Multivariate Data Analysis (STAT 755) Spring 2020
Davidson Mathematics and Science (DMS) 106
TR 12:00-1:15PM
3 credits

Instructor: Ilya Zaliapin **Office:** Davidson Math & Science (DMS), Room 221
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The course website is maintained at WebCampus (https://wcl.unr.edu/)

Catalog description: Statistical analysis of multivariate data. Multivariate normal and related distributions, multivariate linear regression, canonical correlation analysis, principal components, factor analysis, discrimination and classification.

Required textbook:
- R. A. Johnson and D. W. Wichern, *Applied Multivariate Statistical Analysis*, Prentice Hall.

Learning outcomes. Upon completion of this course, students will be able to:
- Build and interpret models using multivariate Normal distribution
- Perform Principal Component Analysis, Factor Analysis, Cluster Analysis
- Implement multivariate analyses in a professional statistical package R
- Perform independent multivariate analysis projects and write project reports
- Independently build multivariate analysis proficiency using professional literature

Tentative list of topics (may change slightly as class proceeds):
- Matrix Algebra and Random Vectors
- Sample Geometry and Random Sampling
- Multivariate Normal Distribution
- Principal Components
- Factor Analysis
- Canonical Correlations
- Cluster analysis
- Discriminant and classification analysis

Home works (20%) will be assigned (approximately) weekly. They consist of textbook problems. You are encouraged to discuss HW assignments between each other and with instructor; although your work must be written individually. Same works result in zero score.

Statistical Lab (30%) is an integral part of the course. The class will meet in a computer lab approximately every second week to learn/discuss applied statistical techniques using the package R (a free open-source package). Take-home lab assignments will require application of statistical techniques to real or synthetic data sets. The results should be presented in a form of illustrated reports (we will discuss the report writing in the class). Previous knowledge of R is not required. The R-portal with downloads, manuals, FAQs, and much more is located at: http://www.r-project.org/. You are encouraged to discuss the Lab assignments and can do the computational part in groups, but your report has to be written individually and demonstrate that you are able to perform and present the analysis independently. You may use any other statistical package of your choice, but all class discussions will refer to R.

Midterms (15% each, 30% total): Tuesday, March 10 and Tuesday, April 28.

Final exam (20%): A comprehensive final exam will be given on Monday, May 11, 12:10-2:10PM

Re-grading: You have one week (7 calendar days) after a homework, midterm or lab report is handed back to discuss regarding with instructor. The original work must be presented for any re-grading question.

Grading policy: Your letter grade for the course will be based on homeworks (20%), statistical lab reports (30% total), two midterms (15% each, 30% total), and final exam (20%).

Letter	A	A-	B+	B	B-	C+	C	D+	D	F
Min. Score	93%	90%	87%	83%	80%	77%	70%	67%	60%	0%

Prerequisites: MATH 330, MATH 461, Co-requisite: STAT 452.

Academic dishonesty statement: Any form of academic dishonesty will not be tolerated in this class. The minimum penalty for academic dishonesty is an **F** in the course. See Student Handbook and UNR Catalog for rules about and sanctions for academic dishonesty: http://www.cis.unr.edu/ecatalog/Default.aspx?article_list_id=11076

Disability statement: The Department of Mathematics and Statistics supports providing equal access for students with disabilities. Any student needing accommodations for a specific disability is encouraged to meet with instructor or any Department representative at your earliest convenience to ensure timely and appropriate accommodations.

Class recording policy: Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.

Academic Success Services: Your student fees cover usage of the Math Center (775) 784-4422, Tutoring Center (775) 784-6801, and University Writing Center (775) 784-6030. These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.

The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information related to immigration concerns, please contact the University's Equal Opportunity & Title IX office at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit: https://www.unr.edu/equal-opportunity-title-ix .