Mathematics and statistics (Ist YEAR, IInd SEMESTER)

Credit value (ECTS) 5

Course category
Domain (Imposed)

Course holder:
Lecturer Ciprian CHIRUȚĂ PhD

Discipline objectives (course and practical works)

Becoming familiar with the main types of issues and approaches in mathematics and applying mathematical concepts in economics and agriculture.

Mathematical modeling of practical problems commonly used in biological and agricultural research and learning the laws of probabilityes and optimization techniques.

Acquiering skills for the use of rigorous reasoning and individual study skills;

Forming a systemic point of view on the fiel and apparatus of Mathematics.

Acquiering the computation skills necessary for the mastering of the mathematical reasoning in using statistic tests;

Understanding the probability theory and linear programming notions using appropriate practical examples;

Applying the given theoretical concepts in order to solve specific problems and modeling processes.

Knowledge of statistical research methods in the field and their application in the profile disciplines.

Acquiring mathematical programming (linear) models.

Contents (syllabus)

Course (chapters/subchapters)
Elements of abstract algebra
Vector spaces, linear dependence and independence, generators' system, base of a space vector, change of coordinates of a vector when moving from one basis to another, substitution lemma, substitution lemma applications.
Linear transformations, matrix associated to a linear transformations, nucleus and image of a linear transformation, eigenvalues and eigenvectors.
Elements of linear programming
Examples leading to linear programming problems. Graphical method for solving linear programming problems.
The simplex method for solving linear programming problems.
Description of the simplex algorithm; The two-phased method
Probability theory elements
Events. Operations with events. Probabilities. Conditional probabilities. Formulas for calculating probabilities.
Classical probability schemes, discrete and continuous random variables. Operations with random variables. The distribution function of a random variable. Typical values of a random variable. Covariance.

Discrete distributions. Continuous distributions.
Elements of statistics
Organization and describing data. Grouping and graphic reprezentations of the statistical series, Numerical characteristics of statistical series, absolute frequency, relative frequency, cumulative frequencies. Regression, correlation method.
Estimation theory. Estimates point. Estimates by confidence intervals.
Statistical tests.

Practical works
Matrices and determinants, matrix operations.
Systems of linear equations, the Gauss method, the Gauss Jordan method, the inverse of a matrix.
Independent linear system, dependent linear system, generators' system, basis, change of vector coordinates in the transition from one basis to another.
Linear transformations, matrix associated to a linear transformations, nucleus and image of a linear transformation, eigenvalues and eigenvectors.
Solving linear programming problems by the graphical method
Using the primal simplex algorithm to determine the optimal solution of a linear programming problem,
Solving linear programming problems by the method of two phases. Transportation problems.
Events, operations, probabilities, conditional probabilities, total probability formula, Bayes' formula.
Classical probability schemes (Bernoulli, Poisson, Hypergeometric, generalized)
Random variables. The distribution function of a random variable. Numerical characteristics of random variables: mean, median, modal value, quintiles, simple and centered time, amplitude, dispersion, standard deviation, Pearson coefficient of variation, Fisher asymmetry coefficient, kurtosis and flattening.
Graphical representation of statistical series, absolute frequencies, relative (cumulative)
Regression, correlation method.
Confidence intervals, Student test.

Bibliography

1. Aldea Florica, *Matematici aplicate în ştiinţele agricole şi silvice*, Editura Risoprint, Cluj Napoca, 2006.
2. Bunu I. coord. colectiv de autori, *Matematici economice*, Departamentul Editorial Poligrafic al Academiei de Studii Economice a Moldovei, Chişinău, 2012.
3. Burdujan I., *Elemente de algebră cu aplicaţii în biologie*, Ed. Pim, Iaşi, 2006.
4. Diaconiţa V., Spînu M., Rusu Ghe., *Matematici aplicate în economie*, Ed. Sedcom Libris, Iaşi, 2004.
5. Jaba Elisabeta, *Statistică* - ediţia a doua - Editura Economică, Bucureşti, 2000.
6. Jaba Elisabeta, *Statistică descriptivă - manual pentru învăţământ deschis la distanţă*, Ed. Univ. Al. I. Cuza, Iaşi, 2005.
7. Jaba Elisabeta, Pintilescu Carmen, *Statistică - teste grilă şi probleme*, ediţia a doua, Ed. SedcomLibris, Iaşi, 2007.
8. Diaconiţa V., Spînu M., Rusu Ghe., *Matematici aplicate în economie - Teste grilă*, Ed. Sedcom Libris, Iaşi, 2004.
11. Burtea M., Burtea Georgeta, *Matematică, clasa a X-a*, Ed. Carminis, Piteşti, 2005.
12. **Chiruţă C.**, *Elemente de matematică. Programare liniară şi statistică matematică,* Editura „Ion Ionescu de la Brad" Iasi, 2019.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	Oral and written examination	10%+60%
Appreciation of the activity during the semester	Oral assessment during the semester and written verification test.	30%

Contact

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