SYLLABUS

Academic year 2023-2024

Year of study I / Semester II

1. Information on academic programme

1.1. University	**„1 Decembrie 1918" from Alba Iulia**
1.2. Faculty	**Faculty Of Informatics and Engineering**
1.3. Department	**Informatics, Mathematics and Electronics Department**
1.4. Field of Study	**Computer Science**
1.5. Cycle of Study	**Undergraduate**
1.6. Academic programme / Qualification	**Computer Science** / **251201, 251204, 251203**

2. Information of Course Matter

2.1. Course		***Probabilistic and mathematical statistics***		2.2. Code		**CSE112**	
2.3. Course Leader			Dr. Aldea Mihaela				
2.4. Seminar Tutor			Dr. Aldea Mihaela				
2.5. Academic Year	**I**	2.6. Semester	**II**	2.7. Type of Evaluation (E – final exam/ CE - colloquy examination / CA - continuous assessment)	**E**	2.8. Type of course (C– Compulsory, Op – optional, F - Facultative)	**C**

3. Course Structure (Weekly number of hours)

3.1. Weekly number of hours	**3**	3.2. course	**2**	3.3. seminar, laboratory	**1**
3.4. Total number of hours in the curriculum	**42**	3.5. course	**28**	3.6. seminar, laboratory	**14**

Allocation of time:	hours
Individual study of readers	***20***
Documentation (library)	***20***
Home assignments, Essays, Portfolios	***30***
Tutorials	**-**
Assessment (examinations)	***6***
Other activities…….	***7***

3.7 Total number of hours for individual study	83
3.9 Total number of hours per semester	125
3.10 Number of ECTS	5

4. Prerequisites (where applicable)

4.1. curriculum-based	-
4.2. competence-based	-

5. Requisites (where applicable)

5.1. course-related	Room equipped with video projector / board
5.2. seminar/laboratory-based	Room equipped with board

6. Specific competences to be acquired

Professional competences	*C4. The use of the theoretical basis of computer science and of formal models*
Transversal competences	-

7. Course objectives (as per the programme specific competences grid)

7.1 General objectives of the course	This course is designed to introduce students to various topics in probability and uncertainty that they will encounter in Computer Science theory. The concepts are illustrated with actual examples from the specialized literature. Exercises are designed to encourage the student to begin thinking about probability within a theoretical context. Today, the theory of probability has found many applications in science and engineering. In this course, the students will learn the basic terminology and concepts of probability theory and statistics.

7.2 Specific objectives of the course	The common goals for students in probability and statistics courses include: - becoming competent in the topics covered in the course, - demonstrating skills and attitudes which contribute to professional, ethical behavior, - the ability to communicate mathematically, in both written and verbal form, - learning to appreciate the beauty and utility of mathematics, define probability, outcome space, events, and probability functions. - using combinations to evaluate the probability of outcomes in coin-flipping experiments. - calculating the union of events and conditional probability. - applying Bayes's theorem to simple situations. - evaluating random processes governed by binomial, multinomial, geometric, exponential, normal, and Poisson distributions. - defining the law of large numbers and the central limit theorem.

8. Course contents

8.1 Course (learning units)	**Teaching methods**	**Remarks**
Field of events	*Lecture, conversation*	
Probability field	*Lecture, conversation*	
Rules for assigning and calculating probabilities	*Lecture, conversation*	
Classical probability distributions	*Lecture, conversation*	
Discrete random variables	*Lecture, conversation*	
Continuous random variables	*Lecture, conversation*	
Numerical characteristics of random variables	*Lecture, conversation*	
The characteristic function. Moment generating function	*Lecture, conversation*	
The law of large numbers for random variables. Limit theorems	*Lecture, conversation*	
Statistical selection theory	*Lecture, conversation*	
Glivenko's theorem. Kolmogorov's theorem	*Lecture, conversation*	
Estimation theory	*Lecture, conversation*	
Confidence intervals	*Lecture, conversation*	
Statistical hypothesis testing	*Lecture, conversation*	

References

1. Wackerly , D., Mendenhall, W., *Mathematical statistics with applications*, Thomson publ., 2016.
2. Lisei, N., *Probability theory*, Casa Cărţii de Ştiinţă, Cluj-Napoca, 2004.
3. Lisei, H., Micula, S., Soos, A., *Probability Theory trough Problems and Applications,* Cluj University Press, 2006.

Seminars	**Teaching methods**	
Field of events	*Exercises and problems*	
Probability field	*Exercises and problems*	
Rules for assigning and calculating probabilities	*Exercises and problems*	
Classical probability distributions	*Exercises and problems*	
Discrete random variables	*Exercises and problems*	

Continuous random variables	*Exercises and problems*	
Numerical characteristics of random variables	*Exercises and problems*	
The characteristic function. Moment generating function	*Exercises and problems*	
The law of large numbers for random variables. Limit theorems	*Exercises and problems*	
Statistical selection theory	*Exercises and problems*	
Glivenko's theorem. Kolmogorov's theorem	*Exercises and problems*	
Estimation theory	*Exercises and problems*	
Confidence intervals	*Exercises and problems*	
Statistical hypothesis testing	*Exercises and problems*	

References

1. Wackerly , D., Mendenhall, W., *Mathematical statistics with applications*, Thomson publ., 2016.
2. Lisei, N., *Probability theory*, Casa Cărţii de Ştiinţă, Cluj-Napoca, 2004.
3. Lisei, H., Micula, S., Soos, A., *Probability Theory trough Problems and Applications,* Cluj University Press, 2006.

9. Corroboration of course contents with the expectations of the epistemic community's significant representatives, professional associations and employers in the field

The accumulation by students of knowledge related to this discipline requires their preparation for the labor market, so that they can solve the problems that arise in practice by creating appropriate mathematical models.

10. Assessment

Activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	*Final evaluation*	*Written paper*	50%
10.5 Seminar/laboratory	*Continuous assessment*	*Tests during the semester*	50%
10.6 Minimum performance standard: Modelling and solving some medium complexity level problems, using the mathematical and computer sciences knowledge.			

Submission date	Course leader signature	Seminar tutor signature
25.09.2023	Aldea Mihaela	Aldea Mihaela

Date of approval by Department members	Department director signature
02.10.2023	Aldea Mihaela