Stat 581A4:
Applied Multivariate Analysis for Researchers

Fall 2019

Instructor:	Dr. Aaron Nielsen	**Email:**	aaron.nielsen@colostate.edu
Sections:	001	**Time:**	T 2:00 – 3:50pm
Location:	Clark C238	**Webpage:**	`http://canvas.colostate.edu/`

Course credits: 2

Recommended Textbook: *Applied Multivariate Statistical Analysis* (any edition) by Johnson and Wichern

Required Software: R (It's free and available at `http://www.r-project.org/`) and RStudio (Also free and available at `https://www.rstudio.com/`)

Office Hours: Tuesday 12 – 2pm or by appointment. These are held in the Statistics Success Center (Weber 223A). *Note:* The SSC is typically only for introductory courses, so you will only be able to get help with me during my office hours.

Prerequisite: Stat 511 or (Introductory Stats + some experience with R)

Catalog Description: Multivariate ANOVA, principal components, factor analysis, cluster analysis, discrimination analysis.

Course overview: Review of Linear Algebra, Mean Inference, MANOVA, Principal Components Analysis, Factor Analysis, Clustering, Discrimination and Classification

Homework: Roughly 5-6 homework assignments will be assigned. Late homework is not accepted without prior approval.

Exams: There will be an in-class 110-minute exam on Tuesday, November 19. You are allowed to use a calculator and one double-sided notecard (3.5"x5") of formulas/notes/etc on this exam. There will also be a take-home exam handed out on Tuesday, November 12 and due on Tuesday, November 19. The take-home exam is open book and notes, but you may not get assistance from anyone else including your classmates. No make-up exams are offered without prior approval.

Final Project Students will complete a final project that requires a 5–10 page report and 10 minute in-class presentation. This project will require each student to apply a method learned in the class to a dataset of their choosing, preferably from their area of research. Students must get their project topic approved by Nov. 5.

Basis for Final Grade: Your final grade will be based on your exam scores, homework sets, and the final project. The weightings will be as follows:

- Homework assignments: 30% (approx. 5 – 6 HWs)
- Final project and presentation: 30%
- In-class exam (Nov. 19): 20%
- Take-home exam (distributed on Nov. 12 and due Nov. 19): 20%

Grading Scale: Your course grade will be determined from the following grading scale:

A	92% – 100%	C+	78% – 80%
A-	90% – 92%	C	70% – 78%
B+	88% – 90%	D	60% – 70%
B	82% – 88%	F	0% – 60%
B-	80% – 82%		

Course Policies:

- **Attendance:** While I do not take attendance, attendance is highly recommended. You are responsible for all announcements and syllabus/schedule changes made in class. Please check your email and Canvas frequently for posted examples and announcements.
- **Late Work Policy:** Late homework is not accepted and make-ups are not given for missed exams without prior approval.
- **Extra Credit Policy:** Extra credit is not given in this course.
- **Grades of "Incompletes":** I will follow university procedures on "incompletes", i.e., they are only given in situations where unexpected emergencies prevent students from completing the course and the remaining work can be easily finished the following semester. Incomplete work must be finished the next semester or the grade automatically turns into an F.
- **Group Work Policy:** Students are encouraged to collaborate on homework sets, as long as they acknowledge their collaborators. There is no penalty for working together. Of course, no collaboration is allowed on exams, as that is considered cheating. Please do not just copy your friend's homework, as this is considered academic dishonesty as well.
- **Cheating:** Students are expected to understand intuitively what proper ethical conduct means in the context of a college mathematics course. If you are caught cheating, you could fail the class or (at least) have your grade lowered, so don't even try it.
- **Students with Disabilities:** The university is committed to providing support for students with disabilities. If you have an accommodation plan, please see me so we can make any arrangements necessary to facilitate your learning.
- **Syllabus:** I reserve the right to make changes to the syllabus during the semester. Students will be notified of any changes via Canvas and an updated syllabus will be posted.
- **Need Help?** CSU is a community that cares for you. If you are struggling with drugs or alcohol and/or experiencing depression, anxiety, overwhelming stress or thoughts of hurting yourself or others please know there is help available. Counseling Services has trained professionals who can help. Contact 970-491-6053 or go to `http://health.colostate.edu`. If you are concerned about a friend or peer, tell someone by calling 970-491-1350 to discuss your concerns with a professional who can discreetly connect the distressed individual with the proper resources (`http://safety.colostate.edu/tell-someone.aspx`). Rams take care of Rams. Reach out and ask for help if you or someone you know is having a difficult time.

Course schedule: The following schedule of course materials covered is tentative, but the dates of the exams will not change.

Week	Date	Topics
1	August 27	Syllabus Linear Algebra review
2	Sept 3	Linear Algebra review
3	Sept 10	Multivariate Analysis intro
4	Sept 17	Mean Inference
5	Sept 24	MANOVA
6	Oct 1	MANOVA and catch-up
7	Oct 8	Principal Component Analysis
8	Oct 15	Principal Component Analysis
9	Oct 22	Factor Analysis
10	Oct 29	Clustering
11	Nov 5	Discriminant Analysis
12	Nov 12	Discriminant Analysis and catch-up
13	Nov 19	**In-class exam** **Take-home exam due**
14	Dec 3	Project presentations
15	Dec 10	Project presentations