School of Professional Advancement
Course Outline

Course Title Statistical Methods for Management Decisions

Course Type Foundational

Course Description & Format

Statistical analysis refers to collection of data, methods for processing the data and its manipulation for analyzing useful inclination. Statistical analysis is useful while dealing with bulk of noisy data, as it provide ways to report on how usual/unusual an event is depending on historical statistics.

The course of statistical analysis is divided in two major modules. The first module will cater theoretical knowledge of data collection and classification techniques. Second module will focus on data analysis and data manipulation relying on inferences from probability methods.
The course of statistical analysis in management decision aims to develop the skills for exploration of variables and relationship between them. It will impart the knowledge of major statistical analysis tools like hypothesis testing, measures of central tendency, deviation, correlation and regression. This course will also include IT applications of statistical tools and a number of case studies.

Course Instructional Objectives

1. The purpose of this course is to instill the statistical analysis approach and skills for decision making through data processing and manipulation
2. In class exercises and practical case studies will assist to gain the practical knowledge of statistical analysis
3. This course will teach the decision making process. It will help the participants to generate quantitative evidence for proper and rational decision making in management processes to meet the required goals.
4. Students will learn the interpretation of statistical computer output for model building and decision making.

Course Student Objectives

1. Students will learn data analysis its application and statistical methodology as an integral part of management decisions.
2. Students will be given some practical business scenarios, to demonstrate the stats for the functional areas of business and public sector.
3. This course will enable the students to review, interpret, design the statistical models leading to effective quantitative decision making.

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Course Contents

Following is the session-wise breakup of the course:

Session 1: Introduction

One-to-one introduction
Description of Course
Discussion on Course Outline
Setting up of Class Norms
An Introduction to Basic Statistics

Session 2: Statistics and its types

Reading 1: Types of Statistics

Statistics in Accounting, Finance, Marketing, Production and Economics
Growth and development of modern statistics
Statistical thinking and modern management
Types of Statistics
Inferential Statistics
Descriptive Statistics
Quantitative and Qualitative data

Learning Outcomes

This session will highlight the types of statistics and their application in different sectors. It will also explain the difference between quantitative and qualitative techniques used as a tool of questionnaire.

Session 3: Data and Statistics

Reading 2: Data Collection

Data
Sources of data
Elements and variables
Types of variables
Data Acquisitions Errors

Case Study: Alumni Association Survey

Learning Outcomes
The case study will distinguish the types of data collected through different data sources and identification of variables. It will further highlight the types of error usually occurred during the process of data collection

Session 4: Sampling

Reading 3: Sampling and Sampling distribution

Sampling Distribution of p and x
Properties of point estimators
Other sampling methods (Cluster, Systematic ...)

In-class activity

Discussion on sampling techniques for each class group

Session 5: Presentation of data

Reading 4: Presenting data in tables and charts

Organizing numerical data
Tables and charts for numerical data
Table and charts for categorical data
Tabulation and graphing categorical data

In Class Activity (5 marks)

1. *The case of frequency distribution*
2. *Development of tables and its graphical representation*

Learning Outcomes

These readings will provide the base for organization of data in order to extract the useful information. Furthermore students will learn tabulation and graphical representation of data for execution of variables.

Session 6: Central tendency and data dispersion

Reading 5: Describing Data

Measures of central tendency
Data Dispersion
Experiment and sample space

Assignment

1. *Examples of central tendency*
2. *Measure of dispersion (Problem Solving)*

Learning Outcomes

Examples of central tendency and Dispersion will highlight the importance of averages and spread of data or population.

Session 7: Probability

Reading 6: Basic Probability
Sample Space

Events
Chances and Likelihood
Associating the probabilities (with examples)

Learning Outcomes
Probability will highlight the importance of "chance" and "likelihood" as an important term of statistics**.**

Session 8: Joint and Marginal Probabilities

Reading 7: Basic Probability: Joint and Marginal Probabilities
Contingency Tables
Joint Probabilities
Conditional Probability
Statistical Independence

Learning Outcomes

This lecture will continue the probability by introducing the concept contingency tables and calculations for conditional and joint probabilities with respect to specific events

Session 9: Multiplication and Additional rules for probabilities

Reading 8: Basic Probability: Multiplication and Additional rules

Additional rule for statistical independent events
Multiplication rule for statistical independent events

In-Class Activity
1. *Exercises for Statistical independence (multiplication and addition rules)*

Learning Outcomes

In this session the students will learn the addition and multiplication for statistical independent events and application of these rules for different events.

Session 10: Normal Distribution

Reading 9: The normal distribution

Normal Distribution
Calculating normal probabilities
Assessing the normality assumptions
Generating normal probability plots

In-Class Activity (5 marks)
Cases for Discussion: Confidence Interval and Ethical Issues
1. *Exercise: 6.14, 6.15, 6.18,6.21 and 6.28*

Learning Outcomes

These exercises will highlight two major concepts of point estimation and interval estimation used for normal distribution.

Session 11: Confidence Interval

Reading 10: Confidence Interval Estimation

Confidence Interval Estimation of the Mean (sigma known)
Confidence Interval Estimation of the Mean (sigma unknown)
Calculating the confidence interval estimate for the population

In-class Activity:
Chapter Review Problems

Learning Outcomes

It will also discuss how to determine size of sample that should be selected in a survey. Students will learn, an appropriate sample size for different number of population and essence of sample in determining the characteristics of population

Session 12: Hypothesis

Reading 11: Hypothesis Testing

Development of null and alternative hypothesis
Type I and II Errors
The critical value of test static
Region of projection and non- projection
Critical value approach to hypothesis testing

Assignment
1. *Applying the concepts for hypothesis testing*

Learning Outcomes

This session will focus on statistical inference. A step by step approach will be followed to make inference about population parameters by analysing differences between the observed results (sample). Another major concept of this session would be fundamental and theoretical underpinning of hypothesis testing methodology.

Session 13: Correlation, Simple Linear regression

Reading 11: Simple linear regression and correlation
Causality
Cause and effect scenario
Correlation (measuring the strength of association)

Determining simple linear regression
Calculating the simple linear regression
Measures of variation
Residual analysis

In-class activity
Conducting and calculating the regression analysis (exercise)

Learning Outcomes

This session comprises of two major concepts of correlation and simple regression. In regression analysis focus would be on prediction. Students will learn the development of statistical model that can be used to predict the values or two different types of variables
Correlation analysis will emphasize the measure of association between the values of two variables.

Recommended Book (s) & Text:

A comprehensive Course Pack with selection of readings from reputed texts on the subject will be provided.

E-Resources: http://moodle.umt.edu.pk

ASSESSMENT METHODOLOGY

Class Participation	10
Assignment	10
Quizzes	10
Group-Projects	15
Mid-Term	20
Final Term	35
Total	100

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CALENDAR OF ACTIVITIES

Session	Sub-Topic	Readings	Activities
1	Introduction		
2	Statistics and its types	Types of Statistics	
3	Data and Statistics	Data Collection	
4	Sampling	Sampling and Sampling distribution	Yes
5	Presentation of data	Presenting data in tables and charts	Yes
6	Central tendency and Data Dispersion	Describing Data	Yes
7	Probability	Introduction to probability	
8	Joint and Marginal Probability	Discrete Probability Distribution	
9	Multiplication and Addition rules for statistical independent events	The Uniform and Exponential Probability Distribution	Yes
10	Normal Distribution	The normal distribution	Yes
11	Confidence Interval	Confidence Interval Estimation	Yes
12	Hypothesis	Hypothesis Testing	Yes
13	Correlation, Simple Linear regression	Simple linear regression and correlation	Yes
14	Final Term Exam		