SYLLABUS FOR FALL 2024

ADVANCED RESEARCH METHODS (HCS7310.001.24F)
ADVANCED RESEARCH METHODS (ACN 7310.001)

Monday, 4:00pm—6:45pm, JO 3.209

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Abstract:

This course is designed to develop the student's ability to understand and apply on real data advanced statistical methods such as Principal Component Analysis (PCA), Correspondence Analysis (CA), Multiple Correspondence Analysis (MCA), Multidimensional Scaling (MDS), Linear Discriminant Analysis (LDA), Barycentric Discriminant Analysis (BADA), Partial Least Square (PLS) methods, and cluster analysis as well as the multi-table multi-block versions of these techniques (e.g., multiple factor analysis, (MFA), STATIS, and DISTATIS). We will also cover the associated computationally intensive inference methods such as cross-validation, jackknife, and bootstrap.

Course Requirements:

Materials

- Weekly readings of articles (A) and book chapters (C) can be downloaded from my homepage (www.utd.edu/∼herve) or from e-learning. The numbers in the class schedule match the numbers of the papers in my homepage.

Class participation

- Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty.

Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct (`https://policy.utdallas.edu/utdsp5003`).

Grading:
Course grade will be based upon class participation, the reports and presentations of a set of small projects, and the final Cookbook and presentation.

LECTURE SCHEDULE

	DATE	TOPIC	READINGS	
1	08/19	Introduction and overview. Methods for one, two and multiple data tables. Principal Component Analysis (PCA)	A.77, B.7, C.27, C.59, Supp.1, Supp.2	
2	08/26	Principal Components Analysis	A.77, B.7, C.34, C.59	
3	09/02	**Labor Day – No class**		
4	09/09	Principal Components Analysis and supplementary projections. Multidimensional Scaling (MDS)	A.77, C.34	
5	09/16	Inference: Bootstrap, Permutation, RESS, PRESS and Leave One Out (LOO)	A.71, A.77, C.61, Bootstrap, Permutation	
6	09/23	Presentation 1 - PCA	A.77, C.69, C.85	
7	09/30	Correspondence Analysis (CA) and Multiple CA (MCA)	A.77, C.69, C.85	
8	10/07	Correspondence Analysis (CA) and Multiple CA (MCA)	C.41, C.69	
9	10/14	Correspondence Analysis (CA) and Multiple CA (MCA)	C.41, C.69	
10	10/21	Two Table Techniques: Discriminant CA (DICA), Barycentric Discriminant Analysis (BADA)	C.50, C.74, C.85, C.86	
11	10/28	Presentation 2 - CA		
12	11/04	Two Table Techniques: PLSC and PLSCA	A.76, A.81, C.75, C87	
13	11/11	Two Table Techniques: PLSC and PLSCA	A.76, A.81, C.75, C87	
14	11/18	Multi-block Extensions: Multiple Factor Analysis, STATIS, DiSTATIS	A.59, A.71, A.86, C.40, C.48	
15	11/27	**Fall Break — No class**		
16	12/02	Final Class - Wrap up the semester		

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the professor.

For more general information about UT Dallas policies and procedures, please consult `http://go.utdallas.edu/syllabus-policies`