STA 524–Applied Multivariate Analyis
Course Syllabus

Course description: Cluster analysis, factor analysis, discriminant analysis, canonical correlation analysis, and multivariate analysis of variance and covariance.

Credit hours: 3

Course Prerequisites and Corequisites: STA 520 and MTH 317

Course outline: Approximate time spent

- **Cluster Analysis** 15%
  - Similarity Measures
  - Single Linkage
  - Complete Linkage
  - Average Linkage
  - K-means Method
- **Factor Analysis** 25%
  - Principal Components
  - Orthogonal Factor Model
  - Methods of Estimation:
    - Principal Component Method
    - Principal Factor Method
    - Maximum Likelihood Method
  - Factor Rotation
  - Factor Scores
- **Multivariate Normal Distribution** 10%
  - Multivariate Normal Density and Its Properties
  - Sampling from a Multivariate Normal Distribution
    - Inference about a Mean Vector
    - Inference about a Covariance Matrix
- **Discrimination and Classification** 15%
  - Evaluating Classification Functions
  - Fisher's Discriminant Functions
- **Canonical Correlation Analysis** 10%
  - Canonical Variates
  - Canonical correlations
- **Multivariate Analysis of Variance and Covariance** 25%
  - One-Way Multivariate Analysis of Variance and Covariance
  - Two-Way Multivariate Analysis of Variance and Covariance
  - Multivariate Linear Regression Models

Student Learning Outcomes (SLO): At the end of STA 524, a student who has studied and learned the material should be to:

1. Use data reduction or structural simplification to represent phenomenon being investigated while minimizing loss in information [PLO: 2,3,5]
2. Create groups of "similar" objects or variables based upon measured characteristics [PLO:2,5]
3. Use techniques for classifying objects into well-defined groups [PLO: 1,2,3,5]
4. Investigate the nature of dependence among several variables [PLO: 1,2]
5. Formulate statistical hypotheses in terms of the parameters of multivariate populations and test them using multivariate test statistics. [PLO: 1,4,5]

Program Learning Outcomes (PLO) :

Students graduating from SFASU with an M.S. degree and a major in statistics will demonstrate:

1. A command of core probability and statistical concepts through major definitions and theorems. **[*Concepts*]** (Probability and Statistical Inference)
2. Strategic competence in formulating a standard probabilistic/statistical model for a given problem. **[*Modeling*]** (Model Choice and Model Interpretation)
3. Skill in using statistical software in order to process and interpret data. **[*Data Processing*]** (Computational Skills and Model Validation)
4. The ability to independently apply principles of probability and statistics to model and solve new or non-standard problems. **[*Independent Thinking and Application*]** (Existing Literature Comprehension, Independent Progression, Resourcefulness)
5. Proficiency in communicating probability and statistics in a format appropriate to expected audiences. **[*Communication*]** (Written Communication, Oral Communication)