



Applied Multivariate Analysis

STP 533

Instructor Info —



Shiwei Lan



Office Hrs: TT 9:30-10:30 AM



WXL R 544; Zoom: 8055899886



<https://math.asu.edu/~slan>



slan@asu.edu

Course Info —



Prereq: STP 530, ECN 525



TuTh 10:30 – 11:45 AM



WXLRA111



<https://slan-teaching.github.io/STP533/>

Grader Info —



Joe Chang



Office Hrs: TBD



TBD



zchang7@asu.edu

Description

This course focuses on statistics analysis with multivariate models and methods. The topics will include discriminant analysis, principal components analysis, factor analysis, cluster analysis, and canonical correlation analysis.

Objective

By the end of the course, students should get a good overview of statistical multivariate analysis. They will be able to use classical multivariate statistics models including ANOVA, PCA, LDA/QDA and clustering.

Textbooks

Required

AMSA - Applied Multivariate Statistical Analysis (6th Edition) by Richard Arnold Johnson, Dean W. Wichern, Prentice Hall, 2007.

Optional

MS - Matrices for Statistics by M. J. R. Healy, Oxford, ISBN-13: 978-0198507024.

IAMAR - An Introduction to Applied Multivariate Analysis with R by Brian Everitt and Torsten Hothorn, Springer, 2011, ISBN: 978-1-4419-9649-7.

Software

We will use the R computing language, available at <https://www.r-project.org> and RStudio at <https://posit.co/products/open-source/rstudio/>.

Grading Scheme

Homework	60 %
Midterm	15 %
Final Exam	25 %
Total	100 %

A+	[97%, 100%]	A	[93%, 97%)	A-	[90%, 93%)
B+	[87%, 90%)	B	[83%, 87%)	B-	[80%, 83%)
C+	[77%, 80%)	C	[70%, 77%)		
D	[60%, 70%)			E	[0%, 60%)

Homework

There will be approximately 7 homework assignments each worth 10 points to cover the corresponding material. The lowest score will be dropped. The total will be 60 points. Homework will be announced and submitted on canvas. Each homework report should be submitted in either Word or PDF format, no other formats accepted. Late home will NOT be accepted. Do NOT send your homework by email!

Exams

There will be 1 midterm exam (worth 15 points) on 03/06/2025 and 1 final exam (worth 25 points) on 05/06/2025. If you are unable to take an exam, you must contact the instructor in advance. All excuses must be verifiable. The make-up exams will be given only under exceptional circumstances.

FAQs

? Where can I find help?

! You can go to my virtual office hours and the grader's office hours. In addition, you can go to [Discussion Forum](#) to post your questions and help others.

? How do I keep track of the class?

! Constantly check canvas and the course website. I will make announcements, post homework solutions, etc..

? Do we have incentives?

! I will give bonus points through the semester for e.g. extra-credit homework problems, most helpful discussion participants, etc..

? When shall I drop if I choose to?

! Last Day to Register or Drop/Add Without College Approval is 01/19/2025. Tuition & Fees Refund Deadline is 01/26/2025 for session C. Course Withdrawal Deadline (without 'W' on your transcript) is 04/06/2025 for session C. Refer to <https://students.asu.edu/academic-calendar> for more deadlines.

Disability Accommodations

Qualified students with disabilities are encouraged to make their requests at the beginning of the semester to get disability accommodations. Disability information is confidential. *Note: Prior to receiving disability accommodations, verification of eligibility from the Disability Resource Center (DRC) is required.* Therefore, you should contact DRC immediately. Their office is located on the first floor of the Matthews Center Building. DRC staff can also be reached at: 480-965-1234 (V), 480-965-9000 (TTY). For additional information, visit: www.asu.edu/studentaffairs/ed/drc. Their hours are 8:00 AM to 5:00 PM, Monday through Friday.

Make-up Policy

In case of valid absence (such as serious illness, going to court, etc.) during scheduled exam, you must notify the instructor BEFORE the exam, if the circumstances allow. To be eligible for make-up exam, valid excuse has to be supported by valid documentation (such as doctor's note, letter from court, etc.). Also, please follow Academic Affairs Manual, ACD 304-04, for appropriate University policies about requesting an accommodation for religious practices, in case you have to miss an assignment due to religious practice.

Cell phones and Electronic Devices

Picture taking, talking or texting on your cell phone or any electronic device during class is prohibited. If you bring a cell phone and/or any other electronic equipment to the class, make sure they are turned off before class begins. Any sounds produced by such devices are disruptive to the class and, as such, will not be tolerated and may be reported to the Office of the Dean of Students.

Academic Honesty

ASU expects and requires all its students to act with honesty and integrity, and respect the rights of others in carrying out all academic assignments. For more information on academic integrity, including the policy and appeal procedures, please visit <http://provost.asu.edu/academicintegrity>.

Inclusion

The School of Mathematical and Statistical Sciences encourages faculty to address and refer to students by their preferred name and gender pronoun. If your preferred name is different than what appears on the class roster, or you would like to be addressed using a specific pronoun, please let me know.

Sexual Violence and Harassment

Both Title IX federal law and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at <https://sexualviolenceprevention.asu.edu/faqs>. As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, <https://eoss.asu.edu/counseling>, is available if you wish to discuss any concerns confidentially and privately. ASU online students may access 360 Life Services, <https://goto.asuonline.asu.edu/success/online-resources.html>.

Syllabus Disclaimer

This syllabus is tentative and should not be considered definitive. The instructor reserves the right to modify it (including the dates of the tests) to meet the needs of the class. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. It is the student responsibility to attend class regularly and make note of any change.

Class Schedule (tentative)

Week	Date	Topic	Assignments
1	01/14 - 01/16	Course orientation (Ch.1) (R introduction)	
2	01/21 - 01/23	Introduction: Matrix Algebra (Ch.2)	Homework 1
3	01/28 - 01/30	Multivariate Normal (Ch. 3-4)	
4	02/04 - 02/06	Inferences about mean (Ch.5)	Homework 2
5	02/11 - 02/13	Comparisons about mean (Ch.6)	
6	02/18 - 02/20	Multivariate ANOVA (Ch.6)	Homework 3
7	02/25 - 02/27	Repeated Measures (Ch.6)	
8	03/04 - 03/06	Multivariate Regression (Ch.7)	Homework 4 midterm exam: 03/06/2025
9	03/11 - 03/13	Spring Break (no class)	
10	03/18 - 03/20	Principal Component Analysis (Ch.8 & 12)	Homework 5
11	03/25 - 03/27	Factor Analysis (Ch.9)	
12	04/01 - 04/03	Factor Analysis (Ch.9)	Homework 6
13	04/08- 04/10	Canonical Correlation Analysis (Ch.10)	
14	04/15 - 04/17	Discriminant Analysis (Ch.11)	
15	04/22 - 04/24	Classification (Ch.11)	Homework 7
16	04/29 - 05/01	Cluster Analysis (Ch.12)	
Final	05/05 - 05/10	Final Exams	final exam: 05/06/2025