

Academic Year	2017	Semester	2
Course Coordinator	PUN Chi Seng		
Course Code	MH4501		
Course Title	Multivariate Analysis		
Pre-requisites	MH2500 Probability and Introduction to Statistics & MH3500 Statistics & MH3510 Regression Analysis		
No of AUs	4		
Contact Hours	57 hours = 39 hours of LEC / 12 hours of TUT / 6 hours of LAB		
Proposal Date	19-July-2017		

Course Aims

This course focuses on the standard methods of multivariate statistical analysis. Many essential data analysis techniques, such as principal component analysis and discriminant analysis, will be covered. This course equip students with the necessary skills for being data analysts.

Intended Learning Outcomes (ILO)

Upon successful completion of the course, the students will be able to:

1. Analyze multivariate data and the dependence structure of variates to extract the useful information from a massive dataset;
2. Apply suitable tools for exploratory data analysis, dimension reduction, and classification to formulate and solve real-life problems;
3. Implement the multivariate analysis techniques with statistical software such as R in a manner that the methodology adopted is motivated by appropriate statistical theory.

Course Content

1. Multivariate Normal Distribution
2. Multivariate Inference
3. Multivariate Analysis of Variance (MANOVA)
4. Principal Component Analysis (PCA)
5. Factor Analysis (FA)
6. Canonical Correlation Analysis (CCA)
7. Discriminant Analysis (DA)

Assessment (includes both continuous and summative assessment)

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weighting	Team/Individual	Assessment Rubrics
1. Final Examination	1,2	A1-A3, B1-B2	60%	Individual	Correctness of answers
2. Continuous Assessment 1 (CA 1): Assignments	1,2,3	A1-A4, B1-B3, D, E	15%	Individual	Correctness of answers and quality of code

3. CA2: Midterm Examination	1,2	A1-A3, B1-B2	25%	Individual	Correctness of answers
Total			100%		

Formative feedback

Through the assignments and the in-class discussion with students, I will regularly give feedback to students on how they are learning in this course.

Learning and Teaching approach

Approach	How does this approach support students in achieving the learning outcomes?
Lecture	Lectures provide systematic instruction of the course content.
Tutorial/Lab	Tutorials and labs consist of practice questions and lab implementation related to the course content. As a result, they provide weekly feedback/knowledge check for the students.

Reading and References

TEXT

Applied multivariate statistical analysis, Richard A. Johnson and Dean W. Wichern, 6th, Pearson Prentice Hall, QA278.J68A, 2007 ISBN 13: 9780131877153

REFERENCE

An introduction to multivariate statistical analysis, T.W. Anderson, Wiley-Interscience, QA278.A551, 2003 ISBN 13: 9780471360919

Course Policies and Student Responsibilities

(1) General

Students are expected to attend all lectures and tutorials/labs punctually and complete and submit all assignments by due dates. Students are expected to take responsibility to follow up with course notes, assignments and course-related announcements.

(2) Assignments

All assignments equally contribute to the CA1 (15% of total score). Late submissions will be subject to mark deduction:

Scenario 1: if the assignment is submitted late after the due date but before the solution is released, then 30% of the maximum mark will be deducted.

Scenario 2: if the assignment is submitted late after the solution is released, then it will be marked zero.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [academic integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors

Instructor	Office Location	Phone	Email
PUN Chi Seng	SPMS-MAS-05-22	65137468	cspun@ntu.edu.sg

Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
1	Introduction of Multivariate Analysis	1	TEXT Chapter 1
1	Review of Matrix Algebra	1	TEXT Chapters 2.1-2.4
2	Population and Sample Statistics	1	TEXT Chapters 2.5-2.6, 3
3	Multivariate Normal Distribution	1	TEXT Chapter 4
4, 5	Multivariate Inference	1,2,3	TEXT Chapters 5.1-5.5, 6.1-6.3
6	Multivariate Analysis of Variance (MANOVA)	1,2,3	TEXT Chapters 6.4-6.6
7	Midterm Examination	1,2	
7, 8, 9	Principal Component Analysis (PCA)	1,2,3	TEXT Chapters 8.1-8.5
9, 10	Factor Analysis (FA)	1,2,3	TEXT Chapter 9
11	Canonical Correlation Analysis (CCA)	1,2,3	TEXT Chapter 10
12, 13	Discriminant Analysis (DA)	1,2,3	TEXT Chapters 11.1-11.6
13	Advanced Topics	1,2,3	TEXT Chapter 12