



Course Syllabus: Multivariate Statistics - STAT 330

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	STAT 330
Course Title	Multivariate Statistics
Academic Semester	Spring
Academic Year	2017/2018
Semester Start Date	01/28/2018
Semester End Date	05/24/2018
Class Schedule (Days & Time)	10:30 AM - 12:00 PM Tue , 01:00 PM - 02:30 PM Sun

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Marc Georges Genton	Marc.Genton@KAUST.EDU.S A	+966128080244	4114, 1, Al- Khawarizmi (bldg. 1)	TBA

Teaching Assistant(s)	
Name	Email
TBA	TBA

Course Information	
Comprehensive Course Description	<p>Course outline: Classical multivariate statistics theory: Basic properties of random vectors; Multivariate normal distributions; Elliptical and skew-elliptical distributions; Estimation; Hypothesis testing. Methods of multivariate statistical analysis: Principal component analysis; factor analysis; canonical correlation analysis; discriminant analysis; cluster analysis; multidimensional scaling; multivariate regression; support vector machines; independent component analysis.</p>
Course Description from Program Guide	An introduction to multivariate statistical models, well balancing three equally important elements: the mathematical theory, applications to real data, and computational techniques. Traditional multivariate models and their recent generalizations to tackle regression, data reduction and dimensionality reduction, classification, predictor and classifier instability problems. Tools for analyzing unstructured multivariate data.
Goals and Objectives	<p>By the end of the course, the student will be able to:</p> <ol style="list-style-type: none"> (1) Understand the concepts and tools of multivariate statistics. (2) Apply the concepts of multivariate statistics to real data sets. (3) Use the software R (or others) to perform multivariate analysis of real data sets.
Required Knowledge	STAT 220,230,240,250
Reference Texts	Izenman, Alan Julian (2008), <i>Modern Multivariate Statistical Techniques</i> , Springer Texts in Statistics. Mardia, K. V., Kent, J. T., Bibby, J. M. (1979) <i>Multivariate Analysis</i> . Academic Press.
Method of evaluation	<p>50.00% - Course Project(s) 25.00% - Scientific review article presentation 25.00% - Homework /Assignments</p>

Nature of the assignments	<ul style="list-style-type: none"> - Homework assignments (25%): Homework assignments will be given throughout the semester. Assignments will be collected at the START of class on the date due. Late assignments will not be accepted. - Paper presentations (25%): Each student will present two papers in class. - Project (50%): A project, done individually, will be due near the end of the semester, and presented in class (30 minutes). More details will be given as the semester progresses. Late projects will not be accepted.
Course Policies	See above.
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Sun 01/28/2018 Tue 01/30/2018	Introduction
2	Sun 02/04/2018 Tue 02/06/2018	Basic properties of random vectors
3	Sun 02/11/2018 Tue 02/13/2018	Multivariate normal distributions
4	Sun 02/18/2018 Tue 02/20/2018	Elliptical and skew-elliptical distributions
5	Sun 02/25/2018 Tue 02/27/2018	Estimation
6	Sun 03/04/2018 Tue 03/06/2018	Hypothesis testing
7	Sun 03/11/2018 Tue 03/13/2018	Principal component analysis
8	Sun 03/18/2018 Tue 03/20/2018	Factor analysis
9	Sun 03/25/2018 Tue 03/27/2018	Canonical correlation analysis
10	Sun 04/01/2018 Tue 04/03/2018	Spring Break
11	Sun 04/08/2018 Tue 04/10/2018	Discriminant analysis
12	Sun 04/15/2018 Tue 04/17/2018	Cluster analysis
13	Sun 04/22/2018 Tue 04/24/2018	Multidimensional scaling
14	Sun 04/29/2018 Tue 05/01/2018	Multivariate Regression
15	Sun 05/06/2018 Tue 05/08/2018	Support vector machines
16	Sun 05/13/2018 Tue 05/15/2018	Independent component analysis
17	Sun 05/20/2018 Tue 05/22/2018	
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Note

The instructor reserves the right to make changes to this syllabus as necessary.