SYLLABUS
PROBABILISTIC AND MATHEMATICAL STATISTICS

Academic year 2024-2025

Year of study I / Semester II

1. Information on academic programme

1.1. University	**„1 Decembrie 1918" of 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 / 2512/ Software developers** **Analyst 251201** **Computer System Programmer 251204** **Computer System Engineer 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	***25***
Documentation (library)	***23***
Home assignments, Essays, Portfolios	***29***
Tutorials	**-**
Assessment (examinations)	***6***
Other activities…….	**-**

3.7 Total number of hours for individual study	83
3.8 Total number of university activities	42
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	CP1 - analyze business processes: Study the needs and expectations of customers regarding a product or service to identify and resolve inconsistencies and possible disagreements of the interested parties involved. CP 2 - create data models: Use specific techniques and methodologies to analyze the data requirements of an organization's operational processes, to create models for these data, such as conceptual, logical and physical models. These models have a specific structure and format.
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*	2 hours
Probability field	*Lecture, conversation*	2 hours
Rules for assigning and calculating probabilities	*Lecture, conversation*	2 hours
Classical probability distributions	*Lecture, conversation*	2 hours
Discrete random variables	*Lecture, conversation*	2 hours
Continuous random variables	*Lecture, conversation*	2 hours
Numerical characteristics of random variables	*Lecture, conversation*	2 hours
The characteristic function. Moment generating function	*Lecture, conversation*	2 hours
The law of large numbers for random variables. Limit theorems	*Lecture, conversation*	2 hours
Statistical selection theory	*Lecture, conversation*	2 hours
Glivenko's theorem. Kolmogorov's theorem	*Lecture, conversation*	2 hours
Estimation theory	*Lecture, conversation*	2 hours
Confidence intervals	*Lecture, conversation*	2 hours
Statistical hypothesis testing	*Lecture, conversation*	2 hours

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*	1 hour
Probability field	*Exercises and problems*	1 hour
Rules for assigning and calculating probabilities	*Exercises and problems*	1 hour
Classical probability distributions	*Exercises and problems*	1 hour
Discrete random variables	*Exercises and problems*	1 hour
Continuous random variables	*Exercises and problems*	1 hour
Numerical characteristics of random variables	*Exercises and problems*	1 hour
The characteristic function. Moment generating function	*Exercises and problems*	1 hour
The law of large numbers for random variables. Limit theorems	*Exercises and problems*	1 hour
Statistical selection theory	*Exercises and problems*	1 hour
Glivenko's theorem. Kolmogorov's theorem	*Exercises and problems*	1 hour
Estimation theory	*Exercises and problems*	1 hour
Confidence intervals	*Exercises and problems*	1 hour
Statistical hypothesis testing	*Exercises and problems*	1 hour

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

Aldea Mihaela

Seminar tutor signature

Aldea Mihaela

Date of approval by Department members

Department director signature

Aldea Mihaela