UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria		
ACADEMIC YEAR	2023/2024		
MASTER'S DEGREE (MSC)	MANAGEMENT ENGINEERING (ONLINE)		
INTEGRATED COURSE	ADVANCED STATISTICS FOR BUSINESS		
CODE	22201		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	SECS-S/02		
HEAD PROFESSOR(S)	LOMBARDO ALBERTO	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)	LOMBARDO ALBERTO MARCON GIULIA	Professore Ordinario Ricercatore a tempo determinato	Univ. di PALERMO Univ. di PALERMO
CREDITS	6		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	**LOMBARDO ALBERTO** Thursday 12:00 14:00 Stanza docente **MARCON GIULIA** Thursday 15:00 17:00 Stanza del docente (Edificio 8, stanza n. 2067) o Microsoft Teams		

DOCENTE: Prof. ALBERTO LOMBARDO

PREREQUISITES	Basic knowledge of matrix analysis and probability and descriptive and inferential statistics
LEARNING OUTCOMES	KNOWLEDGE AND UNDERSTANDING At the end of the course the student will have knowledge of the basic tools of multivariate statistical analysis and generalized linear models. The student will be able to use the aforementioned tools in the business environment, enriching the set of their statistical tools through quantitative methods of multi-dimensional data analysis. AUTONOMY OF JUDGMENT The student will be able to collect, organize, analyze data of a multidimensional phenomenon under study related to large data bases, as well as to apply statistical methods in order to build models for the analysis of statistical dependence on non-metric data. COMMUNICATION SKILLS The student will acquire the ability to communicate the methods of approaching multidimensional data for the analysis of complex phenomena. Communication skills will be assessed during the exam. LEARNING SKILLS The student will learn the principles of multivariate statistics methods and will be able to acquire and communicate complex information, as well as interpret the results of statistical software. Learning ability will be assessed during the exam
ASSESSMENT METHODS	The knowledge acquired during the course is verified by an oral exam, based on theoretical questions, and a practical test with the use of R.
TEACHING METHODS	Theoretical and practical lessons, involving the use of software R, will be given. The theoretical module involves the formal part of the statistical methods. The practical module train to software R through applications on real or simulated data.

MODULE
MULTIVARIATE ANALYSIS: THEORY

Prof. ALBERTO LOMBARDO

SUGGESTED BIBLIOGRAPHY

Dispense del docente
Multivariate Statistical Methods, A Primer, Manly B.F.J, Navarro Alberto, J.A., CRCPress

AMBIT	20929-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	51
COURSE ACTIVITY (Hrs)	24

EDUCATIONAL OBJECTIVES OF THE MODULE

Multivariate Statistical Analysis techniques are a fundamental tool in all fields of Management: Finance, Production, Accounting, Marketing and Personnel Management. At the end of the course, the student will have knowledge of the basic tools of multivariate statistics and in general of the quantitative methods of analysis of large complex databases. The statistical tools presented in the course will allow to analyze the dependence of non-metric data (generalized linear models) in order to formulate supervised models (regression) and unsupervised models (Principal Component Analysis, Factorial Analysis, Canonical Correlation Analysis, Cluster Analysis).

SYLLABUS

Hrs	Frontal teaching
4	Introduction to Statistical Multivariate Analysis Introduction to matrix calculus
6	Principal components analysis Factor analysis Analysis of canonical correlations
6	Cluster analysis Agglomerative and divisive methods Redistributive methods
8	Binary Logistic Regression Multinomial Logistic Regression Ordinal Logistic Regression

MODULE
MULTIVARIATE ANALYSIS: APPLICATIONS

Prof.ssa GIULIA MARCON

SUGGESTED BIBLIOGRAPHY

An Introduction to Applied Multivariate Analysis with R. Everitt B. and Hothorn T. Springer
R in Action - Data Analysis and Graphics with R. Kabacoff R.I.

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EDUCATIONAL OBJECTIVES OF THE MODULE

Multivariate Statistical Analysis techniques are a fundamental tool in all fields of Management: Finance, Production, Accounting, Marketing and Personnel Management. At the end of the course, the student will have knowledge of the basic tools of Multivariate Statistics, the software R and in general of the quantitative methods of analysis of large complex databases. The statistical tools presented in the course will allow to analyze the dependence of non-metric data (Generalized Linear Models) in order to formulate supervised models (Regression) and unsupervised models (Principal Component Analysis, Factorial Analysis, Canonical Correlation Analysis, Cluster Analysis).

SYLLABUS

Hrs	Practice
4	Introduction to R software
6	Principal Component Analysis Factor Analysis Canonical Correlations Analysis
6	Cluster Analysis Agglomerative and Divisive methods Redistributive methods
8	Binary Logistic Regression Multinomial Logistic Regression Ordinal Logistic Regression