COURSE SYLLABUS

University	UNIVERSITY OF ORADEA
Faculty	**FACULTY OF ENERGY ENGINEERING AND INDUSTRIAL MANAGEMENT**
Study program	***KNITTING AND CLOTHING TECHNOLOGY***

I. Course Name: PROBABILITY THEORY AND MATHEMATICAL STATISTICS

II. Course Details

	No of hours/week					
Code	Semester	Credits	Lecture	Seminar	Laboratory	Project
IEMI-0756	I	3	2	2	-	-

III. Course coordinator (title, name, surname, e-mail): Assoc. Prof. Dziţac Simona, simona@dzitac.ro

IV. Course objectives

- The main objective of the course is to build a solid theoretical and practical foundation in the field of probability and mathematical statistics, essential for the analysis and modeling of random phenomena, as well as for the interpretation and processing of experimental data.
- The lectures and seminars will cover fundamental concepts and methods of probabilistic and statistical computation at an accessible level, with examples and practical applications, preparing students for advanced specialty courses in subsequent years.
- Acquisition of basic concepts from probability theory, including classical schemes, random variables, and fundamental distributions.
- Development of skills in probabilistic computation and the application of statistical methods for analyzing and interpreting real data.
- Familiarization with the main techniques of parameter estimation and statistical hypothesis testing, using modern methods and software tools.
- Development of the ability to use modeling and simulation tools, construct statistical series, graphs, and meaningful interpretative reports.
- Cultivation of analytical thinking and the ability to make forecasts regarding the evolution of random phenomena.

V. Course content

V.1. Lecture (chapters/subchapters and paragraphs)	No. of hours
1. Fundamental concepts used in probabilities and mathematical statistics. Examples. Elements of crowd theory. Elements of combination analysis	2
2. Fundamental notions regarding the theory of probability. Introduction in the theory of probability; events field; probability field; conditioned probabilities; independent events; Bayes formula	2
3. Classical schemes of probability; Hypergeometric schemes, geometric scheme, Bernoulli's scheme, Poisson's scheme. Examples;	2
4. Random variables (stochastic): Discrete Random Variables: Distribution Function Properties, Discrete Random Vectors, Classic Distributions of Discrete Random Variables, Operations with Discrete Random Variables. Examples; Continuous Random Variables: Distribution Function Properties, Classic Distributions of Continuous Random Variables. Examples; Numerical characteristics of random variables Grouping Features & Scatter Features. Examples; Random vectors continue	6
5. Types of convergence. The laws of large numbers. The theorem of central limit.	2
6. Elements of mathematical statistics: definition, statistic population, statistic variable, statistic indicators, statistic series.	4
7. Notions and concepts of the theory of selection: survey, selection operation, selection variables, the value of the selection function, selection dispersion, Glivenko theorem, Kolmogorov theorem. Examples	2
8. Notions and concepts of the theory of estimation: estimation of parameters, the consistent estimator of the parameter, distortion. Examples	2
9. Statistic methods of processing: the method of maximum credibility, the method of moments, the method of the smallest squares, the method of linearity, the method of trust intervals. Examples	2

10. Assessment tests for the statistic hypotheses: notions, χ^2 test, Kolmogorov test, T test. Examples	2
11. Correlation and regression: definitions; Examples	2
V.2. Laboratory/Seminar/Project:	
Seminar	
1. The probability calculus with the help of definitions and event operations. The probability calculus using classical schemes and operations with discrete random variables.	8
2. The calculus of the main statistic indicators. Creating charts in Excel.	4
3. Applications with statistic series	4
4. Ways to use the empirical characteristics. Applications in the theory of selection. Following the main stages.	2
5. Applications in the theory of estimation. Practical methods of estimation. Finding and using certain efficient estimation functions.	2
6. Applications in the assessment of the statistic hypotheses. Following the stages of some tests for the given practical examples.	2
7. Modelling and simulating applications for the probabilistic and statistic calculus	4
8. Check during the semester	2

VI. Bibliography

Bibliografie
1. Beganu G., Teoria probabilităţilor şi statistică matematică, Editura Meteor Press, 2004;
2. Butaci Casian, Simona Dziţac, Ioan Dziţac, Gabriela Bologa, Prudent decisions to estimate the risk of loss in insurance, Technological and Economic Development of Economy, Volume 23, 2017 - Issue 2, Pages 428-440, ISI;
3. Chiruţa C., Elemente de matematică - Programare liniară şi statistică matematică, Ed.Ion Ionescu de la Brad, Iaşi, 2019;
4. Dziţac Simona, Probabilităţi şi statistică matematică, Editura Universităţii Aurel Vlaicu Arad, ISBN 978-973-752-533-8, 166 pagini, 2010;
5. Dziţac Simona, Probabilităţi şi statistică matematică – Ediţie revizuită / format electronic, 2021;
6. Simona Dzitac, Ramona Simut, Daniel Badulescu, Ciprian Simut, Alina Badulescu, The role of education and digitalization in tourism development: Evidence for the European Union, Technological and Economic Development of Economy, ISSN: 2029-4913 / eISSN: 2029-4921, https://doi.org/10.3846/tede.2025.24388, Volume 31, Issue 4, page 1181–1205, 2025, factor impact: 3,9, ISI;
7. Ramona Simut, Simona-Aurelia Bodog, Alina Badulescu, Daniel Badulescu, Simona Dzitac, Mariana Sehleanu, Exploring the Nexus between Innovation and Economic Growth. Empirical Evidence from European Countries, Journal of Economic Computation And Economic Cybernetics Studies And Research, Vol. 59, Issue 1/2025, pp.52-67, DOI: 10.24818/18423264/59.1.25.04, factor de impact 1, ISI;
8.Dziţac Ioan, Seremi Liliana, Dziţac Simona, etc, Matematici speciale/Elemente de algebră, Geometrie analitică, Probabilităţi, Ed Universităţii din Oradea, ISBN 973-613-044-4 (2001), 247 pag.;
9. Ravish Kumar, Seshadhri Srinivasan, G. Indumathi, Simona Dzitac, A Communication Viewpoints of Distributed Energy Resource, Soft Computing Applications (SOFA 2016), Advances in Intelligent Systems and Computing, vol 633. Springer, Cham vol 633, Springer, Cham, Online ISBN 978-3-319-62521-8, Print ISBN 978-3-319-62520-1, First Online: 02 September 2017, pp.107– 117, https://doi.org/10.1007/978-3-319-62521-8_10, Published: 2018, Proc ISI;
10. Petrişor Emilia, Probabilităţi şi statistică. Aplicaţii în economie şi inginerie, Editura Politehnica, 2003;
11. Simo A.; Dzitac S.; Dzitac D. (2022). First Responders' Localization and Health Monitoring During Rescue Operations, International Journal of Computers Communications & Control, 17(1),4665, 2022, https://doi.org/10.15837/ijccc.2022.1.4665, factor impact: 2,635, ISI;
12. Waleh John, An Introduction To Probability Theory And Mathematical Statistics, 2019, An Introduction To Probability Theory And Mathematical Statistics PDF Book - Online Library (diannefeinstein.org);
13. Readings | Introduction to Probability and Statistics | Mathematics | MIT OpenCourseWare, 2014

VII. Grading criteria

Activities	Assesment	% of final grade
Exam	• Knowledge required for a grade of 5: minimal level, covering the essential topics presented in the course. • Knowledge required for a grade of 10: correct and complete answers	50%

	to 5 questions selected from the full list provided in advance.	
Seminar/Laboratory/Project	Seminar: • Knowledge required for a grade of 5: minimal level, with correct solutions to the basic problems discussed in the seminar. • Knowledge required for a grade of 10: application of knowledge by solving 3 representative applications in the written exam; assessment of involvement throughout the semester; alternatively, the presentation of a report on assigned topics or the completion/submission of 4 integrative assignments covering the entire seminar content.	30% 20%

VIII. Learning outcomes:
- Correct acquisition of the terminology specific to probability and statistics, knowledge of the fundamental theoretical concepts, and their application in solving basic statistical exercises and case studies.
- Mastery of quantitative methods and techniques for analyzing random and economic phenomena, along with the ability to correctly apply the acquired competencies in practice.
- Development of the ability to solve practical applications, use software tools for statistical computation, and construct and interpret statistical graphs and reports.
- Understanding and correct application of statistical reasoning in the analysis and interpretation of data.

Course coordinator,
Assoc. Prof. Dziţac Simona