COURSE OUTLINE

Ημερομηνία: 1 Νοε 2022

A. INFORMATION FOR THE COURSE

A1. School	School of Science and Technology of Information
A2. Department	Department of Statistics
A3. Master Programme	
A4. Course Code	6145
A5. Title of the Course	TIME SERIES ANALYSIS

Lecturers

Name	Rank	Specialization
VRONTOS IOANNIS	Associate Professor	Statistics

B. TYPE OF COURSE

B1. Year of Study	2
B2. Semester	4th
B3. Level of Course (if applicable)	1st Cycle
B4. Type of course	Core
B5. Field	Background
B6. ECTS credits allocated (ECTS)	8.00
B7. Is the Course in the Syllabus?	Yes
B8. If yes, which is the reference Page?	29-68
B9. Is there a site for the course?	Yes https://www.dept.aueb.gr/el/stat-courses

C. INSTRUCTION

C1. Lectures Include:	Classroom lectures: Yes Distance learning lectures: No Seminars: No Laboratory exercises: Yes Field training exercise: No Literary analysis: Yes Tutorial: Yes Interactive teaching: No Educational visits: No Project: No Essays/reports: Yes Independent study: Yes Lectures given by scientists: No Internship: No
C2. Scheduled Hours for Lectures per week	4.00
C3. Scheduled Hours for Tutorials per week	
C4. Scheduled Hours for Workshops per week	2.00
C5. Scheduled Hours for Case Studies per week	
C6. Scheduled Hours for Other Activities per week	
C7. Scheduled Hours for Lectures per semester	52
C8. Scheduled Hours for Tutorials per semester	
C9. Scheduled Hours for Workshops per semester	26
C10. Scheduled Hours for Case Studies per semester	
C11. Scheduled Hours for Other Activities per semester	
C12. Mode of Delivery	Face to Face
C13. Student’s Evaluation	Written examination at the end of the semester: Yes Oral examination: No Midterm exam: No Homework: No Project: Yes Public Presentation: No Laboratory exercises: No Practical exercises: No Exempt work: No

C14. Language of Instruction	Greek

D. PREREQUISITE COURSES

E. COURSE CONTENTS (Syllabus)

Presentation of various examples of time series as a type of temporally correlated data of observed random variables. Decomposition of time series based on the additive model of trend, seasonal and irregular components. Methods of determination and filtering of trend and seasonal components. Tests of randomness and normality. Definitions of strict and second-order stationarity, auto-covariance and auto-correlation functions of a stationary time series and relevant properties. Wold's decomposition theorem and the general linear model representation of stationary time series. Autoregressive - Moving Average (ARMA) type models for time series, conditions for existence-causality-invertibility of stationary solutions and methods for calculating their auto-covariance function. Estimation of the auto-correlation function, asymptotic properties of its sampling distribution and statistical inference based on Bartlett's theorem. Prediction by mean square error minimization and algorithms for optimal linear predictions, with applications to forecasting via ARMA models, estimation of partial auto-correlations, inference and diagnostic control of fitted ARMA models. Introduction to ARIMA and SARIMA models for non-stationary time series.

F. LEARNING OUTCOMES

Upon successful completion of the course, students should be able:
o to identify mathematical models for time series,
o to estimate numerical parameters of models for time series,
o to predict values of a modelled time series,
o to test the adequacy of a model based on residuals between observed and predicted values of a modelled time series.

G. LITERATURE

G1. Use of Multiple Literature	Yes
G2. Recommended or required reading	Yes