Department of Economics

### Forman Christian College

(A Chartered University)

Spring 2023

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| Course Title | Statistics for Economists  |
| Course Information | Econ – 203 (B), 3 credits. Pre-requisite = None |
| Class Timing /Venue | 9:30am to 10:45 am (Tuesday and Thursday , E-204)  |
| Instructor | Dr. Zahid Iqbal |
| E-mail / Cell#/ Office | zahidiqbal@fccollege.edu.pk / 0333-4351443/ E-208 |
| Office Hours | Monday Wednesday: 9:00 am to 10:00am |

**COURSE DESCRIPTION:** Econ 203 is designed to introduce the students with basic concepts of Statistics and their application in Economics. The course focuses on measures of central tendency and variability, basic concepts in probability and probability distributions, sampling and sampling distributions, hypothesis testing, regression and correlation analysis. After the completion of course students will be able to apply statistical techniques to analyze real life economic problems.

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| **Course Learning Outcomes/Objectives** | **Program Learning Objectives**  | **Course Assessment Items** |
| Upon completing this course, students will be able to | This course helps you to develop the following Program Learning Objectives  | This learning outcome will be assessed in the following items: |
| Explain basic statistical methods and know when to apply appropriate methods in practical scenarios. Employ statistical tools and skills to interpret characteristics of data relevant to problems in economics |  Objective 1 , Objective 3 | Case study assessmentAssignmentMid-term testFinal Exam |
| Independently use Excel’s graphical and statistical capabilities | Objective 2 Objective 4 | Case study assessmentAssignment |
| Formulate and solve real problems amenable to statistical analysis using data that arise in Microeconomics ,macroeconomics and Econometrics, using methods appropriate to the problem and data available | Objective 1Objective 2Objective 3Objective 5 | Case study assessmentAssignmentMid-term testFinal Exam |
| Explain and demonstrate the ethical responsibilities associated with reporting statistical results. | Objective 5Objective 6 | Case study assessment |
| Apply descriptive statistics such as measures of central tendency, variability and association between two variables. |  | Quiz1 , Assignment 1 |
|  Compute the expected value and variance of any random variable. |  | Quiz2 , Mid Term 1 |
|  Use discrete and continuous probability distributions for economic problems. |  | Mid Term 2 |
| Demonstrate the central limit theorem and its implications. Construct and interpret interval estimations. . Test various hypotheses to make statistical inferences. |  | Quiz3 , Assignment 2 , Final Term  |
| Test various hypotheses to make statistical inferences. |  | Final Term |
| Apply regression analysis to estimate the linear relationship between two variables. |  | Final Term |

# BASIC TEXT BOOK

1. Douglas A. Lind, William G. Marchal and Samuel A. Wathen, 2017.Statistical Techniques in Business and Economics,McGraw-Hill Companies, 17th Edition

**TEACHING-LEARNING METHODOLOGY**

Basic methodology of this course is based upon the following

Learning/teaching methodologies include:

* Lectures
* Handouts
* Skill Development Exercises
* Assignments/Case Study
* Software

**ASSESSMENT & EVALUATION**

 Quizzes 10 %

 Assignments 10 %

Case Study 10%

 Mid Term1 Examination 20 %

Mid Term2 Examination 20%

 End Term Examination 30 % **Total 100**

Calendar of Activities

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| **Lecture No**  | **Contents**  | **Learning outcomes**  | **Activities**  |
| 1 | **What Is Statistics?**Why Study Statistics? What Is Meant by Statistics? Types of Statistics Descriptive Statistics Inferential Statistics  | 1. Define statistics and provide an example of how statistics is applied.2**.** Differentiate between descriptive and inferential statistics |  |
| 2 | Types of Variables  Levels of Measurement Nominal-Level Data Ordinal-Level Data Interval-Level Data Ratio-Level Data  | 1. Classify variables as qualitative or quantitative, and discrete or continuous.2. Distinguish between nominal, ordinal, interval, and ratio levels of measurement. |  |
| 3 | **Describing Data** Constructing a Frequency Table Relative Class Frequencies Graphic Presentation of Qualitative Data  | Summarize qualitative variables with frequency and relative frequency tables. |  |
| 4 | Constructing Frequency Distributions:Quantitative DataGraphic Presentation of a FrequencyDistribution Histogram Frequency Polygon | 1. Summarize quantitative variables with frequency and relative frequency distributions.2. Display a frequency distribution using a histogram or frequency polygon. | **Computer Applications** |
| 5 | **Describing Data**The Population Mean The Sample Mean Properties of the Arithmetic Mean The Weighted Mean | Compute and interpret the mean, and weighted mean. |  |
| 6 | The Median  The Mode  The Relative Positions of the Mean,Median, and Mode | Compute and interpret Median and Mode  |  |
| 7 | The Geometric Mean  | Compute and interpret GM |  |
| 8 | Why Study Dispersion?  Measures of Dispersion Range Mean Deviation Variance and Standard Deviation | Compute and interpret the range, variance, and standard deviation. |  |
| 9 | Interpretation and Uses of the StandardDeviation Chebyshev’s Theorem The Empirical Rule | Explain and apply Chebyshev’s theorem and the Empirical Rule. | **Quiz 1** |
| 10 | **Describing Data: Displaying and****Exploring Data**Introduction Dot Plots Stem-and-Leaf Displays | 1. Construct and interpret a dot plot.2. Construct and describe a stem-and-leaf display. |  |
| 11 | Measures of Position Quartiles, Deciles, and Percentiles  | Identify and compute measures of position. |  |
| 12 | Box Plots  Skewness | Compute and interpret the coefficient of skewness. | **Computer Applications** |
| 13 | **Probability**What Is a Probability? Approaches to Assigning Probabilities Classical Probability  | Define the terms probability, experiment, event, and outcome. |  |
| 14 | Empirical Probability Subjective Probability | Assign probabilities using a classical, empirical, or subjective approach. |  |
| 15 | Some Rules for ComputingProbabilities Rules of Addition Rules of Multiplication | 1. Calculate probabilities using the rules of addition.2. Calculate probabilities using the rules of multiplication. |  |
| 16 | Principles of Counting The Multiplication Formula The Permutation Formula The Combination Formula | Determine the number of outcomes using principles of counting. | **Quiz 2** |
| 17 | **Discrete Probability Distributions**What Is a Probability Distribution?Random Variables Discrete Random Variable Continuous Random Variable  | Identify the characteristics of a probability distribution.Distinguish between discrete and continuous random variables |  |
| 18 | The Mean, Variance, and StandardDeviation of a Discrete ProbabilityDistribution  | Compute the mean, variance, and standard deviation of a discrete probability distribution. |  |
| 19 | **MID 1** |
| 20 | Binomial Probability Distribution | Explain the assumptions of the binomial distribution and apply it to calculate probabilities. |  |
| 21 | Poisson Probability Distribution | Explain the assumptions of the Poisson distribution and apply it to calculate probabilities |  |
| 22 | **Continuous Probability****Distributions**Introduction  The Family of Uniform Probability Distributions | Describe the uniform probability distribution and use it to calculate probabilities. |  |
| 23 | The Family of Normal ProbabilityDistributions The Standard Normal ProbabilityDistribution Applications of the Standard NormalDistribution The Empirical Rule | Describe the characteristics of a normal probability distribution. |  |
| 24 | Finding Areas under the Normal Curve | Describe the standard normal probability distribution and use it to calculate probabilities. |  |
| 25 | The Normal Approximation to theBinomial Continuity Correction Factor How to Apply the Correction Factor  | Approximate the binomial probability distribution using the standard normal probabilitydistribution to calculate probabilities |  |
| 26 | The Family of Exponential Distributions | Describe the exponential probability distribution and use it to calculate probabilities |  |
| 27 | **MID 2** |
| 28 | **Sampling Methods and the****Central Limit Theorem**Introduction Sampling Methods Reasons to Sample Simple Random Sampling  | Explain why populations are sampled and describe four methods to sample a population. |  |
| 29 | Systematic Random Sampling Stratified Random Sampling Cluster Sampling  | Explain why populations are sampled and describe four methods to sample a population. |  |
| 30 | Sampling “Error”  Sampling Distribution of the Sample Mean The Central Limit Theorem | Recite the central limit theorem and define the mean and standard error of the sampling distribution of the sample mean. |  |
| 31 | Using the Sampling Distribution of theSample Mean | Apply the central limit theorem to calculate probabilities |  |
| 32 | **Estimation and Confidence Intervals**Introduction Point Estimate for a Population Mean Confidence Intervals for a Population Mean  | Compute and interpret a point estimate of a population mean. | **Quiz 3** |
| 33 | Introduction Point Estimate for a Population Mean Confidence Intervals for a Population Mean  | Compute and interpret a point estimate of a population mean. |  |
| 34 | Choosing an Appropriate Sample Size Sample Size to Estimate a Population MeanFinite-Population Correction Factor | Calculate the required sample size to estimate a population proportion or population mean Adjust a confidence interval for finite populations. |  |
| 35 | **One-Sample Tests of Hypothesis**Introduction What Is a Hypothesis? What Is Hypothesis TestingType1 and Type11 Error | Explain the process of testing a hypothesis. | **Assignment 2** |
| 36 | Five -Step Procedure for Testing aHypothesis State the Null Hypothesis (*H*0) and theAlternate Hypothesis (*H*1) Step 2: Select a Level of Significance Step 3: Select the Test Statistic Step 4: Formulate the Decision Rule Step 5: Make a Decision  | 1. Apply the Five -Step procedure for testing a hypothesis. |  |
| 37 | One-Tailed and Two-Tailed Tests ofSignificance  Testing for a Population Mean: KnownPopulation Standard Deviation | Distinguish between a one-tailed and a two-tailed test of hypothesis Conduct a test of a hypothesis about a population mean. |  |
| 38 | *p*-Value in Hypothesis Testing |  |  |
| 39 | **Analysis of Variance**Introduction  The *F* Distribution  Comparing Two Population Variances | Apply the F distribution to test a hypothesis that two population variances are equal. |  |
| 40 | ANOVA Assumptions The ANOVA Test |  |  |
| 41 | **Correlation and Linear Regression**Introduction What Is Correlation Analysis? The Correlation Coefficient | Explain the purpose of correlation analysis.Calculate a correlation coefficient |  |
| 42 | Regression Analysis Least Squares Principle | Apply regression analysis to estimate the linear relationship between two variables. |  |
| **Final Term** |

**UNIVERSITY GRADING POLICY**

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| --- | --- | --- | --- | --- | --- |
| A |  93% - 100% | 4.0 | C | 73% - 76% | 2.0 |
| A- | 90% - 92% | 3.7 | C- | 70% - 72% | 1.7 |
| B+ | 87% - 89% | 3.3 | D+ | 67% - 69% | 1.3 |
| B | 83% - 86% | 3.0 | D | 60% - 66% | 1.0 |
| B- | 80% - 82% | 2.7 | F | Below 60% | 0.0 |
| C+ | 77% - 79% | 2.3 | W | Withdrawn |  |
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**STUDENT’S CONDUCT & OTHER ISSUES**

**You are responsible to bring your calculator during exams; nobody will be allowed to use mobile phones as a calculator.**

* + Turn off your cell phone(s) before entering the class room either for lecture or for exam.
	+ After 10 minutes of the start of the class, no student will be allowed to enter in the class.
	+ You are expected to attend all classes. In case of absence **you are responsible for the announcements made and material given during that missed classes**. Minimum class attendance to participate in final examination is 80%.
	+ The course will have assignments and quizzes in class. The problem assignments will be submitted on due date; no late submission will be allowed. Problem sets will also be regularly provided and students are encouraged to solve them. **There will be no makeup quiz or examinations, therefore, don’t miss any exam or quiz.**
	+ Students can learn more from each other; therefore, you are encouraged to work together on problem sets/assignments outside the class as long as problem sets/assignments do not look like identical copies.

Plagiarism and cheating are considered to be a most serious breach of academic integrity (see your students manual for detail). Any student found responsible for dishonest practice (for example, copying, use of unauthorized material in exam, etc.) in relation to any piece of work submitted for assessment shall be subject to the FCC's dishonest practice regulations which may result in various penalties, including forfeiture of marks for the piece of work submitted, an F grade for the paper, or in extreme cases exclusion from the University.