COURSE OUTLINE

GENERAL

SCHOOL	Sciences and Engineering		
ACADEMIC UNIT	Computer Science		
LEVEL OF STUDIES	1st Cycle		
COURSE CODE	MATH-325	**SEMESTER**	Fall, Spring
COURSE TITLE	Probability and Statistics II		

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	6
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:	MATH-225
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	
COURSE WEBSITE (URL)	

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*

After completion of the course students are expected to be able to:

- Employ moment generating functions to derive moments of random variables, to distinguish probability distributions.
- Work with marginal, conditional and joint distributions for both discrete and continuous random variables.
- Calculate the covariance and correlation between two random variables and prove properties of expectation, variance and covariance.
- Formulate the least squares estimator and maximum likelihood estimator for the mean and variance of a Normal random variable and investigate properties for unbiasedness and

consistency.

- Compute confidence intervals and carry out hypotheses testing for the normal mean when the variance is known or unknown.

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…*
	…….

Adapting to new situations, decision-making, working independently, critical and quantitative thinking, synthesis of ideas.

SYLLABUS

- Moments and moment generating functions.
- Multivariate distributions: the bivariate case, marginal, conditional and joint distributions.
- Conditional expectation, Joint Expectation, Covariance and Correlation.
- Least Squares Estimator, Maximum Likelihood Estimator and the properties of unbiasedness and consistency.
- The law of large numbers, the central limit theorem and sampling distributions of the sample mean.
- Statistical inferences for the mean of a normal random variable.

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 / Χρήση ΤΠΕ* *Communication with students / Επικοινωνία με Φοιτητές*
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*	

Activity	***Semester workload***
Lectures	49
Practice problems	49
Examinations	4

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*	Study of textbook, lecture notes and online material.	48
	Course total	***150***
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.*	One test and one Final Exam	

ATTACHED BIBLIOGRAPHY

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Introduction to Probability	Grinstead C. and Snell L.	AMS	2012	978-0821894149

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Introduction To Probability and Statistics: Principles and Applications for Engineering and the Computing Science	Milton S. and Arnold J.	McGraw Hill	2002	9780071198592
Probability and Statistics for Computer Science	Johnson J.L.	Wiley	2008	9780470383421