MATHEMATICS (Horticulture and Landscape architecture, Ist YEAR, Ist SEMESTER)

Credit value (ECTS): 4

Course category: mandatory

Course holder: Lect. PhD. Emilian BULGARIU

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
Adjusting the data to a series of statistical 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. covariance
Graphical representation of statistical series, absolute frequencies, relative (cumulative)
Adjusting a series of statistical data (linear, polynomial adjustment)
Confidence intervals, Student test

Bibliography

1. **Burdujan I**.-*Elemente de matematici cu aplicaţii în Biologie,* Ed.Vasiliana'98, Iaşi 2001.
2. **Ciucu G., Craiu V.** - *Teoria estimaţiei şi verificarea ipotezelor statistice,* EDP, Bucureşti, 1971.
3. **Craiu V.** - *Verificarea ipotezelor statistice,* EDP Bucureşti, 1972.
4. **Stoleriu I.,** - *Statistică prin Matlab,* Ed. Matrixrom, Bucureşti, 2010.
5. **Mihoc Gh., Ciucu Gh., Craiu V.** - *Teoria probabilităţilor şi statistica matematică,* EDP Bucureşti, 1970.
6. **Snedecor** G.W. - *Metode statistice aplicate în cercetările din agricultură,* EDP, Bucureşti, 1968.
7. **Chiruță C.,** *Elemente de matematică - Programare liniară și statistică matematică,* Ed. Ion Ionescu de la Brad, iași, 2019

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Course	Exam	70%
	presence	10%
Practical works	Tests + cours and practical	20%

Contact
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