

First Course Handout – MTH514A: MULTIVARIATE ANALYSIS

1. Objectives:

The objective of the course is to impart necessary knowledge about theoretical foundations of multivariate distribution theory, with special emphasis on Multivariate Gaussian distribution, statistical inferential aspects related to random sampling from multivariate populations and to learn various important applied multivariate data analysis tools and techniques, with a view to understand the mathematical derivation and justification of these methods and further to implement them for solving real life problems.

2. Prerequisites:

The prerequisite is MTH418A (Inference I) both for students of M.Sc. (2-yr) Statistics program for whom it is a compulsory course, as well as for those who take it as OE/DE. Students are expected to have good knowledge in Statistical Distribution Theory and Statistical Inference. They should also be comfortable with statistical computing using R / SAS.

3. Course Contents: (with approx. no. of lectures)

- (i) Multivariate normal distribution, assessing normality, (9 lectures)
- (ii) Wishart and Hotelling's T^2 , (9 lectures)
- (iii) Comparisons of several multivariate means, MANOVA; (3 lectures)
- (iv) Principal Component Analysis, (3 lectures)
- (v) Factor Analysis; (3 lectures)
- (vi) Canonical Correlations; (4 lectures)
- (vii) Discrimination & Classification; (6 lectures)
- (viii) Cluster Analysis. (3 lectures)

4. Special Emphasis: (optional): Real life problem solving using multivariate techniques.

5. Lecture, Tutorial & Lab Schedule & Venue

Lectures: Mon, Wed 8:00 - 9:00 hrs (FB557), Thu 14:00 - 15:00 hrs (FB557)

Tutorial: Tue 16:00-17:00 hrs (L12),

6. Office Hours:

Mode of contact beyond formal contact hours – appointment made through emails

7. Evaluation Components & Policies: Exams, Quizzes, Assignments, Attendance, Participation etc.

Quiz 1 & 2 - 20%, (10% each)

Mid-Sem Exam - 30%

End-Sem Exam - 50%

Assignments at regular intervals – 5% bonus marks for solving assignment problems during tutorials. No extra weightage for attendance.

8. Course Policies: Attendance, Honesty Practices, Withdrawal (within the limits of DOAA Guidelines)

Any dishonest practice during exams to be reported to DOAA/SSAC and appropriate action would be taken to penalize such action. Students are allowed to withdraw from the course as per guidelines set by the academic office.

9. Books & References:

- (i) Applied Multivariate Analysis - D. W. Johnson & R. A. Wichern, *Prentice Hall*
- (ii) Aspects of Multivariate Statistical Theory - R. J. Muirhead, *Wiley (Wiley Series in Probability and Statistics)*
- (iii) An Introduction to Multivariate Statistical Analysis - T.W. Anderson, *Wiley (Wiley Series in Probability and Statistics)*
- (iv) Elements of Statistical Learning - T. Hastie, R. Tibshirani & J. Friedman, *Springer*.