COURSE OUTLINE

(1) GENERAL

SCHOOL	**SOCIAL SCIENCES**		
ACADEMIC UNIT	**SOCIOLOGY**		
LEVEL OF STUDIES	**UNDERGRADUATE**		
COURSE CODE	769	SEMESTER	**H (SPRING)**
COURSE TITLE	**ADVANCED TOPICS IN STATISTICS**		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	WEEKLY TEACHING HOURS	CREDITS
LECTURES	**3**	**6**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	**COMPULSORY ELECTIVE / GENERAL AND SPECIAL BACKGROUND / SPECIALIZED GENERAL KNOWLEDGE**
PREREQUISITE COURSES:	**SOCIAL STATISTICS**
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	**GREEK**
IS THE COURSE OFFERED TO ERASMUS STUDENTS	**NO**
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

This course offers specialized knowledge in the field of Statistics, with a focus on its application within the broader context of the Social Sciences—particularly Sociology. It covers the fundamental aspects and dimensions of multivariate analysis methods, aiming to introduce students to the most up-to-date scientific approaches for analyzing, presenting, and interpreting multivariate data.

Through this course, students are expected to gain a solid understanding of key topics related to multivariate analysis techniques. They will become familiar with core concepts and learn to apply a range of tools and methodologies used in multivariate analysis.

By the end of the course, participants will have developed practical skills in handling multivariate data, implementing appropriate analytical techniques, and drawing conclusions based on their findings. The course also emphasizes the use of statistical software, enabling students to carry out

multivariate analyses using relevant statistical packages.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…
…….

Production of free, creative and inductive thinking
Criticism and self-criticism
Working in an interdisciplinary environment
Search for, analysis and synthesis of data and information, with the use of the necessary technology
Decision-making
Project planning and management
Production of new research ideas

(3) SYLLABUS

1st Lecture **Introduction**

1. Introduction to Multivariate Statistical Analysis
2. Multivariate Data

2nd Lecture **Descriptive Measures**

1. Multivariate Descriptive Statistics
2. Covariance Matrix

3rd Lecture **Multivariate Graphs**

1. Graphical Representations for Describing Multivariate Data

4th Lecture **Multivariate Distributions**

1. Multivariate Distributions
2. Multivariate Normal Distribution

5th Lecture **Cluster Analysis I**

1. Cluster Analysis
2. Hierarchical Methods

6th Lecture **Cluster Analysis II**

1. K-means Methods
2. Model-Based (Probabilistic) Methods
3. Cluster Analysis Using Statistical Software

7th Lecture **Principal Component Analysis I**

1. Principal Component Analysis (PCA)

2. Selection of Principal Components

8th Lecture **Principal Component Analysis II**

1. Selection of Principal Components
2. Interpretation of Principal Components
3. PCA Using Statistical Software

9th Lecture **Factor Analysis I**

1. Factor Analysis
2. Orthogonal Factor Model
3. Estimation Methods: Principal Components and Maximum Likelihood

10th Lecture **Factor Analysis II**

1. Model Selection Criteria
2. Factor Rotation
3. Oblique Factor Analysis

11th Lecture **Factor Analysis III**

1. Confirmatory Factor Analysis
2. Factor Analysis Using Statistical Software

12th Lecture **Discriminant Analysis**

1. Discriminant Analysis
2. Two-Group Discrimination
3. Multi-Group (k-Group) Discrimination

13th Lecture **Additional Techniques**

1. Correspondence Analysis
2. Canonical Correlation Analysis
3. Multidimensional Scaling
4. Methods for Directional Data

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>The university’s electronic platform will be used to communicate with students, provide educational material, support training and practice, and deliver feedback.

In parallel, statistical software (such as SPSS and possibly R) as well as spreadsheets (e.g., Excel) will be utilized.</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Guided applications by students</td><td>35</td></tr>
<tr><td>laboratory practice</td><td>50</td></tr>
<tr><td>Independent study</td><td>56</td></tr>
<tr><td>Course total</td><td>180 (ECTS 6)</td></tr>
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<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>1. Participation in coursework – 20%
2. Final written examination – 80%

The final exam will consist of multiple-choice questions, short-answer questions, and problem-solving exercises.

Students with learning difficulties will receive appropriate support in accordance with legal requirements, academic standards, and the specific nature of the course.

Individual academic support will be available by appointment or during designated office hours.</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

Supplementary Readings

1. Field, A. (2024). *Discovering statistics using IBM SPSS statistics*. Sage publications limited.
2. Tabachnick, B. G., & Fidell, L. S. (2018). Using multivariate statistics. Pearson
3. Sharma, S. (1996). Applied Multivariate Techniques. New York. Wiley

4. Agresti, A., & Finlay, B. (2009). Statistical Methods for the Social Sciences. Pearson
5. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate Data Analysis (8th ed.). Cengage Learning