

Planning and Quality Assurance Affairs

Form (A)

Course Specifications

General Information

Course name	Statistical Theory
Course number	STAT3310
Faculty	
Department	
Course type	Major Needs
Course level	3
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

- 1 - Identifying joint probability distributions for two random variables or more
- 2 - Being able to find the probability distribution function and probability density function and conditional and marginal probability density of the variables from the joint probability density
- 3 - Transferring the random variable to another random variable and calculate the probability density function of the new random variable with which a relationship exist
- 4 - Transferring two random variables to two new random variables through a relationship with these two variables
- 5 - Ability to compute the central and non-central moments for a random variable, the expected value, the variance and covariance of random variables, the correlation coefficient between two random variables, as well as the moments generating function and the characteristic function
- 6 - Ability to prove the Central Limit Theory, and undersatnd its applications on large samples
- 7 - Ability to prove the chi-squared, t and F distributions and their applications on small samples

Intended Learning Outcomes

Knowledge and Understanding	<ul style="list-style-type: none"> * Learning the various probability distributions and their relationship to one another and how to connect them to each other * Learn how to deal with moments and the Expectation operator and how to find the moments for a function of a random variable and its moment generating function * Understanding the foundations of data analysis in the case of large samples * Understanding the foundations of data analysis in the case of small samples
Intellectual Skills	<ul style="list-style-type: none"> * Using the principles of calculus and mathematics and linear algebra to analyze and prove the statistical theory and application rules * Linking the statistical theory with practical situation and Applied Statistics * Distinguishing various probability distributions and linking them to statistical variables and phenomena in real life
Professional Skills	<ul style="list-style-type: none"> * Distinguishing between various probability distributions and their conditions and statistical methods that can be used in practical situations * Distinction between methods of statistical analysis used in the cases of large samples and small samples

Course Contents

<ol style="list-style-type: none"> 1 - Joint probability distributions of two variables or more 2 - Transformation of random variables (the Jackobian transformation) 3 - The Central Limit Theory and Analysis of Large Samples 4 - Random variables that can be used in small sample sizes and their distributions 5 - The Moments of random variables

Teaching and Learning Methods

<ol style="list-style-type: none"> 1 - Lecturing 2 - Discussion 3 - Homework

Teaching and Learning Methods for the Disabled Students

1 - NA

Students Assessment

<u>Assessment Method</u>	<u>TIME</u>	<u>MARKS</u>
Midterm Exam	8th Week	30
Homework	All weeks	10
Final Exam	16th week	60

Books and References

Course note	Course notes and homework sheets offered by the Lecturer
Essential books	Hogg, R.V and Craig A.T. ; " Introduction to Mathematical Statistics " ; 6th ed. , Macmillan Publishing Co. Inc. , New York ; 2002
Recommended books	Freund , J.E. & Walpole , R.E. ; " Mathematical Statistics " ; 3rd ed. ; Prentice/ Hall International Editions , 1980 . Bickel , P.J. and Doksum , K.A. ; " Mathematical Statistics: Basic Ideas and Selected Topics " ; Holden Day Inc.; Oaklan, California , 1977.

Knowledge and Skills Matrix

Main Course Contents	Study Week	Knowledge and Understanding	Intellectual Skills	Professional Skills	General Skill
Review of Probability Theory	1	Learning the various probability distributions			
Joint probability distributions of two variables or more	2-4	Learning the various probability distributions and their relationship to one another and how to connect them to each other	Using the principles of calculus and mathematics and linear algebra to analyze and prove the statistical theory and application rules	Distinguishing between various probability distributions and their conditions and statistical methods that can be used in practical situations	
Transformation of random variables (the Jackobian transformation)	5-7	Learning the various probability distributions and their relationship to one another and how to connect them to each other	Using the principles of calculus and mathematics and linear algebra to analyze and prove the statistical theory and application rules	Distinguishing between various probability distributions and their conditions and statistical methods that can be used in practical situations	
The Moments of random variables	8-11	Learn how to deal with moments and the Expectation operator and how to find the moments for a function of a random variable and its moment generating function			
The Central Limit Theory and Analysis of Large Samples	12-13	Understanding the foundations of data analysis in the case of large samples	Linking the statistical theory with practical situation and Applied Statistics	Distinguishing between various probability distributions and their conditions and statistical methods that can be used in practical situations	
Random variables that can be used in small sample sizes and their distributions	14-15		Distinguishing various probability distributions and linking them to statistical variables and phenomena in real life	Distinction between methods of statistical analysis used in the cases of large samples and small samples	Distinction between methods of statistical analysis used in the cases of large samples and small samples

Final Exam	16				
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