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	MCDA112	**SEMESTER**	B
COURSE TITLE	SURVIVAL AND RELIABILITY MODELS		

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:	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.upatras.gr/courses/MATH1072/

(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*

The course describes the basic concepts of survival and reliability analysis. Stochastic processes (parametric and non-parametric) are presented for modeling lifetime data. Lifetime data, relating to time to an event of interest, appears in a wide range of scientific fields, such as Medicine, Industry, Engineering, etc.

Upon completing the course, students are expected to be able to:

- analyze lifetime data and draw conclusions about the time to an event of interest,
- compare alternative models and consider their suitability,
- apply survival and reliability analysis techniques in various scientific areas.

In addition, they are expected to acquire:

- use statistical programs,
- implement algorithms in a programming environment to analyze lifetime data and fit survival models.

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 interdisciplinary environment.
- Production of free, creative and inductive thinking.

(3) SYLLABUS

Survival and reliability analysis - Basic concepts. Censored and truncated data. Basic Functions: Reliability or Survival Function, Risk Function, Mean residual lifetime, etc.

Non-parametric estimation. Kaplan-Meier, Nelson-Aalen. Log-rank test. Graphical tests.

Parametric models and lifetime distributions. Gamma, Weibull, Gumbel, Lognormal and others. Maximum likelihood estimation. Goodness-of-fit tests.

Regression models. Proportional hazards model, accelerated time model and the semi-parametric Cox model. Diagnostic methods, Cox-Snell residuals, Schoenfeld residuals.

Special issues of survival and reliability analysis. Frailty models, longitudinal data etc.

(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
• during lectures,
• in learning statistical software (MINITAB,STATA, R, etc.)</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>Projects</td><td>45</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Final examination</td><td>3.5</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:
• Projects with public presentation (30%).
• Written exams (70%).

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

(5) ATTACHED BIBLIOGRAPHY

- Cox, D. R. and Oakes, D. (1984). *Analysis of Survival Data*. Chapman and Hall.
- Hosmer, D.W., Lemeshow, Jr. S. and May S. (2008). *Applied Survival Analysis: Regression Modeling of Time-to-Event Data*. 2nd ed. Wiley.

(in Greek)

- Καρώνη, Χ. (2009). *Μοντέλα Αξιοπιστίας και Επιβίωσης*. Εκδόσεις Συμεών.