



## Course Specifications

<b>Course Title:</b>	NONPARAMETRIC STATISTICAL METHODS
<b>Course Code:</b>	STAT 333
<b>Program:</b>	Statistics
<b>Department:</b>	Statistics and Operations Research
<b>College:</b>	Science
<b>Institution:</b>	King Saud University

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## A. Course Identification

<b>1. Credit hours:</b> 3(2+0+2)
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> Level 4 / Year 2
<b>4. Pre-requisites for this course (if any):</b> STAT 105
<b>5. Co-requisites for this course (if any):</b>

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	15
2	Laboratory/Studio	15
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours*</b>		
1	Study	40
2	Assignments	
3	Library	20
4	Projects/Research Essays/Theses	40
5	Others(specify)	
	<b>Total</b>	<b>100</b>

\*The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Nonparametric statistical methods is a course on distribution-free statistical methods, dealing mostly with testing procedures that are not based on a normal-distribution assumption. The course contains a various topics and techniques of non-parametric statistics. The main topics are: Kolmogorov–Smirnov one-sample test, Wilcoxon signed rank and the sign test, Confidence interval for the Wilcoxon signed rank test, Mann–Whitney U-test and the Kolmogorov–Smirnov two-sample test, The Friedman test, Kruskal–Wallis H-test, Spearman rank-order, Point-Biserial, and Biserial correlations,  $\chi^2$  Goodness-of-Fit Test (Category Frequencies not equal), The  $\chi^2$  test for independence, performing the  $\chi^2$  test for independence, Fisher exact test and test for randomness. Performing all non-parametric methods using statistical packages.

### 2. Course Main Objective

The aim of this course is intended to provide a conceptual and procedural approach for non-parametric statistics, obtain knowledge about the basic concepts of nonparametric statistical inference, learn about nonparametric testing procedures and use these nonparametric procedures for analyzing data, and this by using statistical software packages. By the end of this course, student will be able to:

1. Distinguish parametric and nonparametric test procedures.
2. Provide familiarity with non-parametric methods of analysis for a variety of situations.
3. Explain commonly used nonparametric test procedures.
4. Perform hypothesis tests using nonparametric procedures.
5. Perform the non-parametric tests using statistical software packages.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Knowledge of essential steps in non-parametric statistical techniques.	K4
1.2	Memorizing statistical methods and techniques in non-parametric tests.	K2
1.3	Distinguishing between different statistical methods and techniques.	K3
2	<b>Skills :</b>	
2.1	Ability to the capability of choosing the appropriate statistical methods for a particular application from nonparametric tests.	S2
2.2	Formulate significant research questions, use appropriate nonparametric statistical tests, applying the right statistical methods and techniques to answer given questions, analyze, and interpret the results.	S4
2.3	Statistically interpreting results and drawing conclusion.	S2

CLOs		Aligned PLOs
<b>3</b>	<b>Values:</b>	
3.1	Ability to write professional statistical report.	C2
3.2	Using advance and professional statistical software.	C3

### C. Course Content

No	List of Topics	Contact Hours
1	Introduction, review of some parametric tests, the nonparametric statistical procedures.	2
2	Testing data for normality: Describing data and the normal distribution, computing and testing kurtosis and skewness for sample normality, Examining skewness and kurtosis for normality using statistical software packages.	2
3	The Kolmogorov–Smirnov one-sample test, performing the Kolmogorov–Smirnov one-sample test using statistical software packages.	2
4	Comparing two related samples: The Wilcoxon signed rank and the sign test: Confidence interval for the Wilcoxon signed rank test, performing the Wilcoxon signed rank test and the sign test using statistical software packages.	3
5	Comparing two unrelated samples: The Mann–Whitney U-test and the Kolmogorov–Smirnov two-sample test, performing the Mann–Whitney U-Test and the Kolmogorov–Smirnov two-sample test using statistical software packages.	3
6	Comparing more than two related samples: The Friedman test, performing the Friedman test using statistical software packages.	4
7	Comparing more than two unrelated samples: the Kruskal–Wallis H-test, performing the Kruskal–Wallis H-test using statistical software packages.	4
8	Comparing variables of ordinal or dichotomous scales: Spearman rank-order, Point-Biserial, and Biserial correlations, performing the Spearman rank-order correlation, the Point-Biserial correlation and the Biserial correlation using statistical software packages.	3
9	The $\chi^2$ Goodness-of-Fit Test (Category Frequencies not equal), performing the $\chi^2$ goodness-of-Fit test using statistical software packages.	3
10	The $\chi^2$ test for independence, performing the $\chi^2$ test for independence using statistical software packages.	2
11	The Fisher exact test, computing the Fisher exact test for $2 \times 2$ tables, performing the Fisher exact test using statistical software packages.	2
<b>Total</b>		<b>30</b>

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Knowledge of essential steps in non-parametric statistical techniques.	Lecture	Written Exam
1.2	Memorizing statistical methods and	Lecture	Written Exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	techniques in non-parametric tests.		
1.3	Distinguishing between different statistical methods and techniques.	Lecture	Written Exam
<b>2.0</b>	<b>Skills</b>		
2.1	Ability to the capability of choosing the appropriate statistical methods for a particular application from nonparametric tests.	Lecture+ Laboratory/Studio	Written Exam and Oral presentations
2.2	Formulate significant research questions, use appropriate nonparametric statistical tests, applying the right statistical methods and techniques to answer given questions, analyze, and interpret the results.	Lecture+ Laboratory/Studio	Written Exam and Oral presentations
2.3	Statistically interpreting results and drawing conclusion.	Lecture+ Laboratory/Studio	Written Exam
<b>3.0</b>	<b>Values</b>		
3.1	Ability to write professional statistical report.	Lecture	Written Exam
3.2	Using advance and professional statistical software.	Laboratory/Studio	Written Exam

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First Midterm Exam	11	30 %
2	Quizzes	5,7,9	30 %
3	Final Exam	16	20%
4	Bonus		20%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

For at least two hours a week, faculty and teaching staff are available to provide student consultations and academic advice.

## F. Learning Resources and Facilities

### 1.Learning Resources

<b>Required Textbooks</b>	Nonparametric statistics: A step-by-step approach, Gregory W. Corder. Dale I. Foreman , Second edition, John Wiley & Sons, Inc., Hoboken, New Jersey, 2014.  Myles Hollander, Douglas A. Wolfe, Eric Chicken-Nonparametric
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	Statistical Methods-John Wiley & Sons (2014)
<b>Essential References Materials</b>	Introduction to modern nonparametric statistics, James, J. Higgins, Thomson, Books/Cole 2004  Practical Nonparametric Statistics. W. J. Conover, John Wiley & Sons, 3rd edition, 1999.
<b>Electronic Materials</b>	Web Sites
<b>Other Learning Materials</b>	

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom and computer lab
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	SPSS Statistical Software
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students	Indirect (Survey)
Quality of learning resources	Students	Indirect (Survey)
Achievement of course learning outcomes	Faculty	Direct (Oral presentations + Written exam)

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	Course instructor/ <b>Dr. Walid Emam</b>
<b>Reference No.</b>	
<b>Date</b>	1/5/2021