COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF FINANCIAL AND MANAGEMENT ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**OI0116**	**SEMESTER**	**7**
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	5
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*	SPECIAL BACKGROUND/SPECIALISED GENERAL KNOWLEDGE/ SKILLS DEVELOPMENT
PREREQUISITE COURSES:	PROBABILITIES STATISTICS ECONOMETRICS
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	http://www.fme.aegean.gr/el/c/khrematooikonomike-oikonometria

(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*

Financial econometrics is essentially a set of mathematical tools and techniques derived from both Probability Theory and Statistics, with aim to study important problems of Finance. These problems, which are mainly of quantitative nature, have their origins in pricing, modeling and risk management. The course is designed to equip students of the Financial Engineering track with basic knowledge of from time series analysis which is necessary in order to analyze and study financial data and thus obtaining a deeper understanding of the behavior of financial markets. To be more precise, among others, we consider: (a) stationary and non-stationary time series models, (b) unit root and stationarity tests, (c) the Box-Jenkins approach to time series modeling, (d) techniques to obtain stationarity, (e) the ARCH/GARCH approach to volatility modeling. Upon successful completion of the course, the students will be:

- will be familiar with the different categories of financial data and especially with the notion of time series.
- able to fully understand the notions of “stochastic process” and “time series”.

- able to understand the notions of autocovariance, autocorrelation, partial autocorrelation and will also be able to test for the significance of the autocorrelation coefficients (t-statistic, Box-Pierce, Ljung-Box).
- able to fully understand the idea of weak stationarity and its importance to the framework of time-series analysis.
- able to test for stationarity (correlogram, unit root test of Dickey-Fuller).
- able to apply transformations to obtain stationarity.
- familiar with the basic stochastic models for time-series analysis, both stationary (AR, MA, ARMA) and non-stationary (ARIMA).
- able to choose between various candidate models (information criteria AIC, BIC, SIC).
- able to estimate the aforementioned models (least squares, maximum likelihood) and to use these models for forecasting purposes. Furthermore, the student will be able to study the accuracy of these forecasts.
- able to apply these techniques to studying important financial problems. Special emphasis will be given to volatility modelling with the family of models ARCH/GARCH.

Every lecture will be accompanied by computational exercises in R with real-world financial data.

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

- 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
- Criticism and self-criticism
- Production of free, creative and inductive thinking

(3) SYLLABUS

Introduction to time-series analysis (introductory notions, stochastic process, time-series, population-sample). Basic notions (stationarity, autocovariance, autocorrelation, partial autocorrelation, correlogram). Testing the significance of the autocorrelation coefficients (t-statistic, Box-Pierce, Ljung-Box). Testing stationarity (unit root test of Dickey-Fuller). Basic stochastic models for time-series analysis (AR, MA, ARMA, ARIMA). Estimating these basic models (least squares, maximum likelihood). Testing and selecting the appropriate ARIMA model. Forecasting and testing the accuracy of forecasts. Modeling volatility with the ARCH/GARCH family of models.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	**Use of ICT in teaching.** **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*	
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.*	Written examinations at the end of the semester, in Greek, which include questions of knowledge development and understanding of the content of the course, as well as problem solving. Additional assessment of candidates on the basis of projects given on a regular basis. Final grade is calculated as: Final exam: 70% Exercises: 30%

Activity	*Semester workload*
Lectures/Laboratory practice	39
Study and analysis of the bibliography	90
Projects	18
Final exam	3
Course total	**150**

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Σύγχρονες μέθοδοι ανάλυσης χρονολογικών σειρών (2013). Σ. Δημέλη. Εκδόσεις ΟΠΑ
- Time series analysis with applications in R (2008). J.D Cryer & K.S. Chan
- Οικονομετρικά υποδείγματα και εφαρμογές με το Eviews (2010). Κ. Συριόπουλος και Δ. Φίλιππας. Εκδόσεις Ανικούλα.
- Introductory Econometrics for Finance, Second Edition (2008). C. Brooks. Cambridge

- Analysis of financial time series, Second Edition (2005). R. Tsay. Wiley.
- The Econometrics of Financial Markets (1997). J.Y. Campbell A.W. Lo and C. Mackinlay. Princeton University Press.
- Applied Econometric Time Series, Fourth Edition (2014). W. Enders. Wiley.
- Introductory Econometrics for Finance, Second Edition (2008). C. Brooks. Cambridge.

  Introductory Econometrics: A modern approach, Fifth Edition (2013). J. Wooldridge. SouthWestern.