COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Financial and Management Engineering		
LEVEL OF STUDIES	7		
COURSE CODE	I-7	SEMESTER	2
COURSE TITLE	FINANCIAL ECONOMETRICS		

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
	3	8
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*	Stream Obligatory
PREREQUISITE COURSES:	
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*

By completion of this module, students will be capable of

1) **Analyzing the statistical properties and detecting repeated patterns in financial time series**
2) **Familiarizing themselves with commercial statistical/econometric software**
3) **Performing risk analysis of financial investments**

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…
…….

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Decision-making
Working independently
Production of new research ideas
Criticism and self-criticism
Production of free, creative and inductive

(3) SYLLABUS

1. ***Simple and multiple linear regression***: the Gauss – Markov model, OLS estimation and statistical hypothesis testing, simple and adjusted coefficient of determination, deviations from the Gauss- Markov framework (autocorrelation, heteroskedasticity, multicollinearity) and diagnostic testing, *practical application: estimating a capital asset pricing model (CAPM)*.
2. ***Time-series analysis models***: the concept of a time series, properties of time series (mean reversion, memory, deterministic/stochastic trend, seasonality), autocorrelation and partial autocorrelation function, autoregressive (AR) υand moving average (MA) models, ARMA model identification and the Box-Jenkins methodology, non-stationary processes, unit root tests, ARIMA models, *practical applications: forecasting financial prices, testing the market efficiency hypothesis*.
3. ***Risk analysis models***: types of financial risks, patterns of market price uncertainty, autoregressive conditional heteroskedasticity (ARCH), volatility models ARCH-GARCH, models for asymmetric volatility (GJR-GARCH, EGARCH), *practical application: analyzing the market risk of financial securities*.

4. ***Multivariate risk models***: the correlation structure of financial returns, multivariate ARCH models, models for the correlation structure (CCC, DCC και ADCC), *practical application: analyzing the risk exposure of a portfolio of securities.*
5. ***Special topics in financial econometrics***: nonlinear models for time series analysis (smooth transition), computational methods for data analysis (neural networks and machine learning algorithms), market risk analysis and factor models, algorithmic trading systems.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT in teaching and communication with students Use of ICT in laboratory education
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*	see table below
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.*	*<u>Method of assessment and evaluation:</u>* • Final exam with Multiple Choice Questions and Problem Solving (Conclusive) • Laboratory Work (Conclusive)

Activity	*Semester workload*
Lectures	30
Laboratory practice	82
Project	85
Exams	3
Course total	*200*

(5) ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*
    - Christou G. (2011) «Introduction to econometrics», Gutenberg (in Greek)
    - Brooks, Ch (2022) «Introduction to Financial Econometrics». Gutenberg (Greek Translation)

- *Related academic journals:*
    - Journal of Time Series Analysis
    - Quantitative Finance