

## SYLLABUS FOR FALL 2016

### ADVANCED RESEARCH METHODS (HCS 7310.001)

Monday, 10:00am—12:45pm, GR 4.209

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Office hours: Mondays from 2 to 3pm and by appointment

#### 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 can be downloaded from my homepage ([www.utd.edu/~herve](http://www.utd.edu/~herve)) or from **e-learning**. The numbers in the class schedule match the numbers of the papers in my homepage.

#### Grading:

Course grade will be based upon class participation, completion of milestones due throughout the semester, and a set of small projects. There will be individual periodic meetings with students throughout the semester to assist them with their milestones towards completion of their projects.

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**SCHEDULE**

	DATE	TOPIC	READINGS	
	08/22	Introduction and overview. Methods for one, two and multiple data tables	A.77, C.27	
	08/29	Principal Components Analysis	A.77, C.34	
	09/05	<b>Labor Day – No class</b>	A.77, C.27	
	09/12	Principal Components Analysis	A.77, C.34	
	09/19	Inference #1: Supplementary Projections and Bootstrap	A.77, A.78	
	9/26	Inference #2: Permutation, RESS, PRESS and Jackknife	A.77, A.71, C.61	
	10/3	Correspondence Analysis (CA)	A.77, A.78, C.69	
	10/10	Multiple CA (MCA)	C.69, C.41	
	10/17	Two Table Techniques: PLSC and CCA	A.78, A.81, C.74, C.50	
	10/24	Two Table Techniques: Discriminant CA (DICA), Barycentric Discriminant Analysis (BADA)	A.78, A.81, C.74, C.50	
	10/31	Multi-tables, $R_V$ Coefficient, MFA, STATIS	A.101, A.86, C.71	
	11/7	Multi-block Extensions (DiCA, BADA)	A.97, A.89, A.78	
	11/14	Distances, Multi-dimensional scaling, and DiSTATIS	A.83, C.43, C.49	
	11/21	<b>Fall Break – No class</b>		
	11/28	Cluster analysis and miscellaneous techniques		
	12/05	Final Short Presentations		

*The descriptions and time-lines contained in this syllabus are subject to change at the discretion of the Professor.*

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