## FACULTATEA C.S.I.E.

## DEPARTAMENTUL DE MATEMATICI APLICATE

Tematica aferentă concursului privind ocuparea postului didactic de conferențiar universitar poziția nr. 10 din Statul de funcții al Departamentului de Matematici Aplicate, pentru semestrul al II-lea, anul universitar 2022-2023

- 1. Series of real numbers: definitions, convergence criteria. Applications to financial calculus.
- 2. Series of functions. Power series expansion for functions of one variable.
- 3. Functions of more than one variable: limits, continuity, partial derivatives, differentiability, higher order differentials. Applications in economics.
- 4. Extreme local points for functions of more than one variable. Extreme points with conditions. Lagrange multipliers method. Applications in economics.
- 5. Improper integrals: integrals on unbounded domain, integrals from unbounded functions, Euler integrals. Applications.
- 6. Double integral. Calculation method. Transformation from Cartesian to polar coordinates.
- 7. Differential equations of first order. Equations with separable variables. Homogeneous equations. First order linear equations. Bernoulli equations. Examples from the financial field.
- Introduction to probability theory. Operations with events. Probability. Properties. Calculus formulae. Conditional probability. The total probability formula and the Bayes formula. Applications in economics.
- Random variables: definition and properties. Discrete and continuous random variables. Operations with random variables. Distribution function, survival function, hazard rate, properties. Functions of random variables. Applications in finance and insurance.
- Numerical characteristics associated with random variables. Quantiles. Risk measures. Applications to finance and insurance.
- The characteristic function and the moment-generating function of a random variable. Properties. Applications.

- 12. Classic, discrete and continuous distributions. Applications to the modeling of economic phenomena.
- Discrete two-dimensional random variables. Conditional distributions, conditional moments. Covariance and correlation coefficient of two random variables. Properties. Applications in economics.
- 14. Statistical methods of estimating parameters in random economic phenomena. Point estimators (method of moments, maximum likelihood). Unbiased, absolute correct and efficient estimators.
- 15. Confidence intervals for the parameters of normal distribution. Examples.

## Bibliografie

- 1. Cenușă, Gh., Raischi, C. et al. Matematici pentru economiști, Editura CISON, 2000.
- 2. Chiang, A.C. Fundamental methods for mathematical economics, McGraw Hill, 1984.
- 3. Simon, K., Blume, L., Mathematics for economists, W.W. Norton&comp., New York, 1994.
- 4. Tudor, M., Mircea, I., Sibiceanu, M., Probabilități, Statistică și aplicații, Editura ASE, 2009.
- 5. Boboc, N., Analiza matematică (vol. I și II), Editura Universității București, 1999.
- 6. Florescu, I., Tudor, C.A., Handbook of Probability, Wiley, 2013.

7. Panjer, H., *Operational Risk: Modeling Analytics*, Wiley Series in Probability and Statistics, 2006.