

Course Code: STA 101	CIE Marks: 60
Course Title: Statistics and Probability	SEE Marks: 40
Credits: 3 Hrs/week	

### Course Content (from syllabus):

1. *Introduction to Statistics*
2. *Data Presentation*
3. *Measures of Central Tendency*
4. *Measures of Location*
5. *Measures of Dispersion*
6. *Shape of the Distribution*
7. *Correlation Analysis*
8. *Regression Analysis*
9. *Introduction to Probability*
10. *Probability Distribution*
11. *Test of Hypothesis*

### Course Description/Rational:

*In real life, statistical methods can apply to solve different problems and help to make an effective decision that affect our daily lives. Statistical methods are used in development of planning, commerce, industry, business, formation of development policy, agricultural sector, social science etc. By studying this course, students will learn the fundamental knowledge about statistics and their applications.*

### Course Learning Outcome (CLO): (at the end of the course, student will be able to do :)

<b>CLO1</b>	<b>Learn</b> and understand the terminology of statistics.
<b>CLO2</b>	<b>Learn</b> the fundamental knowledge about descriptive statistics and their applications.
<b>CLO3</b>	<b>Apply</b> appropriate statistical tools (Regression, data mining, and probability) for making decision
<b>CLO4</b>	<b>Present</b> and <b>Defend</b> the technical aspect of statistical knowledge and skills throughout their future studies.

### Content of the course:

SL	Course Content (as summary)	Hrs	CLO's
1.	<i>Introduction to Statistics</i>	3	1
2.	<i>Data Presentation</i>	4.5	2
3.	<i>Measures of Central Tendency</i>	4.5	2
4.	<i>Measures of Location</i>	4.5	2
5.	<i>Measures of Dispersion</i>	4.5	2
6.	<i>Shape of the Distribution</i>	3	2
7.	<i>Correlation Analysis</i>	3	3,4

8.	<i>Regression Analysis</i>	3	3,4
9.	<i>Introduction to Probability</i>	6	3
10.	<i>Probability Distribution</i>	6	3
11.	<i>Test of Hypothesis</i>	6	3,4

(Add row if needed)

Mapping of Course Learning Outcomes to Program Learning Outcomes [attainment level used for CLO's from 1(weak)-3(strong) correlation]

	PLO-1	PLO-2	PLO-3	PLO-4	PLO-5	PLO-6	PLO-7	PLO-8	PLO-9	PLO-10	PLO-11	PLO-12
CLO-1	X											
CLO-2	X											
CLO-3		X	X									
CLO-4										X		

(Add row if needed)

Mapping Course Learning Outcome (CLOs) with the Teaching-Learning and Assessment Strategy:

CLO's	Teaching Learning Strategy	Assessment Strategy	Corresponding PO number	Domain Level/Learning Taxonomy
CLO-1.	Lecture, Group Study, Discussion, Exercise	Quiz, Question answer, Midterm, Assignment	PO-1	Remember, Understand, Apply
CLO-2	Lecture, Group Study, Discussion, Exercise	Quiz, Question answer Midterm, Assignment	PO-1	Remember, Understand, Apply, Analyze,
CLO-3	Lecture, Group Study, Discussion, Exercise	Quiz, Question answer, Final	PO-3	Remember, Understand, Apply, Analyze,
CLO-4	Lecture, Group Study, Discussion, Exercise	<b>Presentation</b>	PO-10	Remember, Understand, Apply, Analyze,

Course Delivery Plan/Lesson Delivery Plan:

Week/Lesson (hour)	Discussion Topic and Book Reference	Student Activities during Online and Onsite and TLA	Mapping with CLO and PLO	Assessment Plan
<p><b>Week-1</b></p> <p>Lesson 1 &amp; 2 [3 Hours]</p>	<p><b>Lesson 1:</b> <i>Introduction to Statistics</i> ( Meaning and Definition of Statistics Types of statistics; Population and sample; Parameter and statistic)</p> <p>[Textbook, Chapter-1, Page (5-9)]</p>	<p>a) Define Statistics and relevant terms</p> <p>b) Provide examples of how statistics is applied,</p> <p>c) Explain why knowledge of statistics is important,</p>	<p>CLO-1, PLO-1</p>	<p><b>Class Test, Assignment, Midterm</b></p>
	<p><b>Lesson 2:</b> <i>Introduction to Statistics</i> (Variable and types of variable; Characteristics, Levels of data, Sampling techniques)</p> <p>[Textbook, Chapter-1, Page (26-40)]</p>	<p>a) Explain the importance of variables and</p> <p>b) Define several variables types, sampling techniques</p>		
<p><b>Week-2</b></p> <p>Lesson 3 &amp; 4 [3 Hours]</p>	<p><b>Lesson 3: Data Presentation</b> (Define data presentation, Constructing frequency distribution and relative frequency, percentage frequency and cumulative frequency distribution both for Qualitative and quantitative data)</p>	<p>a) Able to Describing Data presentation</p> <p>b) Able to learn about frequency distribution and relative frequency,</p> <p>c) Able to calculate percentage frequencies as well as cumulative frequencies.</p>	<p>CLO-2, PLO-1</p>	<p><b>Class Test, Assignment, Midterm</b></p>

	[Textbook, Chapter-1, Page (5-9)]			
	<p><b>Lesson 4:</b> <b><i>Data Presentation</i></b> Graphic presentation of a quantitative frequency distribution (Histogram, Frequency polygon, Ogive curve) with their merits and demerits</p> <p>[Textbook, Chapter-2, Page (65-75)]</p>	a) Able to know about graphical presentation of quantitative variables with their limitations		
<p><b>Week-3</b> Lesson 5 &amp; 6 [3 Hours]</p>	<p><b>Lesson 5:</b> <b><i>Data Presentation</i></b> Graphic presentation of a qualitative frequency distribution (Bar Chart, Pie Chart) with their merits and demerits, Time series data, Line diagram</p> <p>[Textbook, Chapter-2, Page (65-75)]</p>	<p>a) Able to know about graphical presentation of qualitative variables with their limitations</p> <p>b) Able to learn about time series data and the application of line diagram</p>	CLO-2, PLO-1	<b>Class Test, Assignment, Midterm</b>
	<p><b>Lesson 6:</b> <b><i>Measures of Central Tendency</i></b> (Define Measures of Central Tendency, applications, Arithmetic Mean, Geometric Mean, Harmonic Mean, Weighted Mean for <b>ungroup data</b> with their merits and demerits)</p> <p>[Textbook, Chapter-2, Page (99-105)]</p>	a) Able to calculate different measures of Central Tendency for ungroup data and their applications		

<p><b>Week-4</b> Lesson 7 &amp; 8 [3 Hours]</p>	<p><b>Lesson 7: Measures of Central Tendency</b> Arithmetic Mean, Geometric Mean, Harmonic Mean, Weighted Mean for <b>group data</b> with their applications and merits and demerits.</p> <p>[Textbook, Chapter-2, Page (99-105)]</p>	<p>a) Able to calculate different measures of Central Tendency for group data and their applications</p>	<p>CLO-2, PLO-1</p>	<p><b>Class Test, Assignment, Midterm</b></p>
	<p><b>Lesson 8: Measures of Central Tendency</b> Calculation of Median, mode both for <b>group and ungroup data</b>, Application of measures of central tendency for different types of level of measurements.</p> <p>[Textbook, Chapter-2, Page (99-105)]</p>	<p>a) Able to calculate Median and mode for both ungroup and group data and their applications</p> <p>b) Able to understand which measure of central tendency is appropriate for which level of measurements.</p>	<p>CLO-2, PLO-1</p>	<p><b>Class Test, Assignment, Midterm</b></p>
<p><b>Week-5</b> Lesson 9 &amp; 10 [3 Hours]</p>	<p><b>Lesson 9: Measures of Location</b> (Definition of Measures of Location, concepts of Quartiles, Percentiles and Deciles , Procedure of calculating quartiles, deciles and percentiles for <b>ungroup data</b>)</p>	<p>a) Able to display and explore Data in terms of quartiles, deciles and percentiles for ungroup data with interpretation</p>	<p>CLO-2, PLO-1</p>	<p><b>Class Test, Assignment, Midterm</b></p>

	[Textbook, Chapter-2, Page (85-94)]			
	<p><b>Lesson 10: Measures of Location</b> (Procedures of calculating Quartiles, Percentiles and Deciles for <b>group data</b> ), mathematical problem solving with interpretations</p> <p>[Textbook, Chapter-2, Page (85-94)]</p>	a) Able to display and explore Data in terms of quartiles, deciles and percentiles for group data with interpretation		
<p><b>Week-6</b> Lesson 11 &amp; 12 [3 Hours]</p>	<p><b>Lesson 11: Measures of Location</b> ( Calculation of IQR with interpretation, Drawing Bow and Whisker Plot with its applications)</p> <p>[Textbook, Chapter-2, Page (94-99)]</p>	a) Able to describe and visualize data using Box and Whisker plot.	CLO-2, PLO-1	<p><b>Class Test, Assignment, Midterm</b></p>
	<p><b>Lesson 12: Measures of Dispersion</b> (Define measures of dispersion, applications, types of dispersion, Absolute measures, Relative Measures, Calculation of Mean deviation)</p> <p>[Textbook, Chapter-2, Page (109-119)]</p>	<p>a) Able to understand different measures Of Dispersion</p> <p>b) Able to identify use of different measures Of Dispersion</p>		
<p><b>Week-7</b> Lesson 13 &amp; 14 [3 Hours]</p>	<p><b>Lesson 13: Measures of Dispersion</b> ( Calculation of Population variance, Population Standard Deviation, Sample</p>	a) Able to calculate different measures Of Dispersion for ungroup data with interpretation	CLO-2, PLO-1	<p><b>Class Test, Assignment, Midterm</b></p>

	<p>variance, Sample Standard Deviation, Coefficient of Variation <b>for ungroup data</b> with mathematical problem solving)</p> <p>[Textbook, Chapter-2, Page (109-119)]</p>			
	<p><b>Lesson 14: Measures of Dispersion</b> ( Calculation of Population variance, Population Standard Deviation, Sample variance, Sample Standard Deviation, Coefficient of Variation <b>for group data</b> with mathematical problem solving)</p> <p>[Textbook, Chapter-2, Page (109-119)]</p>	<p>a) Able to calculate different measures Of Dispersion for group data with interpretation</p>		
<p><b>Week-8</b> Lesson 15 &amp; 16 [3 Hours]</p>	<p><b>Lesson 15: Shape of the Distribution</b> ( Define shape of the distribution, Concepts of Skewness and Kurtosis with graphical presentation)</p> <p>[Textbook, Chapter-2, Page (105-109)]</p>	<p>a) Able to understand about skewness and kurtosis of a data distribution graphically.</p>	<p>CLO-2, PLO-1</p>	<p><b>Class Test, Assignment, Midterm</b></p>
	<p><b>Lesson 16: Shape of the Distribution</b> (Calculation of Coefficient of skewness, Coefficient</p>	<p>a) Able to calculate skewness and kurtosis and logically interpret the result.</p>		

	of Kurtosis with their interpretations)  [Textbook, Chapter-2, Page (105-109)]			
<b>Week-9</b>  Lesson 17 & 18 [3 Hours]	<b>Lesson 17:</b> <b><i>Correlation Analysis</i></b> ( Define correlation Analysis, Types of Correlation, positive correlation, negative correlation, simple correlation, partial correlation, multiple correlation, linear correlation, non-linear correlation, Scatter diagram with interpretation)  [Textbook, Chapter-12, Page (637-642)]	a) Able to understand basic idea of the Correlation Analysis with their several types. b) Able to use Scatter diagram to present the relationship between variables.	CLO-3, CLO-4 PLO-2, PLO-3	<b>Class Test, Presentation, Final</b>
	<b>Lesson 18:</b> <b><i>Correlation Analysis</i></b> (Calculation of Coefficient of correlation with interpretation, mathematical problem solving)  [Textbook, Chapter-12, Page (637-642)]	a) Able to calculate correlation coefficient to know about the strength of correlation between variables with interpretation.		
<b>Week-10</b>  Lesson 19 & 20 [3 Hours]	<b>Lesson 19:</b> <b><i>Regression Analysis</i></b> ( Define Regression Analysis, Types of Regression, Simple regression analysis, Multiple regression analysis, Calculation of Simple regression coefficients)	a) Able to understand basic idea of the Regression Analysis b) Able to calculate the regression coefficient c) Able to learn use of regression analysis	CLO-3, CLO-4, PLO-2 PLO-3 PLO-10	<b>Class Test, Presentation, Final</b>



	[Textbook, Chapter-12, Page (642-667)]			
	<p><b>Lesson 20:</b> <b>Regression Analysis</b> (Interpretation of regression coefficients, Calculation of the standard error of the regression coefficients, Calculation of coefficient of determination with interpretation)</p> <p>[Textbook, Chapter-12, Page (642-667)]</p>	<p>a) Able to interpret regression coefficients and calculate standard error of the regression coefficients</p> <p>b) Able to calculate the Coefficient of determination</p> <p>c) Able to Forecast the future value using regression equation</p>		
<b>Week-11</b> Lesson 21 & 22 [3 Hours]	<p><b>Lesson 21:</b> <b>Introduction to Probability</b> ( Define Probability, Equally likely outcomes, mutually exclusive outcomes, Sample Space, Tree diagram, Venn diagram, Laws of probability, Additional rules)</p> <p>[Textbook, Chapter-3, Page (165-197)]</p>	<p>a) Able to learn about basic probability Concepts.</p>	CLO-3, PLO-2 PLO-3	<b>Class Test, Presentation, Final</b>
	<p><b>Lesson 20:</b> <b>Introduction to Probability</b> (Marginal probability, Joint probability, Conditional probability, multiplication rules complement rule)</p> <p>[Textbook, Chapter-3, Page (165-197)]</p>	<p>a) Able to learn about marginal, joint, conditional probabilities with application</p>		

<b>Week-12</b> Lesson 23 & 24 [3 Hours]	<b>Lesson 23:</b> <i>Introduction to Probability</i> (Bayes theorem with related maths )  [Textbook, Chapter-3, Page (165-197)]	a) Able to learn about Bayes Theorem with application	CLO-3, PLO-2 PLO-3	<b>Class Test, Presentation, Final</b>
	<b>Lesson 24:</b> <i>Introduction to Probability</i> (Random variable, Discrete Random variable, Continuous random variable, Mean and variance and standard deviation of random variables )  [Textbook, Chapter-4, Page (227-236)]	a) Able to know about random variable, discrete and continuous random variable a b) Able to calculate mean, variance and standard deviation of random variable.		
<b>Week-13</b> Lesson 25 & 26 [3 Hours]	<b>Lesson 25:</b> <i>Probability Distribution</i> (Define Probability distribution, Basic idea of Discrete Probability Distribution/ Probability Mass Function(PMF) and Continuous Probability Distribution/ Probability Density Function(PDF))  [Textbook, Chapter-4, Page (237-249)]	a) Able to understand about probability distribution both for discrete and continuous variable.	CLO-3, PLO-2 PLO-3	<b>Class Test, Presentation, Final</b>
	<b>Lesson 26:</b> <i>Probability Distribution</i>	a) Able to use Bernouli and Binomial		

	(Bernoulli distribution and Binomial Distribution with related maths)  [Textbook, Chapter-4, Page (237-249)]	distribution in real life situations		
<b>Week-14</b>  Lesson 27 & 28 [3 Hours]	<b>Lesson 27: Probability Distribution</b> (Geometric and Poisson Probability distribution with related maths)  [Textbook, Chapter-4, Page (237-249)]	a) Able to use Geometric and Poisson distribution in real life situations	CLO-3, PLO-2 PLO-3	<b>Class Test, Presentation, Final</b>
	<b>Lesson 28: Probability Distribution</b> (Normal and exponential probability distribution with related maths)  [Textbook, Chapter-5 and 6, Page (291-347)]	a) Able to use Normal and Exponential distribution in real life situations		
<b>Week-15</b>  Lesson 29 & 30 [3 Hours]	<b>Lesson 29: Test of Hypothesis</b> (Basic concepts of Test of hypothesis, Null hypothesis, Alternative hypothesis, Test Statistics, One tailed test, Two tailed test))  [Textbook, Chapter-9, Page (473-550)]	a) Able to define hypothesis with basic concepts of one tailed test and two tailed test	CLO-3, CLO-4 PLO-2, PLO-3	<b>Final</b>

	<p><b>Lesson 30:</b> <b><i>Test of Hypothesis</i></b> (Basic idea of One sample test and two sample test, Z-test, t-test, critical value, Acceptance area, rejection area, Decision rule)</p> <p>[Textbook, Chapter-9, Page (473-550)]</p>	a) Able to explain the process of testing a hypothesis and apply the six step procedure for testing hypothesis		
<p><b>Week-16</b> Lesson 31 &amp; 32 [3 Hours]</p>	<p><b>Lesson 31: <i>Test of Hypothesis</i></b> (One sample Z-test and t-Test with related maths and interpretation)</p> <p>[Textbook, Chapter-9, Page (473-550)]</p>	a) Able to apply one sample Z-test and t-test in real life situations	CLO-3, CLO-4 PLO-2, PLO-3	<b>Final</b>
	<p><b>Lesson 32:</b> <b><i>Test of Hypothesis</i></b> (Two sample Z-test and t-Test with related maths and interpretation)</p> <p>[Textbook, Chapter-9, Page (473-550)]</p>	a) Able to apply two sample Z-test and t-test in real life situations		

**Assessment Pattern:**

**CIE – Breakup (Theory) [60 marks]**

Bloom's Criteria	Attendance (07)	Class Test (15)	Assignment (05)	Presentation (08)	Mid Exam (25)
Remember	Students will be awarded for full marks	3			
Understand		3	1	2	5
Apply		3	2	2	10
Analyze		2	1	2	10

Evaluate	if attend all classes	2	1	2	
Create		2			

**SEE – Semester End Examination [40 marks] {Theory}**

Bloom Criteria	Score for the Test
Remember	
Understand	5
Apply	15
Analyze	15
Evaluate	5
Create	

**Learning Materials:**

**Textbook/Recommended Readings:**

Introductory Statistics, OpenStax College, Barbara Illowsky and Susan Dean, XanEdu Publishing Inc, Latest Edt. (2017), ISBN-10: 1-947172-05-0

**Reference Books/Supplementary Readings:**

1. Introduction to Statistics, College of the Sequoias, George Woodbury, Thomson Learning Academic Resource Center, Latest Edt., ISBN 0-534-37755-6 Computer Network, 4th Edition, Andrew S. Tanenbaum

**Other Readings:**

N/A