NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ECONOMICS AND STATISTICAL ENGINEERING

STATISTICAL ENGINEERING PROGRAM

ES411 – PROBABILITIES II

I. GENERAL INFORMATION

CODE	**:**	ES411 Probabilities II
SEMESTER	**:**	2016 - I
CREDITS	**:**	3
HOURS PER WEEK	**:**	5 (2 Theory – 3 Practice)
PREREQUISITES	**:**	ES 312, EC 314
CONDITION	**:**	Mandatory

II. COURSE DESCRIPTION

The course includes: Random Vectors, Random Vector Distribution, Properties; Marginal and Conditional Distributions independence: Theorems and propositions; Random Vector Distributions; The Jacobian method; expectancy for Random Vector Functions; Convergence Theorems; Distribution and conditional expectancies; Weak Law and Strong Law of Big Numbers, Succession of Events and Borel Cantelli's Motto. Function characteristics of a vector Random; Convergence in distribution; The Central Limit Theorem for Succession of Random Variables.

III. COURSE OUTCOMES

The student:

1. Organizes data for its proper analysis and interpretation and calculates and interprets its fundamental statistical properties (mean value and variance).
2. Explains and determine the probability of events and random variables, as well as their probability density function.
3. Understand and apply random vectors and determine their joint probability density function.
4. Interprets the concept of sample distribution and applies it to calculate the probability of an event or variable.
5. Constructs linear regression models to represent the relationship between the representative parameters of a data set.

The subject :

6. Strengthen the student in the techniques of calculating Multivariate distributions.
7. To consolidate in the student Techniques of calculation in Transformation of random variables.
8. Reinforce distributional theories, convergence in probability and near-convergence.

IV. LEARNING UNITS

Sampling and Distributions

Introduction and entrance test. Random Vector Distribution: Random Variable Independence, Random Variable Transformation. Statisticians of Order. Integral Transformation of Probabilities. Expectancy for Random Vector Functions.

Function Features
Function Features. Theorems of Convergence.

Distributions and Conditional Expectancies
Conditional distribution of X. Poisson process. Formal Definitions and Definitions of Theorems of Existence of Conditional Distribution. Substitution Principle for Conditional Distribution. Principle of Conservation of Relative Odds. Continuation of the Principle of Conservation of Relative Odds.

Law of Large Numbers and the Central Limit Theorem
Conditional expectancy. Properties of Conditional Expectancy. Substitution Principle for Conditional Expectancy. Inequality - Cauchey - Shawarz. Law of the big numbers. Convergence in Probability and Convergence almost certain. Weak Law of Large Numbers. Succession of Events and the Theorem of Borel Cantelli. Central Limit Theorem for succession of random variables and examples.

V. BIBLIOGRAPHY

1. Karrs. A.F, (1993) Probability Springer.
2. Barrey R. James, (1981) Probability: A course in intermediate level. Rio de Janeiro: Institute of Pure and Applied Mathematics, IMPA.
3. George G. Roussas, " A First course in mathematical Statistics", John Wily & Sons.
4. H.T. Nguyen G.S Rogers, (1989) "Fundamentals of Mathematical Statisctis" Volumen I y II Springer Verlag.
5. V.K. Rohatgi (1976) An Introduction to Probability theory and Mathematical Statistics. John Wiley & Sons.
6. Robert V. Hogg & Allen T. Craig. (1978) Introduction to mathematical statistics. Fourth Edition, Macmillan Publishing co., Inc. New York.