# Multivariate Statistics

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As a classic topic in statistics, multivariate statistics is a standard and core course in many graduate programs in statistics. It becomes more important to have this course in the age of big data. Indeed, it shows a solid move from univariate statistical analysis to its multivariate counterpart, which will give the audience a good preparation towards analyzing high dimensional and big data. This course will cover key ideas and techniques in multivariate analysis, which are crucial in modern data analysis.

Such a course will benefit students in statistics, applied mathematics, mathematics programs and other disciplines such as biostatistics, computer sciences, engineering, economics, etc. It will help students to understand, visualize and analyze multivariate data. Students will obtain hand-on experience by analyzing real-world datasets using software and packages.

**Description:** Classical theory on multivariate statistics. Topics include multivariate normal distribution and Wishart distribution; estimation and hypothesis testing of mean vectors and covariance matrices; principal component analysis; canonical correlation analysis and discriminant analysis. Some selected topics on high dimensional statistics may be also covered.

**Prerequisite(s):** Solid background in linear algebra and multivariate calculus; basic probability and statistics, Math 464/466 or above.

**Reference**:     K.V. Mardia, J.T. Kent, and J.M. Bibby (1979).  *Multivariate Analysis.*  Academic Press; T.W. Anderson (2003).  *An Introduction to Multivariate Statistical Analysis. 3$^{rd}$ Ed.* Wiley. (neither of them is required.)

Some recent research papers may also be discussed.