Course Specification

(Bachelor)

Course Title:	**Principles of Statistics 1**
Course Code:	**STAT111**
Program:	**Bachelor of Applied Statistics in Data Analysis**
Department:	**Basic Sciences**
College:	**Science and Theoretical Studies**
Institution:	**Prince Musaid bin Abdulrahman University (PMAU)**
Version:	**1**
Last Revision Date:	**10-1-2025**

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (2nd Level /1st year)					
4. Course general Description:					
This course introduces basic concepts of both descriptive and inferential statistics. Topics included are: - Variables and Types of Data, - Data Collection and Sampling Techniques, - Organizing and summarizing Data, - Measures of location and variability, - Probability, Random variables and sampling distributions, - Normal Distributions and The Central Limit Theorem, - Point and interval estimation single population parameter, - Hypothesis testing for a single population parameter.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Co-requisites for this course (if any)**:**					
No Co-requisites					
7. Course Main Objective(s):					
The purpose of this course is to introduce the basic concepts of descriptive and inferential statistics. Upon successful completion of the course, students should 1. Understand the definition of statistics, population, and sample. Understanding the concept of statistic and parameter. 2. Demonstrate the knowledge of statistical terms, Identify types of data and the measurement level for each variable. Identify the four sampling techniques and explain the difference between an observational and an experimental study. 3. Understand the basic statistical methodology of data analysis including; graphs, descriptive statistics, deducing measures of location and variability. 4. Determine sample spaces and find the probability of an event, using classical probability or empirical probability, Find the probability of compound events, using the addition and the multiplication rules. 5. Demonstrate the definition of the random variable, some discrete and continuous distributions. 6. Demonstrate the Point and interval estimates of single population parameter. Hypothesis testing for a single population parameter.					

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2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Demonstrate the knowledge of basic statistical terms, types of data and the levels of measurement for variables. Identify the different data collecting techniques	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Recognize measures of central tendency and dispersion	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
				• Final Exam
2.0	**Skills**			
2.1	Apply discrete probability distributions: Binomial and Poisson	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Understand continuous probability distributions, sampling distribution and the central limit theorem	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.3	Construct confidence intervals and testing hypothesis for single population parameter	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions •	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Apply the Concepts to hypothetical examples and real data	V1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.2	Use Excel software in solving statistical problems	V2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours

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1.	The Nature of Probability and Statistics	6
2.	Frequency Distributions and Graphs	6
3.	Data Description	6
4.	Probability and Counting Rules	6
5.	Discrete Probability Distributions	6
6.	The Normal Distribution	6
7.	Confidence Intervals and Sample Size	6
8.	Hypothesis Testing	3
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Bluman, A. (2014). Elementary Statistics: A step-by-step approach 9e. McGraw Hill.
Supportive References	Triola, M.F. (2011). Elementary statistics using theTI-83/84 Plus calculator. (3rdEdition). Pearson Education. ISBN:978-0-321-64148-9 (print version)
Electronic Materials	Blackboard Material https://drive.uqu.edu.sa/_/mskhayat/files/MySubjects/2017SS%20Elementary%20Statistics/Elementary%20Statistics.pdf
Other Learning Materials	Microsoft Excel and Minitab

2. Required Facilities and equipment

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Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms-online setting - Blackboard Collaborate.
Technology equipment (projector, smart board, software)	Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.
Other equipment (depending on the nature of the specialty)	Accessible related site E library. Digital Writing pad.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student-Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification

(Bachelor)

Course Title:	**Principles of Statistics 2**
Course Code:	**STAT121**
Program:	**Bachelor of Applied Statistics in Data Analysis**
Department:	**Basic Sciences**
College:	**Science and Theoretical Studies**
Institution:	**Prince Musaid bin Abdulrahman University (PMAU)**
Version:	**1**
Last Revision Date:	**10-1-2024**

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (2nd /1st year)					
4. Course general Description:					
This course introduces concepts of Inferences concerning the parameters of two populations, Inference about Simple linear regression. Design and analysis of experiment (one way and two-way), Contingency tables, Chi-square tests for goodness of fit and independence. One-Way Analysis of Variance, The Scheffé Test and the Tukey Test, Two-Way Analysis of Variance , and Introduction to nonparametric tests.					
5. Pre-requirements for this course (if any)**:**					
Principles of Statistics 1- STAT 111					
6. Co-requisites for this course (if any)**:**					
No Co-requisites					
7. Course Main Objective(s):					
Upon successful completion of the course, students should be able to 1. Demonstrate the knowledge of Hypothesis Test for the difference between two sample means for independent and dependent samples. Test the difference between two proportions and variances or standard deviations. 2. Demonstrate the knowledge of Drawing a scatter plot, Compute the correlation coefficient, the regression line and the coefficient of determination for a set of ordered pairs. 3. Demonstrate the knowledge of chi-square Test for goodness of fit, independence and homogeneity. 4. Use the one-way ANOVA technique to determine if there is a significant difference among three or more means. Use the two-way ANOVA technique to determine if there is a significant difference in the main effects or interaction. 5. State the advantages and disadvantages of nonparametric methods. Test hypotheses, using the sign test, the Wilcoxon rank sum test, the signed-rank test, the Kruskal-Wallis test and the runs test. Compute the Spearman rank correlation coefficient.					

2. Teaching mode (mark all that apply)

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No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Familiarize students with the use of Normal table, t-table, Chi-square table and F-table	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Recognize small-sample inference regarding some of the population parameters	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam
1.3	Demonstrate the knowledge of Hypothesis Tests and ANOVA tests	K4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
				• Exam Final Exam
2.0	**Skills**			
2.1	Apply the linear regression model on bivariate data	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Understand one way and two ways ANOVA	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.3	Familiarize students with contingency tables and Chi-square tests	S3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Use Statistical analysis software (Excel & Minitab)	V1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.2	Recognize some nonparametric methods	V2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam
...				

C. Course Content

No	List of Topics	Contact Hours

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1.	Testing the Difference Between Two Means, Two Proportions, and Two Variances	9
2.	Correlation and Regression	6
3.	Other Chi-Square Tests: Test a distribution for goodness of fit, Test two variables for independence, Test proportions for homogeneity	12
4.	Analysis of Variance: One-Way Analysis of Variance, The Scheffé Test and the Tukey Test, Two-Way Analysis of Variance	9
5.	Nonparametric Statistics	9
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Bluman, A. (2014). Elementary Statistics: A step-by-step approach 9e. McGraw Hill.
Supportive References	Triola, M.F. (2011). Elementary statistics using theTI-83/84 Plus calculator. (3rdEdition). Pearson Education. ISBN:978-0-321-64148-9 (print version)
Electronic Materials	Blackboard Material Link: https://drive.uqu.edu.sa/_/mskhayat/files/MySubjects/2017SS%20Elementary%20Statistics/Elementary%20Statistics.pdf
Other Learning Materials	1. Microsoft Excel; Minitab

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**

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Items	Resources
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification

(Bachelor)

Course Title:	**Calculus 1**
Course Code:	**MATH121**
Program:	**Applied Statistics in Data Analysis**
Department:	**Basic Sciences**
College:	**Science and Theoretical Studies**
Institution:	**Prince Musaid bin Abdulrahman University (PMAU)**
Version:	**1**
Last Revision Date:	**14.01.2025**

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A. General information about the course:

1. Course Identification

1. Credit hours: 3

2. Course type

A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		

3. Level/year at which this course is offered: (3rd Level/ 2nd Year)

4. Course general Description:

This course provides a foundational understanding of calculus, emphasizing functions, limits, continuity, derivatives and their applications covering L'Hospital's Rule, Rolle's Theorem, Relative Extrema and Mean Value Theorem . The course equips students with analytical tools to model and solve real-world problems in mathematics, engineering, and the sciences. Students will develop skills in graphing and problem-solving techniques.

5. Pre-requirements for this course (if any):

Fundamentals of Mathematics - MATH 001

6. Co-requisites for this course (if any):

None

7. Course Main Objective(s):

Upon successful completion of the course, students will be able to:

1. Analyze and graph different types of functions, including trigonometric, exponential and logarithmic functions.
2. Apply limit laws and concepts to evaluate the behavior of functions and determine continuity.
3. Build a foundational knowledge of differentiation and its rules, including the power, product, quotient and chain rules.
4. Understand and practice methods for finding derivatives of different types of functions such as polynomials, exponentials and trigonometric functions.
5. Understand how functions increase and decrease, represent these behaviors graphically and analyze the shape of the corresponding curve.
6. Apply derivatives to solve practical problems involving rates of change, optimization and curve sketching.

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2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	15
2.	**Virtual Lectures**	15
3.	**Field**	
4.	**Tutorial**	
5.	**Others: Interactive**	15
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Determine the existence of limits of functions and use the limit properties to evaluate them (with particular attention to indeterminate forms).	K1	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
1.2	Recognize infinite limits, compute limits at infinity, and interpret the behavior of a function in terms of its asymptotic lines.	K2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.3	Investigate the continuity of a function at a point and on intervals, distinguish between types of discontinuities, and apply properties of continuous functions.	K2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
2.0	**Skills**			
2.1	Evaluate the derivatives of a function using the limit definition and the differentiation rules, find the equation of the tangent line of the curve of a function at a point, and apply relevant results to solve optimization and word problems.	S1	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
2.2	Compute the derivative of inverse functions and implicit derivative of the equation of a curve.	S4	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Analyze and sketch the graph of a function by determining the asymptotic lines, extrema, intervals of monotonicity, inflection points and concavity.	V1	A portion of certain lectures will be dedicated to group discussions. Students will be organized into groups at least once a month to discuss specific topics related to the theoretical component.	• Assignments • Online Quizzes • Midterm Exam Final Exam
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C. Course Content

No	List of Topics	Contact Hours
1.	Functions – Functions and Their Graphs-Combining Functions– Shifting and Scaling Graphs-Trigonometric Functions-Exponential Functions - Inverse Functions and Logarithms.	9
2.	Limit of a function – Calculating limits using the limit laws – The precise definition of limits – Limit techniques.	6
3	Continuity – Properties of Continuity – Limits at infinity; horizontal and vertical asymptotes.	6
4	Derivatives and rates of change – Differentiation by definition – The Relationship between Differentiation and Continuity – Differentiation Laws – Derivative of Trigonometric and Inverse Trigonometric Functions – Derivative of Hyperbolic and Inverse Hyperbolic Functions – Logarithmic and Exponential Functions – Determining the nth derivatives	12
5	Using the first derivative to study increasing and decreasing functions – Chain Rule – Implicit Differentiation.	3
6	L'Hospital's Rule – Rolle's Theorem and the Mean Value Theorems.	3
7	Using Differentiation to study concavity of functions and studying some applications of Differentiation – Relative and absolute extrema values – Tangent and normal equations – Related rates – Sketching the graphs of polynomial, rational and logarithmic functions.	6
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Thomas, G. B., Weir, M. D., Hass, J., & Heil, C. (2014). *Thomas' calculus: Early transcendentals* (13th ed.). Pearson Education.
Supportive References	Anton H., Bivens I. & Davis S., (2012), Calculus: Early Transcendentals, International Student Version, 10th Edition, USA, John Wiley & Sons, Inc.
Electronic Materials	• Calculus at S.O.S. Mathematics • http://www.sosmath.com/calculus/calculus.html

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	• Visual Calculus; tutorials and demos • http://archives.math.utk.edu/visual.calculus/index.html • Calculus online
Other Learning Materials	Swokowski E., (1991), Calculus, 5th Edition, USA, Tomson Brooks /Cole, Tomson Learning.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms-online setting - Blackboard Collaborate.
Technology equipment (projector, smart board, software)	Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.
Other equipment (depending on the nature of the specialty)	Accessible related site E library. Digital Writing pad.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**Indirect "Student-Survey"**
Effectiveness of Students assessment	**Faculty members**	**Direct Survey**
Quality of learning resources	**Faculty members**	**Direct Survey**
The extent to which CLOs have been achieved	**Quality co-ordinator**	**Course report**
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification

(Bachelor)

Course Title: Principles of Probability 1
Course Code: STAT232
Program: Applied Statistics in Data Analysis
Department: Basic Sciences
College: Science and Theoretical Studies
Institution: Prince Musaid bin Abdulrahman University (PMAU)
Version: 1
Last Revision Date: 10-01-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (3rd/ 2nd Year)					
4. Course general Description:					
This course aims to introduce the student to the basics of probability science. This course includes sets, sample space, counting methods, probability axioms, conditional probability and independence, Bayes' theorem, random variables, probability distributions, expectation, Gebescheff's inequality, moment generating function, binomial distribution, Poisson distribution, normal distribution, and other distributions.					
5. Pre-requirements for this course (if any)**:**					
Principle of Statistics 1 - STAT111					
6. Co-requisites for this course (if any)**:**					
No Co-requisites					
7. Course Main Objective(s):					
At the end of this course, students should: 1. Understand concepts of discrete probability, continuous probability, conditional probability, and independence. 2. Understand mathematical descriptions of random variables 3. able to know the Expectation and variation					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

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3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.2	Define the concept of a random variable	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.1	Understand and comprehend sets, sample space, counting methods, probability axioms, independence	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.0	**Skills**			
2.1	Construct discrete distributions (geometric, inverse binomial, binomial, Poisson)	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Use the concepts of discrete and normal probability distributions.	S2	• Group Learning (Face to Face Sessions)	• Assignments • Online Quizzes

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
			• Virtual Sessions	• Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Evaluate data in terms of describing, exploring, and comparing data	V1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	The nature of probability theory and sample space	**6**
2.	Random variables and Probability distributions	**12**
3.	Random vectors - Expectation and variation	**6**
4.	Discrete bivariate probability distributions - Marginal and conditional probability distribution	**6**
5.	Independence, correlation and covariance - Moments and moment generating function	**9**
6.	Distributions of Function of one and two random variables (Transformations).	**6**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Assessments (Course work and Assignments)**	**1-14**	**40%**
2.	**Midterm Exam**	**8**	**20%**
3.	**Final Exam**	**16**	**40%**
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

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Essential References	Ross, Sheldon M. *Introduction to probability models*. Academic press, 2014. 10th Ed.
Supportive References	Wasserman, L. "All of statistics: A concise course in statistical inference." (2013).
Electronic Materials	Blackboard Materials https://www.youtube.com/watch?v=SkidyDQuupA
Other Learning Materials	Microsoft Excel

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms-online setting - Blackboard Collaborate.
Technology equipment (projector, smart board, software)	Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.
Other equipment (depending on the nature of the specialty)	Accessible related site E library. Digital Writing pad.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification
(Bachelor)

Course Title:	Calculus 2
Course Code:	MATH231
Program:	Applied statistics in Data analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Musaid bin Abdulrahman University (PMAU)
Version:	1
Last Revision Date:	14.01.2025

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A. General information about the course:

1. Course Identification

1. Credit hours: 3

2. Course type

A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		

3. Level/year at which this course is offered: (3rd Level/ 2nd Year)

4. Course General Description:

This course focuses on the study of definite and indefinite integrals, the Fundamental theorem of calculus, trigonometric, inverse trigonometric, transcendental functions, integration techniques, geometric applications of definite integrals, improper integrals, convergence & divergence of sequences and series, Taylor's series. In applied contexts, integration can be used to calculate physical quantities like work done by a force, moments of inertia, and centers of mass in one and two-dimensional systems. It provides a comprehensive understanding of integration applications, laying a strong foundation for advanced mathematical studies and practical problem-solving. This course deepens student's knowledge of calculus and strengthens their ability to apply mathematical principles to solve real-world problems.

5. Pre-requirements for this course (if any):

Calculus 1 - MATH 121

6. Co-requisites for this course (if any):

None

7. Course Main Objective(s):

After successful completion of this course, the student will be able to:

1. Develop a deep understanding of the concepts and properties of definite and indefinite integrals.
2. Master various techniques of integration and apply them to solve complex problems.
3. Gain proficiency in working with transcendental functions and their applications in calculus.
4. Understand the geometric and physical applications of definite integrals, including areas, volumes, and arc lengths.
5. Analyze and evaluate improper integrals for convergence or divergence.

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6. Comprehend the behavior of sequences and series and apply convergence tests effectively.
7. Use power series representations to approximate functions and solve related problems.

2. Teaching mode **(mark all that apply)**

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	15
2.	**Virtual Lectures**	15
3.	**Field**	
4.	**Tutorial**	
5.	**Others: Interactive**	15
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Approximate the value of a definite integral using Riemann sums and apply the Fundamental Theorem of Calculus.	K1	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
1.2	Evaluate integrals involving trigonometric functions, logarithmic functions, hyperbolic	K2	• Group teaching (F2F Lectures)	• Assignments • Midterm

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Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	functions, exponential functions, and their inverse functions.		• Virtual sessions	Exam • Final Exam
1.3	Investigate the continuity of a function at a point and on intervals, distinguish between types of discontinuities, and apply properties of continuous functions.	K2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
1.4	Find the limits of sequences and apply various convergence tests to determine the convergence or divergence of series.	K2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
2.0	**Skills**			
2.1	Characterize the types of improper integrals and determine their convergence or divergence.	S2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
2.2	Find the areas between graphs of functions, arc length, volumes, and surface areas of solids of revolutions.	S2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
2.3	Compute an integral using an appropriate integration technique and recognize the equivalence of antiderivatives resulting from evaluating an integral using different techniques.	S4	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Find the limits of sequences and apply various convergence tests to determine the convergence or divergence of series.	V2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Definite Integrals: Area and Estimating with Finite Sums, Sigma Notation, and Limits of Finite Sums	6
2.	The Definite Integral and the Fundamental Theorem of Calculus	3
3	Indefinite Integrals, Substitution Methods, and Applications of Definite Integrals (Including Area Between Curves)	6
4	Applications of Definite Integrals: Volumes Using Cross-Sections and Cylindrical Shells, Arc Length, and Surface Area of Revolution	9
5	Advanced Applications: Work, Fluid Forces, Moments, and Centers of Mass	3
6	Integration Techniques: Integration by Parts, Trigonometric Integrals and Substitutions, and Partial Fractions	12
7	Infinite Sequences and Series: Convergence Tests, Power Series, and Taylor Series Expansion	6
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Coursework and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

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E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Thomas, G. B., Weir, M. D., Hass, J., & Heil, C. (2014). *Thomas' calculus: Early transcendentals* (13th ed.). Pearson Education.
Supportive References	Anton H., Bivens I. & Davis S., (2012), Calculus: Early Transcendentals, International Student Version, 10th Edition, USA, John Wiley & Sons, Inc.
Electronic Materials	• Calculus at S.O.S. Mathematics • http://www.sosmath.com/calculus/calculus.html • Visual Calculus; tutorials and demos • http://archives.math.utk.edu/visual.calculus/index.html • Calculus online
Other Learning Materials	Swokowski E., (1991), Calculus, 5th Edition, USA, Tomson Brooks /Cole, Tomson Learning.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms-online setting - Blackboard Collaborate.
Technology equipment (projector, smart board, software)	Wi-Fi speed access, Interactive smart Board, and Availability of IT technicians in the branch.
Other equipment (depending on the nature of the specialty)	Accessible related site E-library. Digital Writing pad.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect "Student-Survey"
Effectiveness of Students' assessment	Faculty members	Direct Survey
Quality of learning resources	Faculty members	Direct Survey
The extent to which CLOs have been achieved	Quality coordinator	Course Report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

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G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification
(Bachelor)

Course Title: Decision Making Methods
Course Code: STAT236
Program: Bachelor of Applied Statistics in Data Analysis
Department: Basic Sciences
College: Science and Theoretical Studies
Institution: Prince Musaid bin Abdulrahman University (PMAU)
Version: 1
Last Revision Date: 10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 3rd Level / 2nd Year					
4. Course general Description:					
This course offers a comprehensive introduction to the application of quantitative techniques in the fields of business and industry. The primary focus will be on acquiring a comprehensive comprehension of quantitative methodologies and their corresponding statistical techniques. This will enable students to engage in critical thinking regarding suitable procedures for decision analysis, project management, data collection and analysis. Also, statistical software such as Excel QM will be used to solve real life problems.					
5. Pre-requirements for this course (if any)**:**					
Principle of Statistics 2 - STAT121					
6. Co-requisites for this course (if any)**:**					
No Co-requisites					
7. Course Main Objective(s):					
By the end of this course, students will be able to: 1. Solve problems of inefficiency, poor productivity, and risky situations within the management of business and technical processes, projects, and operations. 2. Emphasize the significance of employing quantitative methods and analysis to resolve business issues through structured problem-solving and specialized data analysis software tools. 3. Use different statistical techniques include linear programming, PERT/CPM analysis, time series, decision tree analysis, and data mining. 4. Make decisions using statistical software.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%

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No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize various decision-making options based on probability and risk.	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Use statistical software such as Excel QM in solving real life Problems	K4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Quizzes
2.0	Skills			
2.1	Calculate the solutions for linear programming problems.	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Construct various inventory controls and project management models.	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Predict data trends based on historical or variable information.	S4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.4	Manipulate the balance between waiting line cost and service cost	S4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Use data for simulation modeling and appraise the outcomes.	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Quantitative Analysis	**6**
2.	Forecasting techniques	**9**
3.	Waiting Lines and Queuing Theory Models	**6**
4.	Linear Programming Models and their application	**9**
5.	Inventory Control Models and project management	**9**
6.	Simulation analysis	**6**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Assessments (Course work and Assignments)**	**1-14**	**40%**
2.	**Midterm Exam**	**8**	**20%**
3.	**Final Exam**	**16**	**40%**
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

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E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Render, B., Stair, R, & Hanna, M. (2012): Quantitative analysis for management (11th ed.). Upper Saddle River, NJ: Prentice-Hall, ISBN: 9780132149112(print version)
Supportive References	http://www.hpbmarketplace.com/Elementary-Statistics-Using-the-Ti-83-84-Plus-Calculator-Mario-F-Triola/book/9962926
Electronic Materials	Blackboard Material, YouTube videos, Tutorial Videos.
Other Learning Materials	Excel QM

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms-online setting - Blackboard Collaborate.
Technology equipment (projector, smart board, software)	Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.
Other equipment (depending on the nature of the specialty)	Accessible related site E library. Digital Writing pad.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification
(Bachelor)

Course Title:	**Regression Analysis**
Course Code:	**STAT233**
Program:	**Bachelor of Applied Statistics in Data Analysis**
Department:	**Basic Sciences**
College:	**Science and Theoretical Studies**
Institution:	**Prince Musaid bin Abdulrahman University (PMAU)**
Version:	**1**
Last Revision Date:	**10-1-2025**

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)

2. Course type

A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		

3. Level/year at which this course is offered: (3rd Level/ 2nd Year)

4. Course general Description:

The course aims to provide students with of how to model and analyse the relationship between a dependent variable and one or more independent variables. They will explore different types of regression, such as simple and multiple linear regression, and gain an understanding of how to interpret coefficients, assess model fit, and evaluate the assumptions underlying these techniques. Through practical applications, students will learn how to use regression to make predictions, identify trends, and uncover patterns in real-world data. Additionally, they will develop skills in diagnosing and addressing issues like multicollinearity, residuals, and outliers to improve the reliability of their models.

5. Pre-requirements for this course (if any):

Principles of Statistics 2 - STAT121

6. Co-requisites for this course (if any):

Principle of Probability 1 - STAT232

7. Course Main Objective(s):

At the end of this course, students should:

1. Understand the concepts of simple linear regression, multiple linear regression, and model fitting.
2. Understand the relation between a dependent variable and an independent variable.
3. Develop the hypothesis test and confidence intervals
4. Use appropriate statistical software
5. Explain the multicollinearity, its sources, effects, and diagnostics
6. Build appropriate models

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%

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No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify basic ideas of regression analysis, and other topics related to it such as multicollinearity.	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Understand simple linear regression models, multiple regression models.	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.3	Use statistical software in solving real life Problems.	K4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Quizzes
2.0	Skills			

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Explain ANOVA or fixed effect models and mixed effect modes.	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Explain the logistical and generalized linear model.	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Develop a model using different variable selection and model building techniques	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction to Regression Analysis**	**3**
2.	**Simple Linear Regression Models**	**6**
3.	**Multiple Regression Models**	**6**
4.	**Model Adequacy Checking**	**6**
5.	**Transformations and Weighting to Correct Model Inadequacies**	**6**
6.	**Indicator Variables**	**6**
7.	**Multicollinearity**	**6**
8.	**Variables Selection and Model Building**	**6**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Assessments (Coursework and Assignments)**	**1-14**	**40%**

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No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Montgomery D., Peck E., Vining G.; Introduction to Linear Regression AnalysisI, Viley 6th Ed.
Supportive References	Applied Regression Analysis and Other Multivariable Methods Kleinbaum, David G., et al. *Applied regression analysis and other multivariable methods*. Vol. 601. Belmont, CA: Duxbury press, 1988.
Electronic Materials	Blackboard Material, YouTube videos, Tutorial Videos.
Other Learning Materials	1. Microsoft Excel; 2. Minitab.

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms-online setting - Blackboard Collaborate.
Technology equipment (projector, smart board, software)	Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.
Other equipment (depending on the nature of the specialty)	Accessible related site E library. Digital Writing pad.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student-Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

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Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification

(Bachelor)

Course Title:	Design of Experiments and Analysis
Course Code:	STAT234
Program:	Bachelor of Applied Statistics in Data Analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Nourah bint Abdulrahman University (PNU)
Version:	1
Last Revision Date:	10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 3 /2nd year)					
4. Course general Description:					
The course deals with One way analysis of variance, Multiple comparison, Model adequacy checking. Randomized block design, Latin square design, Graeco-Latin square design. Incomplete block design, Factorial designs (2k and 3 k designs).					
5. Pre-requirements for this course (if any)**:**					
Principles of Statistics 2- STAT121					
6. Co-requisites for this course (if any)**:**					
Principle of Probability 1 - STAT232					
7. Course Main Objective(s):					
Upon successful completion of the course, students will be able **1.** understand the issues and principles of Design of Experiments. **2.** review basic statistical concepts for two sample problems based on the t-test for two independent samples and paired samples. **3.** understand Randomized Blocks, Latin Squares, and Related Designs. **4.** Understanding which multiple comparison procedure is appropriate for your situation Be able to allocate our observations among the k treatment groups. **5.** The idea of 2-level Factorial Designs as one of the most important screening designs **6.** Defining a "contrast" which is an important concept and how to derive Effects and Sum of Squares using the Contrasts.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%

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No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the methods to design proper experiments	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Determine the design based on the model	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Construct the one-way and two-way ANOVA	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Check both model adequacy and model assumptions	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Understand and analyze different advanced designs of experiments	V2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to design and analysis of experiments with basic concepts and applications	3
2.	Simple Comparative Experiments	6
3.	Experiments with a Single Factor: The Analysis of Variance	6
4.	Randomized Blocks, Latin Squares, and Related Designs	12
5.	Introduction to Factorial Designs	6
6.	The 2k Factorial Design	6
7.	Blocking and Confounding in the 2k Factorial Design	6

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Total	45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Montgomery, D. C. (2017). Design and analysis of experiments. John Wiley & sons.
Supportive References	Oehlert, G. W. (2010). A first course in design and analysis of experiments.
Electronic Materials	Blackboard Material, YouTube videos, Tutorial Videos.
Other Learning Materials	R software

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**

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Items	Resources
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student-Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification
(Bachelor)

Course Title: Linear Models
Course Code: STAT235
Program: Bachelor of Applied Statistics in Data Analysis
Department: Basic Sciences
College: Science and Theoretical Studies
Institution: Prince Musaid bin Abdulrahman University (PMAU)
Version: 1
Last Revision Date: 10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (3rd Level/2nd Year)					
4. Course general Description:					
The course aims to provide students with of how to model and analyse linear models. A rigorous examination of the Fitting Generalized Linear Models, Exponential Family of Distributions and general linear model using vector space theory. Includes: generalized inverses, orthogonal projections; quadratic forms; Gauss-Markov theorem and its generalizations; BLUE estimators; non-full rank models; estimability considerations.					
5. Pre-requirements for this course (if any)**:**					
STAT121 Principle of Statistics 2					
6. Co-requisites for this course (if any)**:**					
STAT233 Regression Analysis STAT232 Principles of Probabilities 1					
7. Course Main Objective(s):					
At the end of this course, students should: 1- Understand the objective and assumptions for regression models. 2- Be able to perform regression in matrix terms and understand the rationale of least-squares estimation. 3- Understand and apply the techniques for testing a general linear hypothesis and the difference between confidence intervals and confidence regions. 4- Understand and apply the techniques for penalized regression and be able to use them properly in practice. 5- Be familiar with R programing and be able to use it to complete assignments					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%

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No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify basic ideas of Fitting Generalized Linear Models	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Use computer statistics programs to solve realistic linear model problems.	K4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam
2.0	Skills			
2.1	Explain Fitting Generalized Linear Models	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Apply techniques for testing a general linear hypothesis	S4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Interpret the numerical and graphical data.	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction; review of simple linear regression and linear algebra.	6
2.	Fitting a Straight Line by least Squares- Straight Line Relationship Between Two Variables, Linear Regression: Fitting a Straight Line by Least Squares	9
3.	Generalized Linear Models- The Exponential Family of Distributions, Fitting Generalized Linear Models	9
4.	Penalized Regression: Introduction to Lasso, Ridge, Elastic Net and their corresponding Bayesian versions and cross-validation for modeling fitting.	9
5.	Logistic regression models and other generalized linear models	12
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Draper, N. R., & Smith, H. Applied regression analysis. John Wiley & Sons. 1998.
Supportive References	Applied Regression Analysis and Other Multivariable Methods MONTGOMERY D., PECK E., VINING G.; INTRODUCTION TO LINEAR REGRESSION ANALYSIS, VILEY 6th Ed.
Electronic Materials	Blackboard Material, YouTube videos, Tutorial Videos.

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Other Learning Materials	1. Microsoft Excel; 2. R Software

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

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Course Specification

(Bachelor)

Course Title: Principles of Probability 2
Course Code: STAT242
Program: Bachelor of Applied Statistics in Data Analysis
Department: Basic Sciences
College: Science and Theoretical Studies
Institution: Prince Musaid bin Abdulrahman University (PMAU)
Version: 1
Last Revision Date: 10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4/ 2nd Year)					
4. Course general Description:					
This course aims to introduce the student to the Multivariate distributions, Marginal and conditional distributions, Random variables and their probability distributions, Moments and generating functions, Conditional expectation, Multinomial distribution, Multivariate hypergeometric distribution, Sample moments and their distributions					
5. Pre-requirements for this course (if any)**:**					
Principles of Probability 1 - STAT232					
6. Co-requisites for this course (if any)**:**					
No Co-requisites					
7. Course Main Objective(s):					
At the end of this course, students should: 1. Determine probability mass functions and the reverse 2. Understanding the assumptions of the probability distributions 3. Understanding of joint, marginal, and conditional probability distributions 4. Select an appropriate discrete probability distribution to calculate probabilities in specific applications 5. Approximating probabilities for some binomial and Poisson distributions 6. Use Statistical analysis software					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%

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No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**56**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the conditional probability and independence moment generating function, sampling distribution, t, F and Chi-square distributions	K1	• **Group Learning (Face to Face Sessions)** • **Virtual Sessions**	• **Assignments** • **Online Quizzes** • **Midterm Exam** • **Final Exam**
1.2	Recognize the discrete and continuous random variables.	K2	• **Group Learning (Face to Face Sessions)** • **Virtual Sessions**	• **Assignments** • **Online Quizzes** • **Midterm Exam** **Final Exam**
2.0	Skills			
2.1	Describe the main technical tools of elementary probability theory, and interpret the result	S1	• **Group Learning (Face to Face Sessions)** • **Virtual Sessions**	• **Assignments** • **Online Quizzes** • **Midterm Exam** • **Final Exam**

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Construct bivariate discrete probability distributions, their marginal and conditional distributions;	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.3	Demonstrate proficiency in using statistical software	S3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.4	Apply appropriate strategies of probability theories to solve statistical problems	S4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.5	Use Statistical analysis software	S4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Quizzes
3.0	**Values, autonomy, and responsibility**			
3.1	Calculate the probability and statistics variables to make important decisions	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Probability theory: Probability Axioms, Conditional Probability and Bayes Theorem	**6**
2.	Random Variables and Their Probability Distributions	**9**
3.	Moments and Generating Functions	**9**
4.	Multiple Random Variables	**6**
5.	Central Limit Theorem	**6**
6.	Sample Moments and Their Distributions	**6**

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7.	Some Statistical Packages as MINITAB and R	**3**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Assessments (Course work and Assignments)**	**1-14**	**40%**
2.	**Midterm Exam**	**8**	**20%**
3.	**Final Exam**	**16**	**40%**
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	An introduction to probability and statistics, VIJAY K. ROHATGI A. K. Md. EHSANES SALEH, Wiley, Third Edition
Supportive References	Rényi, Alfréd. *Probability theory*. Courier Corporation, 2007.
Electronic Materials	Blackboard Material https://www.youtube.com/watch?v=UnzbuqgU2LE https://www.youtube.com/watch?v=4YLtvNeRIrg
Other Learning Materials	Microsoft Excel

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

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F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

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Course Specification

(Bachelor)

Course Title:	Survival Analysis
Course Code:	STAT245
Program:	Bachelor of Applied Statistics in Data Analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Nourah bint Abdulrahman University (PNU)
Version:	1
Last Revision Date:	1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 4th Level / 2nd year					

4. Course general Description:

This course introduces foundations of Survival Analysis/Time-to-event data and its applications in different fields (e.g., medicine, engineering, social sciences). Basic concepts such as Censoring schemes, Survival function, Hazard, Cumulative hazard function and Relationship between these functions. Overview of parametric survival models such as exponential, Weibull, log-normal. Assumptions and estimation of model parameters. Semi-Parametric Models such as Cox proportional hazards model, Checking the proportional hazards assumption. Extending the Cox model. Assessing the fit of survival models. Application of survival analysis techniques using real or simulated datasets using software tools like R.

5. Pre-requirements for this course (if any)**:**

Principles of Statistics 2 - Stat121
Principles of Probability 1 - Stat232

6. Co-requisites for this course (if any)**:**

No Co-requisites

7. Course Main Objective(s):

1. **Equip students with foundational knowledge of survival analysis concepts, focusing on how to analyze and interpret time-to-event data and account for censoring.**
2. **Enable students to perform non-parametric, parametric, and semi-parametric methods of survival analysis and interpret survival curves and hazard models effectively.**
3. **Teach students how to calculate and interpret survival functions, hazard functions, and cumulative hazard functions, emphasizing their practical applications.**
4. **Provide an understanding of basic survival analysis models such as the Kaplan-Meier estimator, Cox proportional hazards model, and parametric models like Weibull and exponential.**
5. **Help students learn how to compare survival experiences of different groups using statistical tests like the log-rank test.**

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6. **Familiarize students with statistical tools and software such as R to analyze real-world datasets.**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Recognize the type of problem addressed by a survival analysis.**	**K1**	• **Group Learning (Face to Face Sessions)** • **Virtual Sessions**	• **Assignments** • **Online Quizzes** • **Midterm Exam** • **Final Exam**
1.2	**Demonstrate the knowledge of basic methods that can be used to describe and analyses survival data involving censored observations.**	**K2**	• **Group Learning (Face to Face Sessions)** • **Virtual Sessions**	• **Assignments** • **Online Quizzes** • **Midterm Exam** **Final Exam**

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Describes the Log rank test to compare Kaplan-Meier survival curves.	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Assumptions and estimation of model parameters.	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Assessing the fit of survival models with statistical tools and software such as R to analyze real-world datasets.	V1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction and Review of Statistical Concepts	3
2.	Survival Curves	6
3.	Comparison of Survival Curves	6
4.	Parametric Modelling	9
5.	Cox's Proportional Hazards Model	6
6.	Selecting Variables within a Cox Model	6
7.	Extensions of the Cox Model	6
8.	Prognostic Indices	3
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%

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No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
3.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Machin, D., Cheung, Y. B., & Parmar, M. (2006). Survival analysis a practical approach. John Wiley & Sons.
Supportive References	Kleinbaum, D. G., & Klein, M. (1996). Survival analysis a self-learning text. Springer.
Electronic Materials	Blackboard Material, YouTube videos, Tutorial Videos.
Other Learning Materials	1. Excel; 2. R Software

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms-online setting - Blackboard Collaborate.
Technology equipment (projector, smart board, software)	Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.
Other equipment (depending on the nature of the specialty)	Accessible related site E library. Digital Writing pad.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

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G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
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Course Specification

(Bachelor)

Course Title:	Sampling Theory and Methods
Course Code:	STAT241
Program:	Bachelor of Applied Statistics in Data Analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Musaid bin Abdulrahman University (PMAU)
Version:	1
Last Revision Date:	1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4th Level / 2nd year)					
4. Course general Description:					
This course introduces basic concepts of Census and sample surveys such as Population and sample design. Data collection methods, Sampling techniques. (simple random sample, systematic, and stratified). Ratio and regression estimators. Estimation of the population mean, total and the proportion. Required Sample size, estimation of the population size. Bound of errors. Other related applications and topics.					
5. Pre-requirements for this course (if any)**:**					
Principles of Probability 1 - STAT232 Regression Analysis - STAT233					
6. Co-requisites for this course (if any)**:**					
No Co-requisites					
7. Course Main Objective(s):					
The purpose of this course is to introduce the basic concepts of descriptive and inferential statistics. Upon successful completion of the course, students should 1. Understand the need for sample surveys, and various steps involved in their planning and execution. Important elementary concepts and definitions used in sample surveys. 2. Understand the basic sampling schemes such as simple random sampling, unequal probability sampling, stratified sampling, and systematic sampling, multiphase, cluster, and multistage sampling. 3. Understand how to deal with ratio, product, and regression estimators.					

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2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Acquire knowledge of statistical sampling methods and the statistical concepts associated with it.	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Distinguish between different sampling techniques	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
				• Midterm Exam • Final Exam
2.0	Skills			
2.1	Understand the differences between sampling methods	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Summarize the collected data to obtain estimators of desired quantities of interest (parameters)	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Summarize data to make inference and submit a report via teamwork.	V1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.2	Carry out a small survey that involves selecting a sample from the target population	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

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C. Course Content

No	List of Topics	Contact Hours
1.	Collection Of Survey Data, Elementary Concepts	3
2.	Simple Random Sampling	3
3.	Sampling With Varying Probabilities	3
4.	Stratified Sampling	3
5.	Systematic Sampling	3
6.	Ratio And Product Methods of Estimation	6
7.	Regression Method of Estimation	6
8.	Two-Phase Sampling	6
9.	Cluster Sampling	6
10.	Multistage Sampling	6
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Assessments (Course work and Assignments)**	**1-14**	**40%**
2.	**Midterm Exam**	**8**	**20%**
3.	**Final Exam**	**16**	**40%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Richard L. Scheaffer, Emeritus William Mendenhall III, Emeritus R. Lyman Ott Kenneth Gerow. Elementary Survey Sampling Seventh Edition 2012. Brooks/Cole

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Supportive References	Rao, P. S. R. S. (2000). Sampling methodologies, Boca Raton, Fla. Chapman & HallCRC.
Electronic Materials	Blackboard Material, YouTube videos, Tutorial Videos.
Other Learning Materials	Microsoft Excel

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student-Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

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G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

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Course Specification

(Bachelor)

Course Title:	**Statistical Data Analysis**
Course Code:	**STAT246**
Program:	**Bachelor of Applied Statistics in Data Analysis**
Department:	**Basic Sciences**
College:	**Science and Theoretical Studies**
Institution:	**Prince Musaid bin Abdulrahman University (PMAU)**
Version:	**1**
Last Revision Date:	**10-1-2024**

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (4th Level/ 2nd year)					
4. Course general Description:					
The course includes some traditional topics in mathematical statistics (such as probability-based methods), and topics in descriptive statistics and data analysis with particular attention to graphical presentations, aspects of experimental design, and complex real-world applications. Topics are chosen from applied probability, Continuous probability density functions sampling, Curve fitting, method of Least Squares estimation, categorical data analysis, and Basics of nonparametric statistics. The course also reflects the integral role that computers play in statistics. These topics will give students a comprehensive view of the nature of modern statistics.					
5. Pre-requirements for this course (if any)**:**					
Principles of Probability 1 – STAT232 Regression Analysis - STAT233					
6. Co-requisites for this course (if any)**:**					
Principles of Probability 2 – Stat242					
7. Course Main Objective(s):					
Upon successful completion of the course, students should be able to 1. Prepare data for analysis procedures. 3. Choose appropriately from a wider range of exploratory and inferential methods for analyzing data. 4. Perform statistical analysis, create meaningful data visualizations and predict future trends from data. 5. Implement statistical and mathematical packages for the data analysis. 5. State the advantages and disadvantages of nonparametric methods. Test hypotheses, using the sign test, the Wilcoxon rank sum test, the signed-rank test, the Kruskal-Wallis test and the runs test. Compute the Spearman rank correlation coefficient.					

2. Teaching mode (mark all that apply)

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No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Familiarize students with the use of Normal table, t-table, Chi-square table and F-table	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Recognize small-sample inference regarding some of the population parameters	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam
2.0	Skills			
2.1	Apply the linear regression model on bivariate data	S1	• Group Learning (Face to Face Sessions)	• Assignments • Online Quizzes

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
			• Virtual Sessions	• Midterm Exam • Final Exam
2.2	Understand one way and two ways ANOVA	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.3	Familiarize students with contingency tables and Chi-square tests	S3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Use Statistical analysis software (Minitab & R Software)	V1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam
3.2	Recognize some nonparametric methods	V2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Fundamentals of Data Analysis, how can apply Data Analysis with world-life- Dataset Examples, the Role of Statistics and the Data Analysis Process	**6**
2.	Understanding structured and unstructured data and knowledge areas in data analysis	**3**
3.	The idea of probability, Some distributions, and Types of Descriptive Statistics	**6**
4.	Continuous probability density functions – Uniform – Exponential	**6**

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5.	Beyond linear classifiers and neural networks	**3**
6.	The method of maximum likelihood	**3**
7.	Basic idea of curve fitting and the method of Least Squares with histogram data	**6**
8.	Expected Values, Functions of random variables, and error propagation	**6**
9.	Upper limits on a Poisson rate parameter – Frequentist approach – Bayesian approach	**6**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Assessments (Course work and Assignments)**	**1-14**	**40%**
2.	**Midterm Exam**	**8**	**20%**
3.	**Final Exam**	**16**	**40%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Heumann, Christian, and Micheal Schomaker Shalabh. *Introduction to statistics and data analysis*. Springer, 2016.
Supportive References	G. Cowan, Statistical Data Analysis, Clarendon Press, Oxford, 1998
Electronic Materials	Blackboard Material Link: https://www.pp.rhul.ac.uk/~cowan/stat/stat_1.pdf
Other Learning Materials	Microsoft Excel; Minitab; and R Software

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms-online setting - Blackboard Collaborate.
Technology equipment (projector, smart board, software)	Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.

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Items	Resources
Other equipment (depending on the nature of the specialty)	Accessible related site E library. Digital Writing pad.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student-Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

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Course Specification
(Bachelor)

Course Title: Statistical Inference 1
Course Code: STAT243
Program: Bachelor of Applied Statistics in Data Analysis
Department: Basic Sciences
College: Science and Theoretical Studies
Institution: Prince Musaid bin Abdulrahman University (PMAU)
Version: 1
Last Revision Date: 10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4th Level / 2nd year)					
4. Course general Description:					
This course covers fundamental topics in probability theory and statistical inference, including methods for determining probability distributions, random variables, and convergence concepts such as convergence in distribution and probability, and convergence of random variables. Key areas of focus include the Central Limit Theorem, moment-generating functions, confidence intervals, and various estimation techniques like maximum likelihood estimation and the method of moments. Emphasizing both theory and practical application, the course prepares students to analyze random variables, make inferences from data, and understand the behavior of estimators in a variety of statistical contexts					
5. Pre-requirements for this course (if any):					
Principles of Probability 1 - STAT232					
6. Co-requisites for this course (if any):					
Principles of Probability 2 - STAT242					
7. Course Main Objective(s):					
At the end of this course, students should: 1. Gain a solid understanding of convergence in distribution and probability. 2. Apply the Central Limit Theorem to approximate the distribution of sample means an understand its significance in statistical analysis. 3. Use various estimation methods, including Maximum Likelihood Estimation and Method of Moments, to estimate parameters and evaluate estimators based on properties like bias, consistency, and efficiency. 4. Learn to construct and interpret confidence intervals using different methods and apply these methods to perform hypothesis testing and make informed statistical decisions					

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2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand the probability distributions of functions of random variables	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Identify the limiting distributions of random variables	K2	• Group Learning (Face to Face Sessions)	• Assignments • Online Quizzes

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
			• Virtual Sessions	• Midterm Exam • Final Exam
2.0	Skills			
2.1	Find estimators for parameters of distributions using different methods	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Justify the steps of the solution statistically using inferences methods	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Study different methods of interval estimation	V1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.2	Develop the ability to analyze and design the practical data that performs these processes.	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	**Probability** - Methods for determining probability distributions, convergence in distribution and Bayes' Theorem	**6**
2.	**Random Variables** - Distribution Functions and Probability Functions, Discrete Random Variables, and Continuous Random Variables	**6**
3.	**Expectation** - Properties of Expectations, Variance and Covariance, Conditional Expectation, Moment Generating Functions, and Inequalities for Expectations	**9**

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4.	**Convergence of Random Variables** - Types of Convergence, The Law of Large Numbers, Central limit theorem, and The Delta Method	6
5.	**Models, Statistical Inference and Learning** - Parametric and Nonparametric Models, Fundamental Concepts in Inference, Point Estimation, Confidence Sets, and Hypothesis Testing	12
6.	**Parametric Inference** - Parameter of Interest, The Method of Moments, and Maximum Likelihood.	6
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Larry Wasserman.; *All of Statistics; A Concise Course in statistical Inference*, Springer.
Supportive References	S.C Gupta, V. K. Kapoor., Fundamentals of Mathematical Statistics. Sultan Chand And Sons, 10th Ed.
Electronic Materials	Blackboard Material, YouTube videos, Tutorial Videos.
Other Learning Materials	Microsoft Excel; R software

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**

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Items	Resources
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
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Course Specification

(Bachelor)

Course Title:	Demographic Analysis
Course Code:	STAT244
Program:	Bachelor of Applied Statistics in Data Analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Maid bin Abdulrahman University (PMU)
Version:	1
Last Revision Date:	10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (4th Level / 2nd year)					
4. Course general Description:					
This course provides an introduction of Age-Period-Cohort (APC) models to analyze and understand the complex interplay between age, time period, and birth cohort effects on various social phenomena. Students will gain a comprehensive understanding of the theoretical foundations, statistical techniques, and practical applications of APC models.					
5. Pre-requirements for this course (if any)**:**					
Regression Analysis - STAT233					
6. Co-requisites for this course (if any)**:**					
No Co-requisites					
7. Course Main Objective(s):					
By the end of this course, students should be able to: **1. • Understand the fundamental concepts of age, period, and cohort models** **2. • Critically evaluate and discuss the strengths and limitations of APC models.** **3. • Apply various statistical techniques for modeling and analyzing age-period-cohort data.**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

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3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand the fundamental concepts of age, period, and cohort analysis	**K1**	• **Group Learning (Face to Face Sessions)** • **Virtual Sessions**	• **Assignments** • **Online Quizzes** • **Midterm Exam** • **Final Exam**
1.2	Demonstrate the knowledge of basic methods that can be used to describe and analyses concepts of age, period, and cohort problems	**K2**	• **Group Learning (Face to Face Sessions)** • **Virtual Sessions**	• **Assignments** • **Online Quizzes** • **Midterm Exam** **Final Exam**
2.0	**Skills**			
2.1	Apply various statistical techniques for analyzing age-period-cohort data	**S2**	• **Group Learning (Face to Face Sessions)** • **Virtual Sessions**	• **Assignments** • **Online Quizzes** • **Midterm Exam** • **Final Exam**
2.2	Evaluate the strengths and limitations of APC models	**S4**	• **Group Learning (Face to Face Sessions)** • **Virtual Sessions**	• **Assignments** • **Online Quizzes** • **Midterm Exam** • **Final Exam**
3.0	**Values, autonomy, and responsibility**			

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Interpret and communicate the results of APC models effectively	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Age-Period-Cohort- Models, Definition and conceptual framework of APC models, Historical development and significance of APC models in social sciences, Terminology and key concepts	9
2.	Data Sources and Data Preparation- Sources of age-period-cohort data, Data cleaning and preparation	9
3.	Descriptive Analysis of Age-Period-Cohort Data, Visualizing age, period, and cohort effects., Constructing age-period-cohort tables. Identifying patterns and trends.	9
4.	Cross-Sectional and Longitudinal Analysis- Cross-sectional versus longitudinal data • Basic cross-sectional APC models • Longitudinal APC models and their advantages	9
5.	Statistical Models for APC Analysis- Introduction to generalized linear models (GLMs). • The intrinsic estimator method. • Quasi-Poisson and Poisson regression for APC modeling.	9
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

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E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	**Robert O'Brien. Age-Period-Cohort Models (Chapman & Hall/CRC Statistics in the Social and Behavioral Sciences)**
Supportive References	**Yang, Yang; Land, Kenneth C. Age-Period-Cohort Analysis: New Models, Methods, and Empirical Applications (Chapman & Hall/CRC Interdisciplinary Statistics)**
Electronic Materials	**Blackboard Material, YouTube videos, Tutorial Videos.**
Other Learning Materials	**Excel; and R Software**

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
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Course Specification

(Bachelor)

Course Title:	Statistical Packages1
Course Code:	STAT 355
Program:	Bachelor of Applied statistics in Data analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Maid bin Abdulrahman University (PMU)
Version:	1
Last Revision Date:	25.01.2025

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A. General information about the course:

1. Course Identification

1. Credit hours: 03					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 8th Level/ 4th Year					
4. Course General Description:					
This course aims to increase the student's knowledge of data analysis concepts using one of the programs specified in this course, using one of the following programs: SPSS, R, or MATLAB to conduct experimental analyses according to different sorting methods. This course includes submitting a report to analyze additional data collected by the student.					
5. Pre-requirements for this course (if any):					
Principles of Probability 2- Stat242 Survival Analysis- Stat245					
6. Co-requisites for this course (if any):					
Time Series Analysis- Stat354					
7. Course Main Objective(s):					
By the end of this course, students will be able to: 1. Gain a practical understanding of professional and ethical standards in the use of statistical software. 2. Use statistical software in decision making					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

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No	Activity	Contact Hours
1.	Face to Face Lectures	10
2.	Laboratory/Studio	10
3.	Virtual Lectures	10
4.	Tutorial	
5.	Others: Interactive Learning	15
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand and comprehend the foundations and methods of using statistical software and their application.	K4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Quizzes
2.0	**Skills**			
2.1	Interpret data results from a statistical perspective.	S3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Prepare work reports on the results according to what the statistical software showed.	V3	• Group Learning (Face to Face Sessions) Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Determined by the instructor and the student.	45
Total		**45**

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D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	Weeks: 5,10	30%
3.	Practical tests	Weeks: 7,12	70%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Determined by the instructors
Supportive References	–
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student-Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

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G. Specification Approval

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Course Specification

(Bachelor)

Course Title:	Time Series Analysis
Course Code:	STAT354
Program:	Bachelor of Applied Statistics in Data Analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Maid bn Abdulrahman University (PMU)
Version:	1
Last Revision Date:	20-01-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 5th Level / 3rd year					
4. Course general Description:					
This course deals with Classical decomposition models, Time series regression models, Exponential smoothing models, and Stationary time series. The autocorrelation and partial autocorrelation functions. Ordinary and seasonal ARMA models. Steps of model building: Identification, estimation and diagnostic checking. Forecasting.					
5. Pre-requirements for this course (if any)**:**					
Regression Analysis – STAT233 Linear models – STAT235					
6. Co-requisites for this course (if any)**:**					
Statistical Package 1 - STAT355					
7. Course Main Objective(s):					
After completing the course, students should be able to: **1. Understand core time series models and apply them to real-world situations in a number of disciplines.** **2. Analyze different statistical time series models.** **3. Estimate components for a time series model.** **4. Explain the underlying theory of stationarity and non-stationarity in time series.** **5. Describe the properties of time series models.** **6. Identify and assess different autocorrelation structures.** **7. Use statistical software to create solutions.**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%

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No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the main components of time series models	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Fit and analyze various time series regression models	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.3	Use statistical software such in solving real life Problems	K4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Quizzes

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Understand various smoothing techniques of time series data	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Forecast future values of time series data based on several methods	V2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction and Fundamental Concepts	5
2.	Trends	5
3.	Models for Stationary Time Series	7
4.	Models For Nonstationary Time Series	8
5.	Model Specification	6
6.	Parameter Estimation	8
7.	Model Diagnostics	6
Total		**45**

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D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Jonathan, D. C., & Kung-Sik, C. (2008). Time Series Analysis with Applications in R. Springer New York, NY
Supportive References	Montgomery, D. C., Jennings, C. L., & Kulahci, M. (2015). Introduction to time series analysis and forecasting. John Wiley & Sons Shumway, R. H., Stoffer, D. S., & Stoffer, D. S. (2000). Time series analysis and its applications (Vol. 3, p. 4). New York
Electronic Materials	Blackboard Material, YouTube videos, Tutorial Videos.
Other Learning Materials	1. Microsoft Excel; 2. R Sofware; 3. MATLAB Sofware

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms-online setting - Blackboard Collaborate.
Technology equipment (projector, smart board, software)	Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.
Other equipment (depending on the nature of the specialty)	Accessible related site E library. Digital Writing pad.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction	Students	Indirect "Student- Survey"

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Assessment Areas/Issues	Assessor	Assessment Methods
with students, Blackboard tool efficiency, and reasonability of assessments' grading		
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification

(Bachelor)

Course Title:	**Elementary Discrete Mathematics**
Course Code:	**MATH351**
Program:	**Bachelor of Applied Statistics in Data Analysis**
Department:	**Basic Sciences**
College:	**Science and Theoretical Studies**
Institution:	**Prince Musaid bin Abdulrahman University (PMAU)**
Version:	**1**
Last Revision Date:	**20.01.2025**

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A. General information about the course:

1. Course Identification

1. Credit hours: 3					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (5th Level / 3rd Year)					
4. Course general Description:					
This course provides a comprehensive introduction to the foundational concepts of discrete mathematics, with a focus on their applications in computer science, mathematics and data analysis. Key topics include Logic, Proofs, Set Theory, Functions, Relations, Number Theory, Combinatorics, Graph Theory, and Boolean Algebra. Emphasis is placed on developing problem-solving skills, mathematical reasoning and exploring how these concepts support statistical modeling, data structures and analytical methods in real-world scenarios.					
5. Pre-requirements for this course (if any)**:**					
Calculus 1- MATH 121					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
By the end of this course, students should be able to: 1. Use propositional and predicate logic for reasoning and proofs. 2. Perform operations with sets, functions, and sequences. 3. Understand basic number theory and apply modular arithmetic. 4. Solve problems using combinatorial methods. 5. Analyze relations, graphs, and trees in mathematical and practical contexts. 6. Apply Boolean algebra in the design of logic circuits.					

2. Teaching mode (mark all that apply)

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No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	15
2.	**Virtual Lectures**	15
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	15
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Acquire basic set-theoretic concepts (belonging, containment, equality, power set, subset), and perform operations on sets (intersection, union, complement, difference, and symmetric difference).	K1	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
1.2	Identify mathematical logic concepts, including truth tables, connectives, equivalences, contradictions,	K2	• Group teaching (F2F Lectures)	• Assignments • Midterm Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	tautologies, and quantifiers with negations.		• Virtual sessions	• Final Exam
1.3	Use a suitable method of graph theory and relations to apply in mathematical and practical contexts.	K2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
2.0	Skills			
2.1	Describe properties of functions and related concepts such as injectivity, surjectivity, bijectivity, images and preimages of sets, inverse function, equivalent sets, cardinality, finite and infinite sets.	S1	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
2.2	Apply accurately the concept of modular arithmetic and linear congruences.	S4	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
3.0	Values, autonomy, and responsibility			
3.1	Apply mathematical reasoning and rigor to ensure accurate and ethical application of discrete mathematics concepts, especially in data analysis and decision-making.	V2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam

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C. Course Content

No	List of Topics	Contact Hours
1.	**The Foundations: Logic and Proofs** • Propositional Logic • Applications of Propositional Logic • Propositional Equivalences . • Predicates and Quantifiers . • Introduction to Proofs	**8**
2.	**Basic Structures: Sets, Functions, Sequences, Sums, and Matrices .** • Set Operations • Functions • Sequences and Summations • Cardinality of Sets . • Matrices	**8**
3.	**Number Theory and Cryptography** • Divisibility and Modular Arithmetic • Integer Representations and Algorithms • Primes and Greatest Common Divisors	**6**
4.	**Counting** • The Basics of Counting • The Pigeonhole Principle • Permutations and Combinations • Binomial Coefficients and Identities	**5**
5.	**Relations** • Relations and Their Properties • *n*-ary Relations and Their Applications • Representing Relations • Equivalence Relations • Partial Ordering	**6**
6.	**Graphs** • Graphs and Graphs Models • Graph Terminology and Special Types of Graphs • Representing Graphs	**6**
7.	**Trees** • Introduction to Trees • Applications of Trees	**3**

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8.	**Boolean Algebra** • Boolean Functions • Representing Boolean Functions • Logic Gates	**3**

Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Rosen, K.H. (2012). Discrete Mathematics and its Applications (7th ed.). New York, NY: McGraw Hill. ISBN: 978-0077431440 (print version).
Supportive References	http://www.maths.ed.ac.uk/~aar/papers/mollin.pdf
Electronic Materials	https://www.youtube.com/watch?v=wd3K_r8Z4R8 https://www.youtube.com/watch?v=K3XCHypzFA0
Other Learning Materials	Saudi Digital Library (SDL)

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

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F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect "Student-Survey"
Effectiveness of Students' assessment	Faculty members	Direct Survey
Quality of learning resources	Faculty members	Direct Survey
The extent to which CLOs have been achieved	Quality coordinator	Course report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

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Course Specification

(Bachelor)

Course Title:	Nonparametric Statistics
Course Code:	STAT352
Program:	Bachelor of Applied Statistics in Data Analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Maid bin Abdulrahman University (PMU)
Version:	1
Last Revision Date:	10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 5th Level/ 3rd Year					
4. Course general Description:					
This course covers the fundamental to intermediate ideas of nonparametric statistical analysis. Derivation and usage of nonparametric statistical methods in univariate, bivariate, and multivariate data. Applications in count, score, and rank data					
5. Pre-requirements for this course (if any):					
Statistical Inference 1- STAT243					
6. Co-requisites for this course (if any):					
No Co-requisites					
7. Course Main Objective(s):					
At the end of this course, students should: 1. Understand and apply key Bayesian method, and hypothesis testing methods and including the Neyman-Pearson Lemma, likelihood ratio tests, and the chi-square test of independence. 2. Gain proficiency in the concepts of sufficient statistical models and make informed decisions based on data. 3. Analyze advanced statistical properties including advanced statistical simulation methods such as Basic Monte Carlo Integration					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%

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No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand a more general set of statistical models and hypothesis testing techniques such goodness-of-fit-tests and nonparametric linear correlation	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Identify the keys of using Bayesian method, and hypothesis testing techniques.	K3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.0	Skills			
2.1	Summarize data using both graphical	S1	• Group Learning	• Assignments

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	and numerical methods for use in nonparametric statistical methods.		(Face to Face Sessions) • Virtual Sessions	• Online Quizzes • Midterm Exam • Final Exam
2.2	Demonstrate the ability to appropriately select among different nonparametric models for hypothesis testing, including assumptions about model data	S4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Present and communicate, both orally and in written-form, the results of statistical analyses of nonparametric data	V1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.2	Understand statistical principles and methods for nonparametric statistical methods	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction-** Nonparametric and Parametric statistical tests	**7**
2.	**Probability-** Discrete Distributions, Continuous Distributions, Continuous Distributions, Mixture Distributions, Exponential Family of Distributions, Stochastic Inequalities	**7**
3.	**Estimation-** Empirical Distribution Function and Statistical Tests	**7**
4.	**Goodness of Fit-**Kolmogorov-Smirnov Test Statistic, Smirnov Test to Compare Two Distributions	**6**
5.	**Rank Tests-**Properties of Ranks, Sign Test, Wilcoxon tests	**6**

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6.	**Categorical Data-**Chi-square and Goodness-of-Fit, Contingency Tables, Fisher Exact Test, MCNemar Test, Cochran's Test	6
7.	**Estimating Distribution Functions-**Nonparametric Maximum Likelihood	6
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	**Corder, Gregory W., and Dale I. Foreman. *Nonparametric statistics: A step-by-step approach*. John Wiley & Sons, 2014.**
Supportive References	S.C Gupta, V. K. Kapoor., Fundamentals of Mathematical Statistics. Sultan Chand And Sons, 10th Ed.
Electronic Materials	**Blackboard Material, YouTube videos, Tutorial Videos.**
Other Learning Materials	**1. Microsoft Excel; 2. R software; 3. Matlab**

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

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F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

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Course Specification

(Bachelor)

Course Title:	Statistical Inference 2
Course Code:	STAT 353
Program:	Bachelor of Applied Statistics in Data Analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Maid bn Abdulrahman University (PMU)
Version:	1
Last Revision Date:	10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 5th Level / 3rd Year					
4. Course general Description:					
The course offers a comprehensive examination of advanced principles in statistical inference, emphasising hypothesis testing, estimation, Bayesian Inference, Classification, and decision theory. Key topics include methods for testing hypotheses, such as the likelihood ratio tests. Students will have a thorough understanding of adequate statistics, exponential families, and the principles of uniqueness and completeness in statistical models. The course focusses on the development of both theoretical knowledge and practical abilities for analysing and interpreting data in complicated statistical settings.					
5. Pre-requirements for this course (if any)**:**					
Statistical Inference 1- STAT243					
6. Co-requisites for this course (if any)**:**					
No Co-requisites					
7. Course Main Objective(s):					
At the end of this course, students should: 1. Understand and apply key Bayesian method, and hypothesis testing methods and including the Neyman-Pearson Lemma, likelihood ratio tests, and the chi-square test of independence. 2. Gain proficiency in the concepts of sufficient statistical models and make informed decisions based on data. 3. Analyze advanced statistical properties including advanced statistical simulation methods such as Basic Monte Carlo Integration					

2. Teaching mode (mark all that apply)

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No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand different methods of testing statistical hypotheses	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Identify the key aspects of Bayesian inference and classification methods.	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.3	Acquired the knowledge necessary to use the terminology, hypothesis tests, and practices associated with Simulation	K3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	Methods such as Basic Monte Carlo Integration			
2.0	Skills			
2.1	Justify the steps of using Bayesian Method	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Select and apply appropriate strategies to solve Classification problems	S4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Ability for decision making using Linear and Logistic Regression	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	**Testing hypothesis and p-values-** The Wald Test, p-values, The $\chi 2$ Distribution, and The Likelihood Ratio Test	**7**
2.	**Bayesian Inference-** The Bayesian Philosophy, The Bayesian Method, Functions of Parameters, and Simulation	**7**
3.	**Linear and Logistic Regression -** Simple Linear Regression, Least Squares and Maximum Likelihood	**7**
4.	**Inference About Independence-** Two Binary Variables, Two Discrete Variables, , Two Continuous Variables, and One Continuous Variable and One Discrete	**9**
5.	**Classification-** Introduction, Error Rates and the Bayes Classifier, Gaussian and Linear Classifiers, Linear Regression and Logistic Regression, Relationship Between Logistic Regression and LDA, Density Estimation and Naive Bayes, and Trees	**9**

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6.	**Simulation Methods -** Bayesian Inference Revisited, and Basic Monte Carlo Integration	**6**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	**Larry Wasserman**.; ***All of Statistics; A Concise Course in statistical Inference*, Springer.**
Supportive References	S.C Gupta, V. K. Kapoor., Fundamentals of Mathematical Statistics. Sultan Chand And Sons, 10th Ed.
Electronic Materials	**Blackboard Material, YouTube videos, Tutorial Videos.**
Other Learning Materials	**1. Microsoft Excel; 2. R software; 3. MATLAB**

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

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F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification
(Bachelor)

Course Title: Descriptive statistics
Course Code: STAT361
Program: Bachelor of Applied Statistics in Data Analysis
Department: Basic Sciences
College: Science and Theoretical Studies
Institution: Prince Maid bin Abdulrahman University (PMU)
Version: 1
Last Revision Date: 10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 6th Level / 3rd Year					
4. Course general Description:					
This course covers foundational concepts in describe data methods and other related topics. describe data is an important field used to analyze, interpret, and predict data. The course explores statistical data; types, sources and methods of collection, Presentation of data; tables, chart and graphs, Errors and Approximations, Measures of location, partition, dispersion, skewness and Kurtosis, Continuous probability distribution, Inferences about Population Central Values, Regression and Correlation.					
5. Pre-requirements for this course (if any)**:**					
Statistical Inference 1- STAT243					
6. Co-requisites for this course (if any)**:**					
No Co-requisites					
7. Course Main Objective(s):					
At the end of this course, students should: 1. Characterize various Data Descriptions 2. Define and describe various Basic Statistical Concepts 3. Demonstrate the various Graphical Presentations 4. Calculate Measures of Central Tendency and Dispersion 5. Compute various problems related to Bivariate Frequency Distribution and Continuous probability distribution					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom	45	100%

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No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand the main aspects of describing a data set	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Understand sources of statistical data and methods using Measures of Central Tendency and Dispersion	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam
2.0	Skills			
2.1	Summarize different types of data using appropriate methods	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Calculate different measures of location and dispersion and be able to interpret them	S4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Apply statistical procedures using software that are appropriate for different types of data.	V2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	**Using Surveys and Experimental Studies to Gather Data-** Observational Studies, Sampling Designs for Surveys, Experimental Studies, Designs for Experimental Studies, Research Study: Exit Polls versus Election Results	7
2.	**Data Description**- "Calculators, Computers, and Software Systems ", Describing Data on a Single Variable: Graphical Methods, Describing Data on a Single Variable: Measures of Central Tendency, Describing Data on a Single Variable: Measures of Variability, The Boxplot, Summarizing Data from More Than One Variable: Graphs and Correlation	9
3.	**Probability and Probability Distributions**- Bayes' Formula, Variables: Discrete and Continuous, Probability Distributions for Discrete Random Variables	7
4.	**Inferences about Population Central Values**- Estimation of mu, Choosing the Sample Size for Estimating of mu, A Statistical Test for mu	7
5.	**Inferences Comparing Two Population Central Values**- Introduction and Abstract of Research Study, Inferences about mu1 and mu2: Independent Samples, A Nonparametric Alternative: The Wilcoxon Rank Sum Test, Inferences about mu1 and mu2: Paired Data, A Nonparametric Alternative: The Wilcoxon Signed-Rank Test	9
6.	**Regression and Correlation-** Estimating Model Parameters, Inferences about Regression Parameters, Estimating Multiple Regression Coefficients	6
Total		**45**

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D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Ott, R. L., and Michael Longnecker. *An introduction to statistical methods and data analysis*. Cengage Learning Inc., 2010.
Supportive References	Goos, Peter, and David Meintrup. *Statistics with JMP: graphs, descriptive statistics and probability*. John Wiley & Sons, 2015.
Electronic Materials	Blackboard Material, YouTube videos, Tutorial Videos.
Other Learning Materials	R Software; and MATLAB

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of	Faculty members	Direct

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Assessment Areas/Issues	Assessor	Assessment Methods
assessment		
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification
(Bachelor)

Course Title:	Statistical Data Mining
Course Code:	STAT362
Program:	Bachelor of Applied Statistics in Data Analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Musaid bn Abdulrahman University (PMAU)
Version:	1
Last Revision Date:	10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 6th Level / 3rd Year					
4. Course general Description:					
This course will provide an introduction to the topic of data mining, and some statistical principles underlying its key methods. Topics covered will include data preprocessing, regression, classification, clustering, dimensionality reduction, and association analysis.					
5. Pre-requirements for this course (if any):					
Statistical Data Analysis - STAT246 Time Series - STAT354					
6. Co-requisites for this course (if any):					
No Co-requisites					
7. Course Main Objective(s):					
Students who successfully complete the course should 1- Demonstrate the ability to understand the basic concepts of data mining. 2- Develop relevant programming abilities. 3- Demonstrate proficiency with statistical analysis of data. 4- Demonstrate proficiency with data visualization methods. 5- Develop the ability to build and assess data-based model classifications.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom	45	100%

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No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	learn the basic ideas of data mining.	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam
1.2	Use software in solving mathematical and statistical problems such as data analysis techniques	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.0	**Skills**			
2.1	Understand all the related methods, from the classic topics of clustering and classification to database	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	methods (e.g., association rules, data cubes)			
2.2	Use software in solving mathematical and statistical problems	S3		• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Identify the basic concepts, analysis, and modeling of data sets	V1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.2	Identify, formulate and solve mathematical and statistical problems	V2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	**introduction to the multidisciplinary field of data mining.**	**9**
2.	**The general data features.**	**9**
3.	**Data preprocessing techniques.**	**9**
4.	**The basic concepts, modeling, design architectures, and general implementations of data warehouses**	**9**
5.	**The basic concepts and methods for data clustering**	**9**
Total		**45**

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D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Data Mining Concepts and Techniques, Third Edition 2012, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann Publishers
Supportive References	
Electronic Materials	Blackboard Material https://video.search.yahoo.com/search/video;_ylt=AwriiGvj0ZJn4QEAAlZXNyoA;_ylu=Y29sbwNiZjEEcG9zAzEEdnRpZAMEc2VjA3BpdnM-?p=Data+Mining&fr2=piv-web&type=E210US91105G0&fr=mcafee#id=1&vid=e7c69844ee03d003e48a2d12d5e147f6&action=view
Other Learning Materials	R Software; Matlab

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms-online setting - Blackboard Collaborate.
Technology equipment (projector, smart board, software)	Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.
Other equipment (depending on the nature of the specialty)	Accessible related site E library. Digital Writing pad.

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F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
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Course Specification

(Bachelor)

Course Title:	**Elementary Linear Algebra**
Course Code:	**MATH361**
Program:	**Bachelor of Applied statistics in Data analysis**
Department:	**Basic Sciences**
College:	**Science and Theoretical Studies**
Institution:	**Prince Musaid bin Abdulrahman University (PMAU)**
Version:	**1**
Last Revision Date:	**25.01.2025**

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A. General information about the course:

1. Course Identification

1. Credit hours: 3					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 6th Level/ 3rd Year					
4. Course General Description:					
This course introduces the fundamental concepts and techniques of linear algebra. Students will explore systems of linear equations, matrix operations, determinants, Euclidean vector spaces, general vector spaces, and matrix transformations. The course focuses on developing computational skills and a theoretical understanding, effectively preparing students for mathematics, physics, computer science, and engineering applications.					
5. Pre-requirements for this course (if any):					
Elementary Discrete Mathematics - MATH351					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
By the end of this course, students will be able to: 1. Solve systems of linear equations using various methods such as Gaussian elimination. 2. Perform operations with matrices, including finding inverses and understanding matrix properties. 3. Compute determinants and apply them to solve linear systems using Cramer's Rule. 4. Understand and apply concepts in Euclidean vector spaces, including orthogonality and vector operations. 5. Analyze general vector spaces, including subspaces, linear independence, basis, and dimension. 6. Compute and interpret matrix transformations and their properties.					

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2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Face to Face Lectures	15
2.	Virtual Lectures	15
3.	Field	
4.	Tutorial	
5.	Others (specify)	15
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Demonstrate an understanding of the fundamental concepts of linear algebra, including systems of linear equations, matrix operations, and determinants,	K1	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
1.2	Acquire basic linear algebra knowledge in defining problems and applications of vector spaces and subspaces, including notions of span, basis, and dimension.	K2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Solve systems of linear equations using various methods, such as Gaussian elimination and matrix inverses. Apply Cramer's Rule to compute solutions for linear systems using determinants.	S1	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
2.2	Develop creativity and imagination skills, self-assignment ability, and critical thinking with analytic ability in this course	S2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
2.3	Identify and describe the properties of vector spaces and apply these concepts to solve problems involving linear combinations and span dimensions.	S4	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Work independently to solve assignments in the course.	V1	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
3.2	Cooperate to work effectively on the group assignments.	V1	• Group teaching (F2F Lectures)	• Assignments • Midterm Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
			• Virtual sessions	• Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	**Systems of Linear Equations and Matrices** - Introduction to Systems of Linear Equations. - Gaussian Elimination. - Matrices and Matrix Operations. - Inverses; Algebraic Properties of Matrices. - Elementary Matrices and a Method for Finding A^{-1} - Diagonal, Triangular, and Symmetric Matrices.	8
2.	**Determinants** - Determinants by Cofactor Expansion. - Evaluating Determinants by Row Reduction. - Properties of Determinants; Cramer's Rule.	6
3.	**Euclidean Vector Spaces** - Vectors in 2-Space, 3-Space, and n-Space - Norm, Dot Product, and Distance in $\mathbb{R}^n$ - Orthogonality - The Geometry of Linear Systems - Cross Product	9
4.	**General Vector Spaces** - Real Vector Spaces - Subspaces - Linear Independence - Coordinates and Basis - Dimension - Change of Basis - Row Space, Column Space, and Null Space - Rank, Nullity, and the Fundamental Matrix Spaces - Matrix Transformations from $\mathbb{R}^n$to $\mathbb{R}^m$ - Properties of Matrix Transformations	22

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Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Coursework and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	– Anton H and Rorres C. (2011). Elementary Linear Algebra with Supplemental Applications, 10th Edition. USA, John Wiley & Sons, Inc.
Supportive References	– Gilbert S.,(2009), Introduction to Linear Algebra, 4th Edition, Wellesley Cambridge. – Kenneth R., Shiskowski M. and Frinkle K. (2011), Principles of Linear Algebra with Mathematica, Wiley.
Electronic Materials	• https://en.wikipedia.org/wiki/Linear_algebra • http://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms are conducted in an online environment using Blackboard Collaborate.
Technology equipment (projector, smart board, software)	The branch offers Wi-Fi speed access, an interactive smart board, and on-site IT technicians.

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Items	Resources
Other equipment (depending on the nature of the specialty)	Accessible related sites: E-Library and Digital Writing Pad.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect "Student-Survey"
Effectiveness of Students' assessment	Faculty members	Direct Survey
Quality of learning resources	Faculty members	Direct Survey
The extent to which CLOs have been achieved	Quality coordinator	Course Report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
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Course Specification

(Bachelor)

Course Title: Multivariate Analysis
Course Code: STAT363
Program: Bachelor of Applied Statistics in Data Analysis
Department: Basic Sciences
College: Science and Theoretical Studies
Institution: Prince Musaid bin Abdulrahman University (PMAU)
Version: 1
Last Revision Date: 10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 6th Level / 3rd Year					
4. Course general Description:					
This course covers foundational concepts in Multivariate Techniques like principal components, factor, cluster and discriminant analyses were studied with examples. The use of computer packages is emphasized in this course. Real life data are often used to illustrate the power and applicability of multivariate methods.					
5. Pre-requirements for this course (if any)**:**					
Time Series Analysis- Stat354, Nonparametric Statistics Stat352					
6. Co-requisites for this course (if any)**:**					
No Co-requisites					
7. Course Main Objective(s):					
At the end of this course, students should: 1. Reviewing the available decisions and the state of nature of each decision 2. Training the students to make Statistical decisions under uncertainty with or without data 3. Recognize the appropriate multivariate method for a problem 4. Employ statistical software to conduct the appropriate analysis					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

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3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Use statistical analysis in decision making	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Calculate statistical quantities like the multivariate mean, covariance matrix and the generalized variance.	K3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.0	Skills			
2.1	Apply the techniques of canonical correlation and discriminant analysis.	S4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Apply the techniques of cluster analysis and multidimensional scaling.	S4	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Select an appropriate statistical package to analyze multivariate data.	V2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	Employ statistical software to conduct the appropriate analysis	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions •	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Multivariate Data: Summary Statistics, Plots	4
2.	The Multivariate Normal Distribution	7
3.	Inference about multivariate means	6
4.	Multivariate analysis of variance	6
5.	Principal Components Analysis	6
6.	Factor Analysis	6
7.	Canonical Correlation	4
8.	Cluster Analysis	6
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Applied Multivariate Statistical Analysis. Edition: 6th edition, Richard A. Johnson and Dean W. Wichern, Prentice Hall
Supportive References	Multivariate Statistical Methods and It's Applications. A. C. Rencher, 1998, John Wiley and sons, Inc.

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Electronic Materials	Blackboard Material, YouTube videos, Tutorial Videos.
Other Learning Materials	R Software; and MATLAB

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

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Course Specification
(Bachelor)

Course Title: Stochastic Processes
Course Code: STAT364
Program: Bachelor of Applied Statistics in Data Analysis
Department: Basic Sciences
College: Science and Theoretical Studies
Institution: Prince Maid bin Abdulrahman University (PMU)
Version: 1
Last Revision Date: 10-1-2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)

2. Course type

A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		

3. Level/year at which this course is offered: 6th Level / 3rd Year

4. Course general Description:

This course covers foundational concepts in stochastic processes and other related topics. Starting with Random Walks to Markov chains, random walks, Classification of States and Processes, Renewal Processes, Expected Size of the Population and Birth and Death Processes. The course requires basic knowledge in probability theory and linear algebra including conditional expectation and matrix. By studying these topics, students will gain a strong understanding of stochastic processes and their applications across various fields.

5. Pre-requirements for this course (if any):

Principle Of Probability 2 - STAT242

6. Co-requisites for this course (if any):

Elementary Linear Algebra - MATH361

7. Course Main Objective(s):

At the end of this course, students should:

1. Gain a strong understanding of stochastic processes and their applications across various fields.
2. Develop skills in using transition matrices to model and predict state transitions in Markov processes and classify different types of states and processes to determine long-term system behaviors and stability.
3. Analyze the impact of birth, death, and migration processes on population dynamics and other systems, applying these concepts to practical scenarios in fields like ecology, economics, and queuing theory.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%

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No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand the definition of a stochastic process and in particular a Markov process	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Calculate the distribution of a Markov chain at a given time	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam
2.0	Skills			
2.1	Classify the states of a Markov chain	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Describe a Markov chain and its transition matrix	S2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Determine the stationery and equilibrium distributions of a Markov chain	V1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.2	Understand the definition and derive some basic properties of a Poisson process.	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Random walk, Markov chains	**9**
2.	Classification of states and processes	**9**
3.	Transition matrices, Renewal processes	**6**
4.	Expected size of the population	**6**
5.	Birth and death processes	**6**
6.	Simple and general effect of migration	**9**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Assessments (Course work and Assignments)**	**1-14**	**40%**
2.	**Midterm Exam**	**8**	**20%**
3.	**Final Exam**	**16**	**40%**
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

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Essential References	Oliver Knill; *Probability Theory and Stochastic Processes with Applications*, OVERSEAS PRESS (INDIA) PVT. LTD.
Supportive References	
Electronic Materials	**Blackboard Material, YouTube videos, Tutorial Videos.**
Other Learning Materials	**1. Microsoft Excel; 2. R Software**

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

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Course Specification

(Bachelor)

Course Title:	**Statistical Machine Learning**
Course Code:	**STAT473**
Program:	**Applied Statistics in Data Analysis**
Department:	**Basic Sciences**
College:	**Science and Theoretical Studies**
Institution:	**Prince Musaid bin Abdulrahman University (PMAU)**
Version:	**1**
Last Revision Date:	**10-01-2025**

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A. General information about the course:

1. Course Identification

1. Credit hours: 3

2. Course type

A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		

3. Level/year at which this course is offered: 7th Level/ 4th year

4. Course general Description:

Based on fundamental knowledge of computer science principles and skills, probability and statistics theory, and the theory and application of linear algebra, this course provides a broad introduction to machine learning models, such as Parameter Estimation, sufficient statistics, decision trees, artificial neural networks. It will familiarize students with a broad cross-section of predication and clustering models and algorithms for machine learning.

5. Pre-requirements for this course (if any):

STAT246 - Statistical Data analysis
STAT362 - Statistical Data Mining
MATH361 – Elementary Linear Algebra

6. Co-requisites for this course (if any):

STAT476 – Statistical Packages 2

7. Course Main Objective(s):

Upon completion of the course, the student should be able to:

1- Understand the fundamentals of machine learning concepts and models that enable them to apply them in real use cases.
2- Use machine learning models in decision making and artificial intelligence prediction

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom	45	100%

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No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	15
2.	**Laboratory/Studio**	
3.	**Virtual Lectures**	15
4.	**Tutorial**	
5.	**Others: Interactive**	15
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the concepts and theory of machine learning.	K2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
1.2	Identify different techniques and tools of machine learning and their domains of application.	K2	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Use various machine learning models in a range of real-world applications.	S3	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively in teams to accomplish a common goal.	V1	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction in machine learning with Some basic concepts in machine learning	**3**
2.	A brief review of probability theory and decision trees	**3**
3	Generative models for discrete data	**6**
4	Bayesian statistics and Frequentist statistics	**6**
5	Support Vector Machine	**9**
6	Unsupervised Learning; Clustering	**9**
7	Artificial Neural Networks	**9**
Total		**45**

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D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Murphy, Kevin P. *Machine learning: a probabilistic perspective*. MIT press, 2012.
Supportive References	Understanding Machine Learning: From Theory to Algorithms, by Shai Shalev-Shwartz and Shai Ben-David, Cambridge University, 2014. Müller, Andreas C., and Sarah Guido. *Introduction to machine learning with Python: a guide for data scientists*. " O'Reilly Media, Inc.", 2016. Badillo, Solveig, et al. "An introduction to machine learning." *Clinical pharmacology & therapeutics* 107.4 (2020): 871-885.
Electronic Materials	https://www.youtube.com/watch?v=jGwO_UgTS7I&list=PLoROMvodv4rMiGQp3WXShtMGgzqpfVfbU
Other Learning Materials	R Software; and python

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

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F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect "Student-Survey"
Effectiveness of Students assessment	Faculty members	Direct Survey
Quality of learning resources	Faculty members	Direct Survey
The extent to which CLOs have been achieved	Quality co-ordinator	Course report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
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Course Specification

(Bachelor)

Course Title:	Statistical Packages 2
Course Code:	Stat 476
Program:	Bachelor of Applied statistics in Data analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Maid bin Abdulrahman University (PMU)
Version:	1
Last Revision Date:	25.01.2025

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A. General information about the course:

1. Course Identification

1. Credit hours: 03					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 8th Level/ 4th Year					
4. Course General Description:					
This course aims to increase the student's knowledge in a more professional way in analyzing data using one of the programs specified in this course, using one of the following programs: SPSS, R, MATLAB or Python to conduct experimental analyses according to different sorting methods, and this course includes submitting a report to analyze the additional data collected by the student.					
5. Pre-requirements for this course (if any):					
None					
6. Co-requisites for this course (if any):					
Statistical Machine Learning -Stat473					
7. Course Main Objective(s):					
By the end of this course, students will be able to: 1. Gain a practical understanding of professional and ethical standards in the use of statistical software. 2. Use statistical software in decision making					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

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No	Activity	Contact Hours
1.	Lectures	10
2.	Laboratory/Studio	10
3.	Laboratory/Studio	
4.	Virtual Lectures	10
5.	Others (specify)	15
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand and comprehend the foundations and methods of using statistical software and their application.	K4	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Quizzes
2.0	**Skills**			
2.1	Interpret data results from a statistical perspective.	S3	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Prepare work reports on the results according to what the statistical software showed.	V3	• Group teaching (F2F Lectures) • Virtual sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Determined by the instructor and the student.	45
	Total	**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	Weeks: 5,10	30%
3.	Practical tests	Weeks: 7,12	70%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Determined by the instructors
Supportive References	–
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

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F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student-Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

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Restricted - مقيد

Course Specification

(Bachelor)

Course Title:	**Numerical Analysis**
Course Code:	**MATH475**
Program:	**Bachelor of Applied Statistics in Data Analysis**
Department:	**Basic Sciences**
College:	**Science and Theoretical Studies**
Institution:	**Prince Musaid bin Abdulrahman University (PMAU)**
Version:	**1**
Last Revision Date:	**20-01-2025**

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 7th level / 4th year					
4. Course general Description:					
This course introduces the fundamental concepts of numerical methods and the relationship between numerical analysis and other branches of science & technology. The course includes the classifications of numerical errors, numerical methods for solving nonlinear equations and linear system of equations, finite differences and interpolation, numerical differentiation, numerical integration, and numerical solution of ordinary differential equations.					
5. Pre-requirements for this course (if any):					
Elementary Linear Algebra - MATH361					
6. Co-requisites for this course (if any):					
No Co-requisites					
7. Course Main Objective(s):					
After completing the course, the students will be able to **1. recognize the importance of using numerical methods to solve problems.** **2. demonstrate proficiency in applying numerical methods to a variety of mathematical and physical problems.** **3. interpret results of numerical solutions and draw conclusions.**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom	56	100%

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No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Acquire Mathematical Knowledge in analysis of Errors and their propagation	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Identify key aspects of numerical methods to obtain approximate solutions to algebraic, transcendental and system of linear equations.	K2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.0	Skills			
2.1	Develop skills in analyzing the methods of interpolation	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Derive numerical methods for various mathematical operations	S2	• Group Learning (Face to Face Sessions)	• Assignments • Online Quizzes • Midterm Exam

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	and tasks such as Differentiation, Integration and solution of differential equations.		• Virtual Sessions	• Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Analyze and evaluate the accuracy of common numerical methods	V1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.1	Use Mathematical Software in analyzing the results.	V2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Errors in Numerical Calculations: Mathematical Preliminaries, Errors and their computations, a general Error Formula, Error in a Series Approximation.	**7**
2.	Solution of Algebraic and Transcendental Equations: Bisection Method, Method of False Position, Iteration Method, Newton–Raphson Method	**7**
3.	Interpolation: Errors in Polynomial Interpolation, Newton's Forward Interpolation- Newton's Backward Interpolation, Lagrange Formula- Newton 's Divided Difference.	**6**
4.	Numerical Differentiation and Integration: Numerical Differentiation: using Newton's Interpolation formulae Numerical Integration: Trapezoidal rule- Simpson's 1/3 rule- Simpson's 3/8 rule	**10**
5.	Numerical Linear Algebra: Direct methods for solving linear systems (Gauss elimination, LU decomposition) and iterative methods (Jacobi –Gauss Seidel –	**10**

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	Relaxation)-errors- iteration matrices and convergence of iterative methods.	
6.	Numerical Solution of Ordinary Differential Equations: Taylor, Picard, Euler's method for solving differential equations of first order.	**5**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Assessments (Course work and Assignments)**	**1-14**	**40%**
2.	**Midterm Exam**	**8**	**20%**
3.	**Final Exam**	**16**	**40%**
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Introductory Methods of Numerical Analysis(5th Ed.) by SS Shastri, PHI Learning Private Limited, New Delhi. ISBN-978-81-203-4592-8
Supportive References	R.L. Burden and J.D. Faires: Numerical Analysis. 9th Edition Brooks / cole , 2011
Electronic Materials	Blackboard Material, YouTube Videos, Tutorial Videos.
Other Learning Materials	MATLAB

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

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F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect "Student-Survey"
Effectiveness of Students assessment	Faculty members	Direct Survey
Quality of learning resources	Faculty members	Direct Survey
The extent to which CLOs have been achieved	Quality co-ordinator	Course report

Other

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
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Course Specification
(Bachelor)

Course Title: Introduction in Actuarial Statistics	
Course Code: STAT471	
Program: Bachelor of Applied Statistics in Data Analysis	
Department: Basic Sciences	
College: Science and Theoretical Studies	
Institution: Prince Maid bin Abdulrahman University (PMU)	
Version: 1	
Last Revision Date: 10-1-2025	

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 7th Level / 4th Year					
4. Course general Description:					
This course covers foundational concepts in actuarial science and other related topics. As well as calculating mortality rates, death rates and identifying the different methods for smoothing death rates, and identifying the statistical tests used to test the fit and smoothing of death rates.					
5. Pre-requirements for this course (if any):					
Descriptive statistics - STAT361					
6. Co-requisites for this course (if any):					
No Co-requisites					
7. Course Main Objective(s):					
At the end of this course, students should: 1. Learn the basic concepts of actuarial science and calculate and prepare for mortality rates. 2. Demonstrate mastery of advanced statistical terms and concepts. 3. Formulate steps in explaining phenomena and making decisions based on available data 4. Generate and present appropriate statistical analysis given statistical data 5. Apply statistical procedures using software that is appropriate for different types of data.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

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3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Demonstrate mastery of actuarial statistical terms and concepts	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.0	Skills			
2.1	Generate and present appropriate statistical analysis given statistical data	S1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.2	Apply statistical procedures using R software	S3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Apply statistical procedures using software that is appropriate for different types of data.	V2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.2	Formulate steps in explaining phenomena and making decisions based on available data	V3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam

C. Course Content

No	List of Topics	Contact Hours

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1.	Introduction and motivation- Risk and insurance, Deterministic versus stochastic models, Finance and investments, Adequacy and equity	**6**
2.	The basic deterministic model- Cashflows, an analogy with currencies, Discount functions, Calculating the discount function, Interest and discount rates, Constant interest	**6**
3.	The life table - Basic definitions, Probabilities, Constructing the life table from the values of qx, Life expectancy, Choice of life tables, Standard notation and terminology, A sample table.	**6**
4.	Introduction to life insurance- Background, Life insurance and annuity contracts, Traditional insurance contracts, Modern insurance contracts, pension benefit, Survival Models	**9**
5.	Claims Reserving and Pricing, Chain Ladder Methods, Average Cost per Claim Method, Loss Ratio Method, Statistical Modelling and the Separation Technique	**6**
6.	Loss Distribution-Introduction to Loss Distributions, Classical Loss Distributions, Fitting Loss Distributions, Loss Distributions and Reinsurance	**6**
7.	Risk Theory-Risk models for Aggregate Claims, Collective Risk Models, Individual Risk Models for S, Premiums and Reserves for Aggregate Claims, Reinsurance for Aggregate Claims	**6**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Assessments (Course work and Assignments)**	**1-14**	**40%**
2.	**Midterm Exam**	**8**	**20%**
3.	**Final Exam**	**16**	**40%**
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Promislow, S. David. *Fundamentals of actuarial mathematics*. John Wiley & Sons, 2014.

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Supportive References	**Dickson, David CM, Mary R. Hardy, and Howard R. Waters. *Actuarial mathematics for life contingent risks*. Cambridge University Press, 2020.**
Electronic Materials	**Blackboard Material, YouTube videos, Tutorial Videos.**
Other Learning Materials	**R Software**

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms-online setting - Blackboard Collaborate.**
Technology equipment (projector, smart board, software)	**Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.**
Other equipment (depending on the nature of the specialty)	**Accessible related site E library. Digital Writing pad.**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
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Restricted - مقيد

Course Specification

(Bachelor)

Course Title:	Sequential Analysis
Course Code:	STAT472
Program:	Bachelor of Applied Statistics in Data Analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Maid bin Abdulrahman University (PMU)
Version:	1
Last Revision Date:	2025-1-10

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 7th Level/ 4th Year					
4. Course general Description:					
This course aims to introduce the student to the basics of sequential analysis and explain the important basic theories. This course includes sequential tests of statistical hypotheses, sample size intervals for sequential tests, Wald identity, decision to stop at probability (1.0) in sequential probability fit test, confidence limits for sample size average.					
5. Pre-requirements for this course (if any)**:**					
STAT361- Descriptive Statistics STAT352 - Nonparametric Statistics					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
At the end of this course, students should: 1. Be familiar with standard group sequential methodology 2. Be able to apply sequential and adaptive methods 3. Be able to understand the advantages and disadvantages to sequential and adaptive designs					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

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3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Face to Face Lectures**	**15**
2.	**Virtual Lectures**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify):** Interactive Learning	**15**
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand the definition of the sequential methods	K1	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
1.2	Acquire the knowledge necessary for sequential tests of statistical hypotheses.	K3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
2.0	Skills			

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Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Use computer statistical software to solve sequential analysis problems	S3	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam • Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Employ the sequential analysis methods in making statistical judgments.	V2	• Group Learning (Face to Face Sessions) • Virtual Sessions	• Assignments • Online Quizzes • Midterm Exam Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Course Introduction	**3**
2.	Sequential testing of Normal Random Variables	**9**
3.	Brownian Motion and Asymptotically Normal test statistics	**3**
4.	Estimation after a sequential trial	**3**
5.	Confidence intervals and p-values	**3**
6.	sequential tests of statistical hypotheses	**9**
7.	Bayesian Sequential methods	**3**
8.	sequential probability ratio test.	**9**
Total		**45**

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D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assessments (Course work and Assignments)	1-14	40%
2.	Midterm Exam	8	20%
3.	Final Exam	16	40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Oliver Knill; ***Probability Theory and Stochastic Processes with Applications***, OVERSEAS PRESS (INDIA) PVT. LTD.
Supportive References	
Electronic Materials	Blackboard Material, YouTube videos, Tutorial Videos.
Other Learning Materials	1. Microsoft Excel; 2. Statdisk

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms-online setting - Blackboard Collaborate.
Technology equipment (projector, smart board, software)	Wi-Fi speed access, Interactive smart Board and Availability of IT technician in the branch.
Other equipment (depending on the nature of the specialty)	Accessible related site E library. Digital Writing pad.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching and assessment, Quality of learning resources, Instructor's interaction with students, Blackboard tool efficiency, and reasonability of assessments' grading	Students	Indirect "Student- Survey"

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Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of assessment	Faculty members	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Restricted - مقيد

Course Specification

(Bachelor)

Course Title:	Graduation project
Course Code:	STAT 483
Program:	Bachelor of Applied statistics in Data analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Maid bin Abdulrahman University (PMU)
Version:	1
Last Revision Date:	25.01.2025

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A. General information about the course:

1. Course Identification

1. Credit hours: 03					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 8th Level/ 4th Year					
4. Course General Description:					
This course aims to raise the level of research and development among the students and increase the foundations of scientific research. This course includes two main parts: The first includes reading some studies on applications in statistical data analysis for different case studies and discussing them in the hall in terms of the scientific aspects of scientific research. The second includes conducting statistical analysis of real data collected by the student or provided to him by the teacher and then writing a report on the student's study and discussing it.					
5. Pre-requirements for this course (if any):					
Available for fourth year undergraduate					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
By the end of this course, students will be able to: 1. Get a practical understanding of professional and ethical standards in making statistical judgments. 2. use their knowledge in decision-making					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning	0	0%

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3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	45
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the importance of scientific research and statistical applications of data.	K2	Practice on writing reports and scientific research	• Evaluation of the student final report • Ora Presentation
2.0	**Skills**			
2.1	Analyze real data set using statistical software.	S3	•Training student in a company. •Practice on writing reports	• Evaluation of the student final report Ora Presentation
3.0	**Values, autonomy, and responsibility**			
3.1	Prepare and write a comprehensive scientific case study within the accepted rules of scientific research	V2	Group Discussions Individual and Group Assignments	- Self-reporting -Instructor assessment sheet
...				

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C. Course Content

No	List of Topics	Contact Hours
1.	Determined by the instructor and the student.	45
	Total	**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Project Evaluation, Writing Method and Results	Week 14	60%
6.	Student presentation	Week 14	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Determined by the instructor and the student.
Supportive References	–
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
Depending on the nature of the training	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of training	Students	Indirect "Student-Survey"
The extent to which CLOs have been achieved	Quality coordinator	Course Report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

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Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

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Course Specification

(Bachelor)

Course Title:	Internship
Course Code:	STAT 484
Program:	Bachelor of Applied statistics in Data analysis
Department:	Basic Sciences
College:	Science and Theoretical Studies
Institution:	Prince Maid bin Abdulrahman University (PMU)
Version:	1
Last Revision Date:	25.01.2025

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A. General information about the course:

1. Course Identification

1. Credit hours: 6					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 8th Level/ 4th Year					
4. Course General Description:					
The Internship course aims to connect students with professional experience as trainees in Statistic and data analysis					
5. Pre-requirements for this course (if any):					
Available for fourth year undergraduate students as well as intermediate diploma students as a graduation requirement.					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
By the end of this course, students will be able to: 1. Apply the basic principles of working as a member of a multidisciplinary team 2. Get a practical understanding of professional and ethical standards in making statistical judgments. 3. Use their knowledge in decision-making					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	90	100%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

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No	Activity	Contact Hours
1.	Lectures	
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Training	90
Total		90

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Apply the knowledge and theoretical methods in real life applications	K1	•Training student in a company. •Practice on writing reports	• Methods Evaluation of the trainer and the Supervisor. • Evaluation of the student final report • Ora Presentation
2.0	**Skills**			
2.1	Take responsibility, and respect regulations and laws	S4	•Training student in a company. •Practice on writing reports	• Methods Evaluation of the trainer and the Supervisor. • Evaluation of the student final report • Ora Presentation
3.0	**Values, autonomy, and responsibility**			

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Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.1	Cooperate to work effectively on the group tasks.	V1	•Training student in a company. •Practice on writing reports	• Methods Evaluation of the trainer and the Supervisor. • Evaluation of the student final report • Ora Presentation
3.2	Work independently to get the job done.	V3	•Training student in a company. •Practice on writing reports	• Methods Evaluation of the trainer and the Supervisor. • Evaluation of the student final report • Ora Presentation

C. Course Content

No	List of Topics	Contact Hours
1.	**To be determent by the supervisor and student**	90
	Total	**90**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignment 1 - The first monthly report	Week 4	10%

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No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Assignment 2 - The first monthly report	Week8	10%
3.	Assignment 3 - The first monthly report	Week 12	10%
4.	Field Advisor Assessment – Attendance	Week 13	10%
5.	Advisor Assessment – Student evaluation	Week13	20%
6.	Student presentation	Week 14	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	- To be determent by the supervisor and student
Supportive References	- Self-learning via attending the training course
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
Depending on the nature of the training	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of training	Students	Indirect "Student-Survey"
The extent to which CLOs have been achieved	Quality coordinator	Course Report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	

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DATE	

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