

STAT 4083/6083 Multivariate Methods for Statistical Learning Winter 2023

Instructor(s):	Nanwei Wang	Class Day(s):	MW
Email:	nwang3@unb.ca	Time:	01:00 PM- 02:20 PM
Phone:	5064534768	Class Location:	C256
Office Location:	Tilley Hall 408	Office Hours:	

About the Course

Course Description:

Multivariate normal distribution; variance and correlation matrices. Visualization of multivariate data. Dimension reduction for numerical and categorical data. Simple modelling of covariances by means of exploratory and confirmatory factor analysis. Methodology and techniques of supervised and unsupervised statistical learning.

Course Prerequisites:

STAT 2503 (at least B) or STAT 3093 and one of MATH 1503 or MATH 2213

Textbook(s):

Lang, W. U., and Q. I. U. Jin. "Applied multivariate statistical analysis and related topics with R." Applied Multivariate Statistical Analysis and Related Topics with R. edp sciences, 2021.

Course Topics and Outcomes:

1. Multivariate normal distribution
2. Principal Components Analysis
3. Factor Analysis
4. Discrete or Categorical Multivariate Data
5. Generalized Linear Models

Tentative Course Outline

- Chapter 1 Introduction to Multivariate Statistics
- Chapter 2 Principal Components Analysis
- Chapter 3 Factor Analysis
- Chapter 4 Inference for a Multivariate Normal Population

- Chapter 5 Discrete or Categorical Multivariate Data
- *Chapter 6 Linear and Nonlinear Regression Models*
- *Chapter 7 Generalized Linear Models*

Methods of Assessing the Expected Learning Outcomes:

Students' competency levels on these outcomes may vary. Outcomes achievement requires the meeting of all course expectations, including honouring of all course policies, regular class attendance, and completion of all assigned work in good faith and on time. Homework will be assigned to check the learning outcomes every week. A midterm exam and a final exam will be used to evaluate students' performance.

Grading, Marks, and Course Policies

Grading Scale

Final Grade	Letter Grade	Grade Points
97-100	A+	4.3
93-96	A	4.0 (Excellent)
90-92	A-	3.7
87-89	B+	3.3
83-86	B	3.0 (Good)
80-82	B-	2.7
77-79	C+	2.3
70-76	C	2.0 (Satisfactory)
65-69	D	1.0
Below 65	F	0.0

Course Marking Scheme

Item	Value	Due Date
Assignments	30%	
Midterm exam	30%	
Final exam	40%	
Total	100%	

Course Policies:

1. Expectations for participation and attendance (note the UNB attendance policy: <http://go.unb.ca/tls1viWva>)
2. Deadlines for assignment submissions
3. Submission methods: electronically

Class Recording and Copyright

Anyone who wishes to video or audio record lecture presentations or distribute course notes or other similar materials provided by instructors must obtain the instructor's written consent beforehand. Otherwise all such reproduction is an infringement of copyright and is absolutely prohibited and subject to academic penalties (see Academic Offences below). In the case of private use by students with documented disabilities, the instructor's consent will not be unreasonably withheld.

Privacy Statement for Online Course Recordings

- The recordings of your online classes are for your personal use for course purposes only and not to be shared with others.
- Be respectful of your peers and instructors. Sharing of any personal information, including but not limited to personal views and opinions with others, other than for course purposes, is not permitted and may violate UNB's Policy for the Protection of Personal Information and Privacy.
- Personal opinions, views, and commentary provided in the course of online delivery may be considered personal information, which requires the consent of the person who provided it in order to share it ethically and legally. Course videos are to be used only to help you learn the course material.
- The content shared by faculty and instructors is subject to copyright and cannot be shared without the explicit permission of the copyright owner, which may include but not be limited to the course instructor, their colleagues, textbook publishers, and multimedia vendors.

Plagiarism and Academic Offences

"The purpose of education is to acquire knowledge, develop skills, and to grow as an individual. In order to achieve these goals one needs to approach one's courses in an honest manner. This requires individuals to submit work that is their own creation. Students often wonder why documenting their sources and maintaining a high level of academic integrity is so important,

and why failure to do so is taken so seriously. Work undertaken at university is part of a centuries-long conversation. All work builds on that of your predecessors. Documenting your sources recognizes the efforts of others and places your contribution within the conversation. Therefore, your documentation/integrity shows courtesy for your sources and for your reader.”

Ken Craft

The university has carefully defined what it considers plagiarism, and these regulations are found in the UNB calendar section B.19 IX Academic Offences:

Plagiarism includes:

1. quoting verbatim or almost verbatim from any source, regardless of format, without acknowledgement;
2. adopting someone else's line of thought, argument, arrangement, or supporting evidence (such as, statistics, bibliographies, etc.) without indicating such dependence;
3. submitting someone else's work, in whatever form (essay, film, workbook, artwork, computer materials, etc.) without acknowledgement;
4. knowingly representing as one's own work any idea of another.

NOTE: In courses which include group work, a penalty may be imposed on all members of the group unless an act of plagiarism is identified clearly with an individual student or students.

Please note that plagiarism is not difficult to spot; web sources can be quickly traced through a variety of specialty search engines. Professors are required to follow the disciplinary procedures outlined in the calendar (B.17. IX. A. 1-2).

OTHER ACADEMIC OFFENCES you need to be aware of include:

1. Cheating on examination, tests, assignments or reports, including but not limited to:
Impersonating a candidate at an examination or test or in connection with any assignment in a course or availing oneself of the results of impersonation.
Obtaining, through theft, bribery, collusion, purchase, or other improper manner,
 1. an examination or test paper prior to the date and time for writing the examination or test;
 2. academic materials belonging to another person, e.g. laboratory reports, assignments, papers, computer materials, datasets.
2. Falsifying or knowingly submitting false assignments or credentials, records, transcripts, or other academic documents.
3. Submitting a false health or other certificate.
4. Submitting identical or substantially similar work for one course or program of study, which has been or is being submitted for another course or program of study, without the prior express knowledge and approval of the instructors.

5. Interfering with the right of other students to pursue their studies.
6. Knowingly aiding or abetting any of the above offences.
7. Tampering with, or altering, in any deceptive way, work subsequently presented for a review of the grade awarded.

Penalties for plagiarism and other academic offences range from a minimum of F (zero) in the assignment, exam or test to a maximum of suspension or expulsion from the University, plus a notation of the academic offence on the student's transcript.

For more information, please see the Undergraduate Calendar, University Wide Academic Regulations, Regulation VIII.A, or visit: <http://go.unb.ca/tlsPb0XX5>. It is the student's responsibility to know the regulations.

Weekly Schedule

The intended schedule is found below. It is subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better student learning. Students will be notified if and when changes are made.

Day/Date	Topics	In-Class Activity	Assignments
01/09, 11 MW	Chapter 1		
01/16,18 MW	Chapter 2		
01/23,25 MW	Chapter 2		
01/30, 02/01 MW	Chapter 3		
02/06,08 Th	Chapter 3		
02/13,15 MW	Chapter 4		
02/20,22 MW	Chapter 4		
02/27, 03/01 MW	Chapter 4		
03/06,08 MW	Reading week		
03/13,15 MW	Midterm EXAM		

Day/Date	Topics	In-Class Activity	Assignments
03/20,22 MW	Chapter 5		
03/27,29 MW	Chapter 5		
04/03,05 MW	Chapter 6		
04/10,12 MW	Chapter 6		
04/24 M	Final EXAM		

Student Services Writing and Study Skills Support

The UNB Writing and Study Skills Centre provides many coaching and mentoring services to assist with writing papers, effective study methods, and other skills development related to student success: <http://www.unb.ca/fredericton/studentservices/academics/writing-centre/index.html>

Student Services Learning Strategist Support

Any UNB student wanting to improve their academic skills may book appointments with the Learning Strategist. The Strategist offers instruction on topics such as: “learning how to learn” strategies, memory techniques, time management skills, test preparation and test taking methods, note-taking, and other learning and study skills.

<https://www.unb.ca/fredericton/studentservices/academics/accessibility/learning-strategies.html>

Math Skills Support

UNB’s Math Learning Centre offers math help drop-in times and opportunity to book appointments: <http://www.math.unb.ca/~mathhelp/>

Technical Support

Information Technology Services (ITS) Help Desk can be reached by phone 457-2222 (Fredericton Campus) 657-2222 (Saint John Campus), email - its servicedesk@unb.ca, or visited in person at the Harriet Irving Library Learning Commons. <http://www.unb.ca/its/get-it-help.html>