Obuda University John von Neumann Faculty of Informatics			Institute of Applied Mathematics	
Name and code: *Multivariate Statistical Methods* (*NBXTS1EMNF*) **Credits*: 5*** *Applied Mathematics MSc (English language)* *2024/25 year I. semester*				
Subject lecturers: Dr. Tamás Ferenci				
Prerequisites (with code):	NAMVS1AENM Basics of Probability Theory and Mathematical Statistics			
Weekly hours:	Lecture: 2	Seminar.: 0	Lab. hours: 2	Consultation: 0
Way of assessment:	Practice tests & Theoretical exam			
Course description:				
Goal: To familiarize the students with the basics of multivariate statistics, both with the theoretical foundations and the most important applications.				
Course description: Multivariate distributions, multivariate normal distribution, conditional distributions, Wishart-distributions, Cochran's theorem. ML estimation of the parameters of the multivariate normal distribution, hypothesis testing. Multidimensional regression, its role in scientific investigations. The linear regression model, OLS-estimation, properties of the estimator, model assumptions. Extensions of the linear regression.				

Lecture schedule	
Education week	*Topic*
1.	Univariate probability theory
2.	Univariate statistical inference
3.	Multivariate normal distribution
4.	Inference and hypothesis testing in the multivariate normal model I.
5.	Inference and hypothesis testing in the multivariate normal model II.
6.	Test
7.	Introduction to regression
8.	Linear regression and its extensions I.
9.	Linear regression and its extensions II.
10.	Linear regression and its extensions III.
11.	Logistic regression
12.	Generalized linear models
13.	Advanced topics
14.	Test

Midterm requirements

Both of the lecture tests (midterm exams) have to be passed to attend the final exam. One of them can be rewritten in the exam period. If both lecture tests fail, exam grade cannot be given.

One homework – an individually performed multivariate statistical analysis – is the requirement from the practical part. This cannot be replaced (as it represents a whole semester's work).

Final grade calculation methods

The final grade is formed from the practice grade and the exam grade.
Based on the lecture tests an exam grade is offered if the average of the tests reaches 76%.
Final grade = 0.5*practice grade + 0.5*exam
A minimum of 50% must be achieved at each part.
The calculation of the test- and final grade:

Achieved result	Grade
89%-100%	excellent (5)
76%-88<%	good (4)
63%-75<%	average (3)
51%-62<%	satisfactory (2)
0%-50<%	failed (1)

Type of exam

Written, theoretical exam.

Type of replacement

In the exam period for the lecture tests (at most one of them).

References

Obligatory:

- B Flury: A First Course in Multivariate Statistics, Springer, 1997.
- W. K. Haerdle, L. Simar: Applied Multivariate Statistical Analysis, Springer, 2015.

Recommended:

- C. R. Rao: Linear statistical inference and its applications, Wiley and Sons, 1968.