

Planning and Quality Assurance Affairs

Form (A)

Course Specifications

General Information

Course name	Mathematical Statistics
Course number	MATH4322
Faculty	
Department	
Course type	Major Needs
Course level	4
Credit hours (theoretical)	3
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

- 1 - To understand sampling distributions and its importance in different disciplines
- 2 - To construct point and interval estimators for the parameters.
- 3 - To determine the properties of point estimators and evaluate their goodness
- 4 - To perform hypothesis testing and calculate the probabilities of Type I, Type II errors and p-value.
- 5 - To conduct and interpret the regression analysis
- 6 - To understand, implement and interpret a simple non-parametric tests
- 7 - To apply inferential procedures on real-world problems

Intended Learning Outcomes

Knowledge and Understanding	* Understand the meaning of sampling distribution, know the popular sampling distributions. * Understand what inferential statistics are used for. * Understand the central limit theorem. * Know the methods of obtaining point estimators and their properties. * Understand the difference between a point and interval estimate * Define null hypothesis, alternative hypothesis, level of significance, test statistic, p value, statistical significance, Type I error and Type II error, and the power of test * Understand the general meaning of non-parametric methods and when they might be used
Intellectual Skills	* Differentiate between probability and sampling distributions * Differentiate between parametric and non-parametric statistics * Interpret the confidence intervals. * Compare between the estimators based on their properties * Appreciate some practical problems associated with statistical inference
Professional Skills	* Implement the central limit theorem * Obtain the point and interval estimation. * Determine the most appropriate sample size * Conduct the test of hypothesis * Obtain the most powerful critical region. * Build regression models for real-world problem.
General Skill	* Appreciate the advantages of using computers in the statistical analysis of data * Communicate with statistical results * Making decisions * Team work

Course Contents

1 - Sampling distribution
2 - Point and Interval Estimation
3 - Test of hypothesis
4 - Regression analysis
5 - Non parametric statistics

Teaching and Learning Methods

1 - Lectures
2 - Discussion
3 - Solving problems and exercises
4 - Applications on computer using statistical software packages.

Students Assessment

<u>Assessment Method</u>	<u>TIME</u>	<u>MARKS</u>
First mid-term exam	Week 8	30%
Second mid-term exam / Quizzes	Week 12	10%
Homework and project reports	Week 13 and 14	10%
Final exam	Week 16	50%

Books and References

Course note	Abuzaid, A. H. (2014). Mathematical Statistics, Department of Mathematics, Al Azhar University-Gaza
Essential books	I. Miller, M. Miller, John E. Freunds Mathematical Statistics (6th Edition), Prentice Hall, 2003.
Recommended books	R. E. Walpole, R. H. Myers, S. L. Myers, Probability and Statistics for Engineers and Scientists, Prentice Hall College, 1997.

Knowledge and Skills Matrix

Main Course Contents	Study Week	Knowledge and Understanding	Intellectual Skills	Professional Skills	General Skill
Sampling distributions	3	Understand the meaning of sampling distribution, know the popular sampling distributions. Know the law of large numbers.	Differentiate between probability and sampling distributions.	Implement the central limit theorem.	Appreciate the advantages of using computers in the statistical analysis of data
Point and Interval Estimation	3	know the methods of obtaining point estimators (moments and maximum likelihood methods). Understand the properties of point estimators.	Compare the performance of two or more estimators. Interpret the confidence intervals.	Obtain the estimates of parameters. Estimate the proper sample size.	Solving problems
Test of hypothesis	3	Define null hypothesis, alternative hypothesis, level of significance, test statistic, p-value, statistical significance, Type I error and Type II error and the power of test	Appreciate the effect of level of significance in hypothesis testing. Interpret the p-value	Conduct the test of hypothesis. Obtain the most powerful critical region. Construct the likelihood ratio tests.	Making decision Solving problems
Regression analysis	2	Know the simple and multiple linear regression. Understand the least square method. Know the coefficient of determination.	Interpret the parameters of regression models.	Build the regression model	Solving problems
Non parametric statistics	2	Understand the general meaning of non-parametric methods and when they might be used	Differentiate between parametric and non-parametric statistics	Conduct the hypothesis testing based on non-parametric tests	Solving problems