STAT 445 / STAT 645: Applied Multivariate Analysis

Simon Fraser University
Spring 2026

Instructor: K. Ken Peng
Email: kangyi_peng@sfu.ca
Office Hours: Tue 3:00-4:00 pm and Thu 3:00-4:00 pm, or by appointment; K9516
Lecture Time and Location:
Tue, 4:30-6:20 pm DFA300 (Jan 5 - Jan 23, 2026);
Tue, 4:30-6:20 pm K9500 (Jan 26 - Apr 10, 2026);
Thu, 4:30-5:20 pm WMC3520 (Jan 5 - Apr 10, 2026)

Tutorials

STAT445-E101: Th 6:30-7:20PM; BLU9402
STAT445-E102: Th 7:30-8:20PM; BLU9402
STAT445-E103: Mo 4:30-5:20PM; BLU9402
Teaching Assistant: Muthukuda Arachchilage, Niwanthi (nrm4@sfu.ca) for tutorials; Nguyen, Chelsy (tmn12@sfu.ca) for marking

Textbook

"*Applied Multivariate Statistical Analysis*", by R.A. Johnson and D.W. Wichern. Publisher: Prentice Hall

Extra reading:
"*Applied Multivariate Statistical Analysis*", by W. Hardle and L. Simar
"*Methods of Multivariate Analysis*", by A.C. Renche

Course Outline

- Part I. Introduction (Textbook Chp 1-3)

    - I.1. General Introduction
    - I.2. Review on Matrix Algebra
    - I.3. Introduction to R
    - I.4. Multivariate Random Variables and Distributions

- Part II. Inference under Multivariate Normal Distribution (Textbook Chp 4-7)

    - II.1. Multivariate Normal Distribution

- II.2. Inference on mean vector
- II.3. Comparisons of Several Mean Vector
- II.4. Multivariate Linear Regression

- Part III. Commonly-Used Multivariate Analysis Methods (Textbook Chp 8-12)

  - III.1. Discrimination and Classification
  - III.2. Principal Components Analysis
  - III.3. Factor Analysis
  - III.4. Clustering Analysis

- Part IV. Other Topics

  - ...

The outline is subject to adjustment depending on the pace of the class.

Evaluation

Requests for re-grading must be submitted in writing within one week of the return of the assignment or exam and must clearly indicate the specific parts being questioned.

- **Assignments** (STAT 445: 40%; STAT 645: 40%)

  - A total of **7** assignments will be given during the term; the best **5** will be counted toward the final grade.
  - Assignments will include a combination of written calculations and applied methodological questions. Students will work with one or more datasets, with tasks designed as new material is introduced.
  - Clarity of presentation and explanation is an important component of assessment. Solutions should be organized and clearly written; work that is difficult to read may receive reduced credit.
  - Students are encouraged to discuss general ideas. However, all solutions must be completed independently.
  - Late submissions will not be accepted.

- **Midterm Exam** (STAT 445: 20%; STAT 645: 15%)

  - During class time on March 5 (Thursday of Week 9).
  - One A4 cheat sheet and a calculator are permitted. (The cheat sheet must be submitted together with the exam paper.)
  - There will be no make-up midterm. (Students who miss the midterm due to documented illness may be required to complete an oral examination to recover the missing credit.)

- **Final Exam** (STAT 445: 40%; STAT 645: 25%)

  - Date and location: TBD.
  - One A4 cheat sheet and a calculator are permitted.

- **Course Project** (STAT 645 only: 20%)

  - A written report is due by the end of the term. Additional guidelines will be provided on Canvas.

- **Class Participation** ($3 \sim 5\%$ bonus)

  - Bonus questions included in the midterm and/or final exams. These questions will be closely related to examples during scheduled class time.

The schedule of assessments is subject to change with appropriate notice.

Computing

R (URL http://www.r-project.org/) is used in the lectures and tutorials.

Academic Integrity

SFU's Academic Integrity web site http://www.sfu.ca/students/academicintegrity.html is filled with information on what is meant by academic dishonesty, where you can find resources to help with your studies and the consequences of cheating. Check out the site for more information and videos that help explain the issues in plain English.

Each student is responsible for his or her conduct as it affects the University community. Academic dishonesty, in whatever form, is ultimately destructive of the values of the University. Furthermore, it is unfair and discouraging to the majority of students who pursue their studies honestly. Scholarly integrity is required of all members of the University.
http://www.sfu.ca/policies/gazette/student/s10-01.html

Students with Disabilities

Students with hidden or visible disabilities who believe they may need class or exam accommodations, including in the current context of remote learning, are encouraged to register with the SFU Centre for Accessible Learning (caladmin@sfu.ca or 778-782-3112).