes, assignments, test reviews, etc. If you miss class, you should check Canvas for material and information that you missed.

Help In the Course: It is important for you to seek immediate help when you feel that you need it. Do not assume that your problems or confusion will go away on its own. Often a delay causes more problems, more confusion, more frustration, and a much lower grade. I expect you to be confused and frustrated at times during the semester. This is normal. I also expect you to come in and ask questions. If you will come to my office and work with me, we can get you through the course successfully. Possible sources of help are the following:

- Come to my office or send me an email. Ask for help. I can and will help you if you ask.
- Ask others in class. Work on problems with them. Many times, this is the best way to learn.
- Find others who have taken the course.

If you need help, go somewhere to get it and get it quickly.

Course Information

Catalog Description: Introduces statistical models and procedures for describing, visualizing, and analyzing random vector response data. Generalizes classical test statistics from univariate to multivariate. Examines linear and quadratic dimension reduction, the multivariate normal distribution, inference on multivariate parameters, and supervised and unsupervised classification methods for high-dimensional data.

Prerequisites: MATH 325 and MATH 377.

Course Audience: Intended for Mathematics or Statistics and Data Science (SDS) majors and minors.

Course Content, Objectives, and Goals: The goals of the course are to

- introduce methods to describe, graph, and analyze multivariate data,
- introduce the multivariate normal distribution and related distributions,
- introduce Wilk's λ and Hotelling's T^2 as extension of the univariate hypothesis testing procedures,

- introduce key supervised and unsupervised statistical methods and criteria used in classification,
- introduce basic model diagnostics, model selection procedures, criteria, and the bias-variance tradeoff in regression,
- increase statistical problem-solving abilities,
- increase communication and presentation skills,
- increase basic matrix algebraic manipulative skills, and
- introduction to multivariate analysis of variance (MANOVA) and repeated measures.

The course outcomes are listed below:

Competency	**Measurement Instrument**	**Measurement Standard**
The student will be able to describe, graph, and analyze multivariate data.	homework, quizzes, and tests	• computes descriptive statistics for multivariate data, including correlation matrices • performs vector and matrix computations • performs exploratory data analysis for multivariate data • conducts multivariate analyses using the multivariate normal distribution and related distributions • computes probabilities of multivariate normal distributions • computes Wilk's λ and Hotelling's T^2
The student will be able to train models using supervised and unsupervised learning methods to classify data.	homework, quizzes, and tests	• classifies multivariate data using naive Bayes classifier, K nearest neighbors, and random forest • understands the bias-variance trade-off • uses model selection methods to appropriately select parsimonious models based on various criteria • understands and performs model cross-validation using training and testing data sets • applies post-hoc model diagnostic procedures to address variance inflation and heteroskedasticity issues

		• applies dimension reduction techniques to a variety of problems to avoid underfitting and overfitting
The student will be able to analyze multivariate data sets in real-world applications.	homework, quizzes, and tests	• understands the importance of exploratory data analysis for multivariate data • expands key hypothesis testing and interval estimation ideas from univariate to multivariate • computes joint and marginal probabilities • determines whether a linear, multiple, or multivariate regression model should be used • analyze data using multivariate analysis of variance (MANOVA) • identify and analyze data with repeated measures

Evaluation Methods: Measurement of competencies will be conducted through tests, homework, and a project.

Course Format: The format of the course will include lecture, class discussion, group work, and individual assignments. Although I will be at the board most of the time, there will be times when you may go to the board to present your work.

Academic Integrity and Intellectual Honesty

University Academic Integrity Statement: *ACU exists to educate students for Christian service and leadership throughout the world. As a Christian academic community, we are each responsible to hold each other accountable for behaviors consistent with the nature of God, to respect the community and to respect ourselves.*

Academic integrity is demonstrated by behavior that honors the learning environment — regardless of setting, context, location or modality.

Academic dishonesty, or failure to practice academic integrity, negatively affects the learning environment and other members of the ACU community.

Academic dishonesty includes — but is not limited to — plagiarism, collusion, cheating, fabrication, facilitating academic dishonesty, failure to contribute to a collaborative project, and sabotage.

Academic dishonesty detracts from a student's personal learning, which will affect her or his academic grade, standing in a course or program, and/or standing in the university.

Academic dishonesty also has a chilling effect on the ACU community creating an air of suspicion in the learning environment.

Rationale for Policy: The most powerful motive for integrity and truthfulness comes from one's desire to imitate God's nature in our lives. As a community of Christian students and scholars, we are each responsible to expect behaviors from each other consistent with the nature of God, to respect the community, and to respect ourselves.

Expectations of academic honesty and integrity extend to both university employees and students. Every member of the community is responsible for protecting the integrity of learning, scholarship, and research. Being responsible requires action against violations despite peer pressure, loyalty, or compassion. Individuals must take responsibility for their own conduct and discourage misconduct by others.

Definition of Academic Integrity: Academic integrity is defined as academic work completed as assigned for each class by the individual or group responsible for the work. Academic work includes but is not limited to reading assignments, homework assignments, assessments, examinations and tests, attendance at required out-of-class activities, written or oral presentations, and laboratory experiments and research.

Violations of academic integrity and other forms of cheating involve the intention to deceive or mislead or misrepresent and therefore, are a form of lying. Specific examples of violations of academic integrity in this course include, but are not limited to, the following:

- Submitting for credit, in whole or in part, the work of others.
- Receiving, giving, or using unauthorized aid on an examination, test, quiz, or assignment (e.g.,
- texting).
- Viewing the answers of a nearby classmate during an examination, test, quiz, or assignment.
- Having inappropriate notes/practice work available during an examination, test, quiz, or assignment.
- Obtaining examination, test, or quiz questions before the examination, test, or quiz is given.
- Accessing printed copies or electronic copies of formulas and/or notes during an examination, test, quiz, or assignment without instructor approval.
- Failure to give credit to sources used in a work to present the work as one's own.
- Submission of paper(s), project(s), or assignment(s), in whole or in part, obtained from any source, such as a friend, research service, or club paper file, as one's own.
- Allowing other members of a group to provide a disproportionate fraction of a required group project or activity.
- Claiming credit for an attendance or service activity without attending or performing the activity.

- Written or oral presentation of falsified materials and facts, including but not limited to the results of interviews, laboratory experiments, and field-based research.

Consequences of Breach: Violations of academic integrity may result in, but are not limited to, the following consequences:

- A first offense will result in a grade of 0 on the assignment in which the violation of academic integrity occurred.
- You will be permitted to remain in the class after the first offense of being found in violation of the academic integrity policy.
- A second violation in a class will result in an automatic grade of F in the course.
- All violations of academic integrity will be reported to Dean of the Onstead College of Science and Engineering and the Dean of Students in the Student Life Office.

Appeal Process: If you would like to appeal a decision, then please follow this link to learn about how to file an appeal:
https://acu.edu/office-of-the-provost/academic-integrity-process/

Calculators and Other Electronic Devices: The sharing of calculators and other devices is not permitted during class. Additionally, recording audio or video during class is not permitted without prior authorization.

Collaboration: Although I encourage you to talk with each other, get ideas from each other, and help each other, all work you submit must be your own. *Any work that is substantially identical will be considered to be a violation of academic integrity.*

Grade Information

Grade Categories and Grading Scale: The grade categories and percentages that will be used to calculate your course average and the grading scale that will be used to calculate your course grade are listed below:

Grade Categories	Percentage
In-class Work	10%
Homework	10%
Tests (3)	60%
Final Exam	20%

Course Average	Course Grade
90–100	A
80–89	B
70–79	C
60–69	D
0–59	F

In-class Work: In-class work will consist of in-class project presentation, quizzes, and possibly other assignments. Your four lowest daily work scores will be dropped when calculating your daily work average.

Homework will be assigned and submitted online or on paper.

You should expect one or two quizzes during class each week. Some in-class quizzes may be given for you to work outside of class and due the next class meeting. Some in-class quizzes will be worked individually and some may be worked as a group. Quizzes will typically be announced in advance and listed in Canvas. Each quiz will be worth 100 points. No late quizzes will be given.

There may be other assignments for you to work that will be considered a daily work assignment.

Tests: There will be four tests during the semester. Each test will be worth 15% of your course grade. Each test will be over material from class, the textbook, and homework. A test may include questions over material from previous tests.

Final Exam: The comprehensive final exam is scheduled for TBD. *University policy prohibits the giving of final exams early.* Make your end-of-semester plans accordingly. Some questions on the final exam may be designed to have you combine ideas from various sections and units.

Make-up Work: You are expected to take a test or exam when it is given and to submit an assignment when it is due. No make-up work for homework or projects will be given and no late work will be accepted.

Late Work and Extra Credit: No late work will be accepted. No work will be accepted for extra credit.

Withdrawal from the Course: If you withdraw from the course, your grade is W. The last day you can withdraw from a Fall 2024 class is Friday, November 15. Remember that your advisor must sign your Withdrawal from Class form.

Attendance and Classroom Management

Attendance: Missing class has a detrimental effect on your learning. The instructor considers class attendance to be a requirement, however, attendance is the responsibility of the student. Attendance will be recorded at each class meeting.

If you have excessive absences (more than 20%), you may be dropped from the course with a grade of W or WF.

In any absence, you are responsible for all material covered and are expected to be prepared for the next class meeting.

There are only two types of absences in this course: a university approved absence and other types of absence.

University Approved Absence. Academic learning and development of leadership take place in and out of the formal academic setting. A student who is required to be absent from a class to participate in a university activity approved by the academic administration will not be penalized by professors for missing class provided that the procedures noted on the Advance Approval for Absence form are followed.

However, the student should not be permitted to participate if he or she has absences of more than 20% of the class meetings. These include absences approved under this policy as well as other absences. In the event that an athletic team earns or is invited to participate in any NCAA postseason activity, participants are eligible for additional excused absences.

Sponsors are responsible for securing approval of university-sponsored trips using the official university approval forms. The forms should be completed in time for students to give them to their teachers at least seven days before the absence. Sponsors are responsible for student conduct. Each student is responsible for notifying his or her teachers in advance of the reason for absence.

Other Types of Absence. Other types of absences are an absence that is not a university approved absence. Examples of this type of absence include injury or illness that is too severe or contagious for you to attend class, death or major illness in your immediate family, illness of a dependent family member, admission interviews for professional or graduate school, skipping class, and having an appointment or meeting during class.

Electronic Devices: I consider the time that we share in the classroom to be extremely valuable. Therefore, to minimize the disruptions and distractions that detract from and interrupt the learning environment, mobile phones, pagers, watch alarms, and other electronic devices should be disabled or turned off and kept in your book bag during class. If such a device is used, rings, or makes a noise or if you take a call or make a call, you will be asked to leave, will be counted absent (unexcused) for the class session, and will be subject to a grade penalty. If there is an urgent or emergency situation or there are extenuating circumstances and you must have a mobile phone or pager on during class, then you must inform me before class begins and (if possible) use silent notification.

Disruptive Behavior: If your actions disrupt the class, you will be notified by the instructor and possibly asked to leave and will be counted as absent. Any student that has been notified by an instructor and/or removed from class for disruptive behavior a second time will be referred to the Student Life office.

Proper Dress: Please follow the university dress code when at ACU and in particular, this class. Inappropriate clothing may be treated as disruptive behavior.

Medical and Mental Care: ACU is committed to making the return to campus as safe as possible by providing students, faculty, and staff with resources to promote their health. We will continue working tirelessly to fine-tune our cleanliness and hygiene protocols. The ACU Medical and Counseling Care Center, along with Wildcat Care, are available to assist you with medical and mental health needs. Now more than ever, telehealth is an excellent resource, allowing you to stay healthy, talk with a provider 24/7 and greatly limit your exposure to

COVID-19. Many medical concerns, such as a cold, sinus infection, rash, nausea, etc., can be discussed via telehealth. In addition to providing in-person care for your medical needs, the ACU Medical Clinic can provide COVID-19 testing with same-day results.

If you experience symptoms related to COVID-19 while on campus, please use our Coronavirus Screening Tool by visiting Wildcat Care and clicking the button at the top of the page. If you are experiencing emotional distress, you can discuss your feelings and concerns with a mental health provider through Wildcat Care as well.

ADA Compliance Statement: Abilene Christian University is dedicated to removing barriers and opening access for students with disabilities in compliance with ADA and Section 504 of the Rehabilitation Act. The Alpha Scholars Program facilitates disability accommodations in cooperation with instructors. In order to receive accommodations, you must be registered with Alpha Scholars Program, and you must complete a specific request for each class in which you need accommodations. If you have a documented disability and wish to discuss academic accommodations, please call our office directly at 325-674-2667.

Title IX Policy: At ACU, we strive to comply with all applicable legal requirements prohibiting, preventing and responding to sexual misconduct against any member of the ACU community. The full Title IX policy and process can be found at https://acu.edu/human-resources/title-ix-and-sexual-misconduct-information/.

Dates and Schedule

Important Dates

September 7, Monday	Labor Day Holiday – *no class*
September 23, Monday	Exam 1
October 23, Friday	Fall Break - *no class*
October 28, Wednesday	Exam 2
November 13, Friday	Last day to withdraw
November 23, Monday	Exam 3
November 25–27, Wednesday–Friday	Thanksgiving Holiday – *no class*
TBD	Final Exam, Time TBD

Canvas: The calendar in Canvas and the syllabus page in Canvas will provide you with the due dates (and times) of upcoming assignments. When an assignment is made, I will add the assignment to Canvas so that it will appear in the syllabus and calendar within Canvas.

Weekly Planning: On Monday of each week, we will set goals for the week, look at upcoming assignments, discuss time management, and review tutoring availability. This is to help you be successful in completing your assignments and stay engaged with the course.

Daily Schedule: The tentative daily schedule for the semester is given below:

Week	Date	Topic
Week 1		
Mon	8/24	Introduction to the course and textbooks; Download R and Python softwares; Introduction to Vectors and Matrices
Wed	8/26	Measures of central tendency; Measures of dispersion; Measures of association
Week 2		
Mon	8/31	Linear combinations of random variables
Wed	9/2	Graphical display of multivariate data; Correlation matrix and correlogram
Week 3		
Mon	9/7	**Labor Day** - *no class*
Wed	9/9	Multivariate normal & related distributions
Week 4		
Mon	9/14	Sample mean vector; Sample correlation
Wed	9/16	Hypothesis testing for multivariate data
Week 5		
Mon	9/21	Confidence ellipses
Wed	9/23	*Review and questions*
Week 6		
Mon	9/28	**Exam 1**
Wed	9/30	Introduce research project; Introduction to statistical learning; Trade-off between prediction accuracy and model interpretability; Supervised vs. unsupervised learning; Regression vs. classification problems
Week 7		
Mon	10/5	Assessing model accuracy; Measuring the quality of model fit; Bias-variance trade-off; Classification confusion matrix
Wed	10/7	Simple, multiple, and multivariate linear regression models
Week 8		
Mon	10/12	Classification models; Logistic regression; Linear and quadratic discriminant analyses
Wed	10/14	Generalized linear regression models
Week 9		
Mon	10/19	Naive Bayes classifier; Clustering methods; K-nearest neighbors; Principle component analysis (PCA)

Wed	10/21	Resampling methods; Cross-validation; k-fold cross-validation; bootstrapping
Week 10		
Mon	10/26	*Review and questions*
Wed	10/28	**Exam 2**
Week 11		
Mon	11/2	Model selection and regularization; Model selection criteria; Subset selection; shrinkage methods
Wed	11/4	Dimension reduction methods for high-dimensional data
Week 12		
Mon	11/9	Smoothing splines; Generalized additive models (GAMs)
Wed	11/11	Regression & classification trees; Random forests; Bagging; Boosting
Week 13		
Mon	11/16	More on PCA; Scree plots Missing values and matrix completion; Sparse matrices
Wed	11/18	Multiple testing; Family-wise error rate (FWER); Trade-off between FWER and power
Week 14		
Mon	11/23	**Exam 3**
Wed	11/25	**Thanksgiving Holiday** - *no class*
Week 15		
Mon	11/30	Introduction to MANOVA; Repeated measures; **Final research project presentations**
Wed	12/2	**Last day of class** - *Final Exam review and questions*
Week 16		
TBD	TBD	**Final Exam** - Time TBD

ABILENE CHRISTIAN UNIVERSITY

LIBRARY

M E M O R A N D U M

DATE: FEBRUARY 10, 2026

TO: Dr. John Ehrke

FROM: Mark McCallon, Associate Dean for Library Services

RE: New Course Application – SDS 479 Multivariate Analysis

After reviewing the course syllabus, the Library is able to support the proposed course. Please contact Mark McCallon (mccallonm@acu.edu), if additional library resources are needed for the course. Thank you for the opportunity to evaluate the course syllabus.

February 11, 2026

Dr. John Ehrke
Associate Professor of Mathematics, Department Chair
Department of Mathematics
Onstead Science Center 173
(325) 674-2162

Re: Multivariate Analysis (SDS 479)

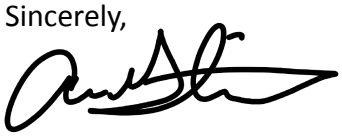
Dear Dr. Ehrke,

Thank you for the submission of SDS 479: Multivariate Analysis for review. I have reviewed it based on the ACU Syllabus Guidelines. I found the syllabus to meet all aspects of the checklist.

Please note that this letter is intended as a reference, which will be read by the department chair and council members, who may also have questions or comments of their own. If you have any questions, please feel free to let me know.

Please also let me know if we can help in the design and facilitation of this course.

Sincerely,



Dr. Amos Gutierrez
Director of Instructional Design, Adams Center