



# University of Management and Technology

## School of Business and Economics

Course Title:           BIostatistics II  
Course Code:           SHS-209  
Resource Person:  
Department:           Economics

### **SBE Vision**

SBE envisions its success in the sustainable contribution that it will make to the industry, academia and research in public and private sector. SBE will lead by providing professionally competent and ethically conscious human resources engaged in the global and local context to foster socio-economic growth and sustainability for the society. SBE envisages having faculty with high research potential and a deep desire for cutting edge research including collaboration with national and international partners.

### **SBE Mission**

Being a research-oriented and student-centric business school, we emphasize research publications in impact journals as well as state-of -the-art learning methodologies. We will prepare our students to become the future ethical business leaders and the guiding post for the society, while equipping them with the knowledge and skills required by world-class professionals. We will be the leading choice for organizations seeking highly talented human resource. SBE will foster internationalization with key stakeholders and actively work to exchange best practices with business schools across Pakistan through collaborations, workshops, conferences and other means.

### **Program Objectives**

Department of Quantitative Methods is responsible within the university for the development of Quantitative Methods which are inter alia, the discipline variously known as Statistics (and all Sub-disciplines such as Biostatistics, Econometrics) Operations Research, Decision Sciences,

Financial Engineering and Quality Management, and for application of the Quantitative Methods in all areas of human endeavour.

We aspire to become one of the Pakistan's prestigious institutions involved in identifying catalyzing and fostering high-impact cross-disciplinary research involving the Quantitative Methods.

## **Course Objectives**

The tools of statistics are employed in many fields—business, education, psychology, agriculture, and economics, to mention only a few. When the data analyzed are derived from the biological sciences and medicine, we use the term *biostatistics* to distinguish this particular application of statistical tools and concepts.

The objectives of the course are to understand basic principles and techniques of Statistics in the context of health sciences. It includes all the basic tools of data presentation, analysis and inference. These basics are then applied in a wide variety of settings. The aim of this course is to learn when a technique is appropriate and what it can achieve. The emphasis throughout the course is on understanding new concepts and the theoretical background that exists in literature. A student of health sciences working in the area of Biostatistics must acquire knowledge of basic statistical tools to enhance his research skills in this area.

## **Learning Objectives**

The aim of this course is to help students of health sciences to understand all the basic tools of statistics both descriptive and inferential so that as a health research scientists they better understand the usefulness of the techniques in all areas of health sciences.

## **Learning Outcomes**

Upon successfully completing this course, the participants will be able to:

- Identify the basic applications of all statistical tools in their respective fields of study.
- Apply these methods and techniques in conducting their research and analyzing the results more scientifically and comprehensively.

## **Learning Methodology**

Following instructional tools and methodologies would be used during the course.

<b>Lectures</b>	15 sessions, of three hours each, in total. Each of these lectures is accompanied by detailed description of the technique, pertinent examples from the research world.
<b>Research Papers &amp; Case Studies</b>	Research Papers or any other book relevant to the discussion topics will be uploaded on Google drive The participants are expected to be familiar with the use of digital repositories made available by HEC, including JSTOR, Emerald, Springer, etc.
<b>In Class Exercises</b>	Application of theory on real life data using recommended softwares.

**Computing Software:** Microsoft Excel/SPSS/Minitab/R language

**Teaching Methodology**

Lectures	60%
Case based teaching	10%
Class activities/Presentation	20 %
Applied Projects	10%

**STUDENTS ARE REQUIRED TO READ AND UNDERSTAND ALL ITEMS OUTLINED IN THE PARTICIPANT HANDBOOK**

**Class Policy:-**

- **Be On Time**  
You need to be at class at the assigned time. After 10 minutes past the assigned time, you will be marked absent.
- **Mobile Policy**  
**TURN OFF YOUR MOBILE PHONE!** It is unprofessional to be texting or otherwise.
- **Email Policy**

**READ YOUR EMAILS!** You are responsible if you miss a deadline because you did not read your email.

Participants should regularly check their university emails accounts regularly and respond accordingly.

- **Class Attendance Policy**

A minimum of 80% attendance is required for a participant to be eligible to sit in the final examination. Being sick and going to weddings are absences and will not be counted as present. You have the opportunity to use 6 absences out of 30 classes. Participants with less than 80% of attendance in a course will be given grade 'F' (Fail) and will not be allowed to take end term exams. International students who will be leaving for visa during semester should not use any days off except for visa trip. Otherwise they could reach short attendance.

- **Moodle**

UMT –LMS (Moodle) is an Open Source Course Management System (CMS), also known as a learning Management System (LMS). Participants should regularly visit the course website on MOODLE Course Management system, and fully benefit from its capabilities. If you are facing any problem using moodle, visit <http://oit.umt.edu.pk/moodle>. For further query send your queries to [moodle@umt.edu.pk](mailto:moodle@umt.edu.pk)

- **Harassment Policy**

Sexual or any other harassment is prohibited and is constituted as punishable offence. Sexual or any other harassment of any participant will not be tolerated. All actions categorized as sexual or any other harassment when done physically or verbally would also be considered as sexual harassment when done using electronic media such as computers, mobiles, internet, emails etc.

- **Use of Unfair Means/Honesty Policy**

Any participant found using unfair means or assisting another participant during a class test/quiz, assignments or examination would be liable to disciplinary action.

- **Plagiarism Policy**

All students are required to attach a “Turnitin” report on every assignment, big or small. Any student who attempts to bypass “Turnitin ” will receive “F” grade which will count towards the CGPA. The participants submit the plagiarism report to the resource person with every assignment, report, project, thesis etc. If student attempts to cheat Turnitin, he/she will receive a second “F” that will count towards the CGPA. There are special rules on plagiarism for final reports etc. all outlined in your handbook.

- **Withdraw Policy**

Students may withdraw from a course till the end of the 12th week of the semester. Consequently, grade W will be awarded to the student which shall have no impact on the

calculation of the GPA of the student. A Student withdrawing after the 12th week shall be automatically awarded "F" grade which shall count in the GPA.

- **Communication of Results**

The results of quizzes, midterms and assignments are communicated to the participants during the semester and answer books are returned to them. It is the responsibility of the course instructor to keep the participants informed about his/her progress during the semester. The course instructor will inform a participant at least one week before the final examination related to his or her performance in the course.

**Course Outline**

**Course code: SHS-209**

**Course title: BIOSTATISTICS II**

Program	DPT/DNS/BS-MLS/BS-MI&USG
Credit Hours	3:00
Duration	15 Weeks
Prerequisites (If any)	SHS-209
Resource Person Name and Email	
Counseling Timing	
Web Links:-	NA

**Chairman/Director Programme signature.....Date.....**

**Dean's signature.....Date.....**

## **Grade Evaluation Criteria**

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

<b>Marks Evaluation percentage</b>	<b>Marks in</b>
Quizzes	15%
Assignments	10%
Mid Term	30%
Attendance & Class Participation	NA
Project + Presentations	10%
Final exam	35%
Total	100%

## **Recommended Text Books:**

Considering the nature and requirement of this course no single book is recommended. However, there are some books available that can cover the course in its minimum requirements. This deficiency may be overcome by using some references besides a recommended book. Following is the recommended text as well as some reference texts for the course:

1. *BIOSTATISTICS* -A Foundation for Analysis in the Health Sciences; 9<sup>th</sup> Edition. Wayne W. Daniel. John Wiley & Sons, Inc.
2. Walpole, R. E. 1982. –Introduction to Statistics||, 3<sup>rd</sup> Ed., Macmillan Publishing Co., Inc. New York.
3. Muhammad, F. 2005. –Statistical Methods and Data Analysis||, Kitab Markaz, Bhawana Bazar Faisalabad.
4. Statistical Methods and Data Analysis by Dr. Faquir Muhammad Concise Course in A. Level Statistic with world examples by J. Crawshaw and J. Chambers (1994)
5. Basic Statistics an Inferential Approach 2<sup>nd</sup> Ed. (1986) Fran II. Dietrich-II and Thomes J. Keans

## BIOSTATISTICS II SHS-209

(DPT/DNS/BS-MLS/BS-MI&USG)

### COURSE CONTENTS

<b>Week No.</b>	<b>Topics to be covered in the course</b>	<b>Learning Objective of this topic</b>	<b>Expected Outcomes from Students</b>	<b>Teaching Method</b>	<b>Assessment Criteria</b>	<b>Deadlines and Homework</b>
<b>1 &amp; 2</b>	<b>Estimation-I</b>	To understand the Objectives of Estimation of single Population Parameters	Students will learn how to Distinguish between a point estimate and a confidence interval estimate. Construct and interpret a confidence interval estimate for a single population mean using both the standard normal and $t$ distributions.	Lecture and Computer Lab	Assignment	Within a Week
<b>3&amp; 4</b>	<b>Estimation-II</b>	To understand the Objectives of ESTIMATION OF TWO POPULATION PARAMETERS	Students will learn how to Distinguish between a point estimate and a confidence interval estimate of difference between two population means and proportions. Construct and interpret a confidence interval estimate for difference between two population means and proportions. using both the standard normal and $t$ distributions.	Lecture and Computer Lab	Assignment+ Quiz	Within a Week
<b>4 &amp; 5</b>	<b>Testing of Hypotheses-I</b>	To understand the Objectives of Hypothesis testing of single population parameters	The students will be able to understand how to Formulate null and alternative hypotheses for applications involving a single population mean or proportion. Know what Type I and Type II errors are. Correctly formulate a decision rule for testing a hypothesis. Know how to use the test statistic, critical value, and $p$ -value approaches to test a hypothesis	Lecture and Computer Lab	Assignment+ Quiz	Within a Week
<b>6 &amp; 7</b>	<b>Testing of Hypotheses-II</b>	To understand the Objectives of Hypothesis	The students will be able to understand how to Formulate null and alternative hypotheses for applications involving difference of two population	Lecture and	Assignment+ Quiz	Within a Week



		testing of difference between two population parameters	means or proportions. Know what Type I and Type II errors are. Correctly formulate a decision rule for testing a hypothesis. Know how to use the test statistic, critical value, and $p$ -value approaches to test a hypothesis	Computer Lab		
8	<b>Testing of Hypotheses-III</b>	To understand the Objectives of Hypothesis testing of single population Variance and Comparing two population variances.	The students will be able to Formulate and carry out hypothesis tests for a single population variance. Develop and interpret confidence interval estimates for a population variance. Formulate and carry out hypothesis tests for the difference between two population variances.	Lecture and Computer Lab	Assignment	Within a Week
9 &10	<b>ANOVA</b>	To understand the concept of Analysis of Variance Technique	The students will be able to understand the basic logic of analysis of variance. Perform a hypothesis test for a single-factor design using analysis of variance manually and with the aid of Excel or Minitab software. Conduct and interpret post-analysis of variance pairwise comparisons procedures. Recognize when randomized block analysis of variance is useful and be able to perform analysis of variance on a randomized block design. for Significant Differences Between Individual Pairs of Means; Tukey's HSD Test	Lecture and Computer Lab	Assignment	Within a Week
11 & 12	<b>Linear Regression &amp; Correlation Analysis-I</b>	To know under what circumstances there exists a regression relation and how correlation helps in determining association between two variables	The students will be able Calculate and interpret the correlation between two variables. Determine whether the correlation is significant. Calculate the simple linear regression equation for a set of data and know the basic assumptions behind regression analysis. Determine whether a regression model is significant. Recognize regression analysis applications for purposes of description and prediction. Calculate and interpret confidence intervals for the regression analysis.	Lecture and Computer Lab	Assignment+ Quiz	Within a Week
13	<b>Linear Regression Models-II</b>	To know Estimation Of The Parameters In Multiple Linear Regression Models and Hypothesis Testing In Multiple Linear Regression	The students will be able to understand how to Analyze an Experiment using Multiple Linear Regression Models. Fitting/Estimating Population Regression model by Sample Regression model; Evaluating The Multiple	Lecture and Computer Lab	Assignment+ Quiz	Within a Week

			Regression Equation and The Coefficient of Multiple Determination			
<b>14 &amp;15</b>	<b>Qualitative Independent Variables</b>	To know the Use of Dummy Variables in Multiple Regression Models	The students will be able to use the technique of Logistic Regression when qualitative variables are involved. The students will be able Calculate and interpret the regression coefficients. Determine whether the regression coefficient is significant. Calculate the logistic regression equation for a set of data and know the basic assumptions behind regression analysis. Determine whether a regression model is significant. Recognize regression analysis applications for purposes of description and prediction. Calculate and interpret confidence intervals for the regression analysis.	Lecture and Computer Lab	Assignment+ Quiz	Within a Week