COURSE OUTLINE

(1) GENERAL

SCHOOLS	NATURAL SCIENCES		
ACADEMIC UNIT/UNITS	MATHEMATICS		
TITLE OF MASTER'S DEGREE	COMPUTATIONAL AND STATISTICAL DATA ANALYTICS (MCDA)		
LEVEL OF STUDIES	POSTGRADUATE		
COURSE CODE	MCDA113	**SEMESTER**	B
COURSE TITLE	TIME SERIES ANALYSIS		

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	7.5
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
PREREQUISITE COURSES:	MCDA101
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://www.math.upatras.gr/en/studies/undergraduate/courses/206

(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*

Time series analysis is applied in many areas (economy, medicine, administration, etc.). It studies systems, processes, signals and patterns that evolve over time. Time series analysis has two main objectives: (a) study and recognize the nature of a phenomenon represented by a sequence of observations and (b) to predict the future evolution of the phenomenon, i.e. the future values of the sequence of observations. It is also a basic and necessary function of the management of a company and their forecast is necessary for the decision making of the company. Forecasting information on future actions is usually a critical input into the wide range of management and management decisions, since decisions on current plans depend on future expectations. Scientific forecasts must be sufficiently precise to allow for better planning and control than would be possible without their use.

At the end of the course, students will have developed a way of thinking that, combined with the necessary knowledge, will be able to apply the concepts and techniques to be learned in practice. The final aim of the course is to obtain basic theoretical and laboratory knowledge on how to design and

execute statistical surveys and to familiarize students with prediction methods and, more specifically, with the Box-Jenkins method.

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.
- Autonomous work.
- Team work.
- Promoting free, creative and inductive thinking.
- Production of new research ideas.

(3) SYLLABUS

Definition of Time Series. Components of Time Series. Methods of Time Series Analysis. Forecasting. Stationarity-Autocovarianve-Autocorellation-Partial Autocorellation. White Noise-Random Walk. Autoregressive Models AR(1), AR(2), AR(p). Moving Average Models MA(1), MA(2), MA(q). Mixed autoregressive/Moving Average Models ARMA(p,q). ARIMA(p,d,q). SARIMA (P,D,Q), x(p,d,q). Identification of ARIMA Models. Estimation of ARIMA Models, Diagnostic Test. Criterion of Model Selection. Forecasting with AR(1), MA(1), ARMA(1,1), ARMA(p,q), ARIMA(p,d,q). Confidence Interval of Forecasting.-Measures of Evaluation.

Box-Jenkins Methodology with SPSS.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Lectures (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>• Use of ICT in teaching
✓ Electronic slide presentations,
✓ Use of specific software (SPSS).
• Support of the course via the online platform eClass of University of Patras.</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></td><td></td></tr>
<tr><td>Study (no driven)</td><td>100</td></tr>
<tr><td>Solving suggested exercises</td><td>45.5</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Final examination</td><td>3</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Total number of hours for the Course (25 hours of work-load per ECTS credit)</td><td>187.5</td></tr>
</table>
</td></tr>
<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>Assessment Language: Greek
Assessment Language for Erasmus students: English

Assessment methods: Final exam (100%) or assignments can be given (100%).

Minimum passing grade: 5
Maximum passing grade: 10</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- Hamilton, J.D. (1994). *Time Series Analysis*. Princeton University Press.
- Priestley, M. B. (1981). *Spectral Analysis and Time Series*. Academic Press.
- Vandaele, W. (1983). *Applied Time Series and Box-Jenkins Models.* Academic Press.

(in Greek)

- Jeffrey, J. (1996). *Μέθοδοι Προβλέψεων (για οικονομικές και επιχειρηματικές αποφάσεις).* Εκδόσεις Gutenberg.
- Δημέλη, Σ. (2002). *Σύγχρονες Μέθοδοι Ανάλυσης Χρονολογικών Σειρών*. Εκδόσεις Κριτική.

e-class url: https://eclass.upatras.gr/courses/MATH1104/