Syllabus

1. Programme information

1.1. Institution	THE BUCHAREST UNIVERSITY OF ECONOMIC STUDIES
1.2. Faculty	Economic Cybernetics, Statistics and Informatics
1.3. Departments	Department of Statistics and Econometrics
1.4. Field of study	Cybernetics and statistics
1.5. Cycle of studies	Master Studies
1.6. Education type	Full-time
1.7. Study programme	Applied data analytics
1.8. Language of study	English
1.9. Academic year	2025-2026

2. Information on the discipline

2.1. Name	**Data Science approach to Asset Pricing**									
2.2. Code	**25.0318IF1.1-0004**									
2.3. Year of study	**1**	2.4. Semester	**1**	2.5. Type of assessment	**Test**	2.6. Status of the discipline	**O**	2.7. Number of ECTS credits	**5**	

2.8. Leaders	C(C)	**Cadru asoc Conf.dr. DHESI GURJIT SINGH**	gurjit.dhesi@csie.ase.ro
	S(S)	**Cadru asoc Conf.dr. DHESI GURJIT SINGH**	gurjit.dhesi@csie.ase.ro
	C(C)	**prof.univ.dr. HERŢELIU Claudiu**	hertz@csie.ase.ro

3. Estimated Total Time

3.1. Number of weeks	14.00		
3.2. Number of hours per week	2.00	of which	
		S(S)	1.00
		C(C)	1.00
3.3. Total hours from curriculum	28.00	of which	
		S(S)	14.00
		C(C)	14.00
3.4. Total hours of study per semester (ECTS*25)	125.00		
3.5. Total hours of individual study	97.00		

Distribution of time for individual study	
Study by the textbook, lecture notes, bibliography and student's own notes	40.00
Additional documentation in the library, on specialized online platforms and in the field	15.00
Preparation of seminars, labs, assignments, portfolios and essays	15.00
Tutorials	7.00
Examinations	2.00
Other activities	18.00

4. Prerequisites

4.1. of curriculum	● Basic Statistics ● Probability theory and Mathematical Statistics
4.2. of competences	● Statistical software: Excel

5. Conditions

for the S(S)	The seminars will be conducted in rooms with computers which have appropriate software: SPSS, SAS, R, Tableau etc
for the C(C)	The lectures will be held in rooms with Internet access and multimedia teaching equipment

6. Acquired specific competences

PREFESSIONAL	CC2	STEM (science, technology, engineering, mathematics) skills – understanding the mathematical foundations of AI, statistical methods of data analysis applied in AI techniques.
PREFESSIONAL	CO4	Conducts quantitative research
PREFESSIONAL	CP1	Applies statistical analysis techniques
PREFESSIONAL	CP3	Performs data analysis
PREFESSIONAL	CT1	Demonstrates an understanding of mathematical terms and concepts and applies basic mathematical principles and processes for interpreting data and facts.

7. Objectives of the discipline

7.1. General objective	This module focuses on the use of modern econometric methodology for dealing with problems in the area of finance and provides students with the econometric tools applied in the area. It applies the techniques of mathematics, statistics and econometrics to analyse financial data so as to understand and model the underlying financial and/or economic conditions. In achieving the above, use of specialist software packages is employed. Empirical applications are considered in the stock, bond and exchange rate markets.
7.2. Specific objectives	The module aims to develop knowledge and understanding of the theories and tools used in financial econometric, so as to choose and apply the appropriate tools and techniques to carry out empirical analysis of financial markets efficiency, models of equity return, financial time-series data, asset pricing, volatility and risk measurement. The module also aims to develop the ability to reach conclusions in the domain of finance and financial economics problems by following appropriate analytic procedures. C1: Acquisition of advanced knowledge of applied statistical analysis concepts, methods, and techniques, including inference, stochastic modeling, econometrics, and Bayesian methods. A1: Development and implementation of statistical models and artificial intelligence algorithms for the analysis of complex data, using programming environments such as R, Python and SQL. A2: Application of exploratory and predictive data analysis techniques, including time series analysis, spatial econometrics and big data, with the purpose of substantiating strategic decisions in public and private organizations. RA2: Taking responsibility for continuous professional development and active involvement in multidisciplinary teams, including through consultancy, applied research or innovation activities in the field of data analysis. RA3: Continuous development of professional skills in accordance with technology trends and business environment

8. Contents

8.1. C(C)		Teaching/Work methods	Recommendations for students
1	Introduction. The objectives of the course. Basic concepts. [C1] [2 h]	Lecture based on multimedia presentations and interaction with students.	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
2	Descriptive Statistics and Statistical Inference. [C1, A1, A2] [2 h]	Lecture based on multimedia presentations and interaction with students.	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
3	Simple regression: application for capital asset pricing model (CAPM) and single index model. Multiple Regression, including Diagnostics. [C1, A1, A2] [2 h]	Lecture based on multimedia presentations and interaction with students.	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
4	Time series approach: Autocorrelation and partial autocorrelation function. Stationarity and nonstationarity in mean. Application in testing Efficient Market Hypothesis. [C1, A1, A2] [2 h]	Lecture based on multimedia presentations and interaction with students.	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
5	Time series approach: introduction to ARIMA models. [C1, A1, A2] [2 h]	Lecture based on multimedia presentations and interaction with students.	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
6	Random walk models: Brownian Motion, application in testing Efficient Market Hypothesis. Cointegration. [C1, A1, A2] [2 hours]	Lecture based on multimedia presentations and interaction with students.	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
7	Modelling asset prices as a stochastic process. Variations on the Brownian Motion: modelling fat tails [C1, A1, A2] [2 h]	Lecture based on multimedia presentations and interaction with students.	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu

Bibliography

- Koop,G., Analysis of Financial Data, Wiley, 2006
- Carol, A, Market Risk Analysis: Practical Financial Econometrics v. 2, The Wiley Finance , 2008

8.2. S(S)		Teaching/Work methods	Recommendations for students
1	Case studies: What is Asset Pricing, The many steps involved, and how to get there. [C1, RA2, RA3] [2 h]	Applications and Case Studies in specialized statistical software: EXCEL	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
2	Case study: Simple regression: application for capital asset pricing model (CAPM) and single index model. [C1, A1, A2, RA2, RA3] [2 h]	Applications and Case Studies in specialized statistical software: EXCEL	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
3	Case study: Time series approach: Autocorrelation and partial autocorrelation function. Stationarity and nonstationarity in mean. Application in testing Efficient Market Hypothesis. [C1, A1, A2, RA2, RA3] [2 h]	Applications and Case Studies in specialized statistical software: EXCEL	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
4	Case study: Time series approach: introduction to ARIMA models. [C1, A1, A2, RA2, RA3] [2 h]	Applications and Case Studies in specialized statistical software: EXCEL	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
5	Case study: Random walk models: Brownian Motion, application in testing Efficient Market Hypothesis. [C1, A1, A2, RA2, RA3] [2 h]	Applications and Case Studies in specialized statistical software: EXCEL	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
6	Case study: Modelling asset prices as a stochastic process. Variations on the Brownian Motion: modelling fat tails. [C1, A1, A2, RA2, RA3] [2 h]	Applications and Case Studies in specialized statistical software: EXCEL	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu
7	Case studies: Modelling volatitliy: ARCH&GARCH models : modelling volatility clustering in financial time series data. [C1, A1, A2, RA2, RA3] [2 h]	Applications and Case Studies in specialized statistical software: EXCEL	Course notes online.ase.ro prof.univ.dr.Dhesi Gurjit Sigh Course notes online.ase.ro prof. univ. dr. Herteliu Claudiu

Bibliography

- Koop,G., Analysis of Financial Data, Wiley, 2006
- Carol, A, Market Risk Analysis: Practical Financial Econometrics v. 2, The Wiley Finance , 2008

9. Corroboration of the contents of the discipline with the expectations of the representatives of the epistemic community, of the professional associations and representative employers in the field associated with the programme

The proposed course and seminar topics are consistent with national and international literature, as well as employers' requirements both in terms of theoretical knowledge and software packages used.

10. Assessment

Type of activity	Assessment criteria	Assessment methods	Percentage in the final grade
10.1. C(C)	Attendance at course and seminars and involvement in discussing issues	Number of course and seminar attendance and interventions Tests	20.00
10.2. S(S)	Project	Software application to time series data and written report	30.00
10.3. Final assessment	Written exam	Whole notes 1-10	50.00
10.4. Modality of grading	Whole notes 1-10		
10.5. Minimum standard of performance	The project structure is presented on online.ase.ro To pass the exam the student must achieve at least 50% at the written exam		

Date of listing,
04/28/2026

Signature of the discipline leaders,

Date of approval in the department

Signature of the Department Director,