GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Science and Business Systems (CSBS)
Semester	II	Version	1.0.0.0
Effective from Academic Year	2026-27	Effective from the batch admitted in	July 2026
Course Code	2BSC1110	Course Name	Statistical Methods
Course Category	Basic Science Courses (BSC)		

Teaching Scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	03	00	01	00	04	Theory	50	50	100
Hours	03	00	02	00	05	Practical	30	20	50

Pre-requisites:

Basic knowledge of statistic.

Course Outcomes

COs	Description
CO1	Understand various linear statistical models, acquire knowledge in hypothesis testing and method of estimation in statistical analysis.
CO2	Understand Non-Parametric tests and their applications.
CO3	Design and forecast models using Time series data.
CO4	Understand and apply R language in data visualization.

Theory Syllabus

Unit	Content	Hours
1	**Sampling Techniques:** Random sampling. Sampling from finite and infinite populations. Estimates and standard error (sampling with replacement and sampling without replacement), Sampling distribution of sample mean, stratified random sampling.	8
2	**Linear Statistical Models:** Scatter diagram. Linear regression and correlation. Least-squares method. Rank correlation. Standard multiple regression models with emphasis on detection of collinearity, outliers, non-normality and autocorrelation, Validation of model assumptions. Multiple correlations, Analysis of variance (one way, two way with as well as without interaction).	8
3	**Estimation:** Point estimation, criteria for good estimates (un-biasedness, consistency), Methods of estimation including maximum likelihood estimation.	8
4	**Test of hypothesis:** Concept & formulation, Type I and Type II errors, Neyman Pearson lemma, Procedures of testing	7
5	**Non-parametric Inference:** Comparison with parametric inference, Use of order statistics. Sign test, Wilcoxon signed rank test, Mann-Whitney test, Run test, Kolmogorov-Smirnov test. Spearman's and Kendall's test.	7
6	**Basics of Time Series Analysis & Forecasting:** Stationary, ARIMA Models: Identification, Estimation, and Forecasting.	7

Practical and Self Learning Content

R statistical programming language: Introduction to R, Functions, Control flow and Loops, Working with Vectors and Matrices, Reading in Data, Writing Data, Working with Data, Manipulating Data, Simulation,

Linear model, Data Frame, Graphics in R.	
Text Books	
1	Probability and Statistics for Engineers (4th Edition), I.R. Miller, J.E. Freund, and R. Johnson
2	Fundamentals of Statistics (Vol. I & Vol. II), A. Goon, M. Gupta, and B.Dasgupta
3	The Analysis of Time Series: An Introduction, Chris Chatfield
Reference Books	
1	Introduction to Linear Regression Analysis, D.C. Montgomery &E.Peck
2	Introduction to the Theory of Statistics, A.M. Mood, F.A. Graybill& D.C. Boes
3	Applied Regression Analysis, N. Draper & H. Smith
4	Hands-on Programming with R,- Garrett Grolemund
5	R for Everyone: Advanced Analytics and Graphics, Jared P. Lander
ICT/MOOCs Reference	
1	https://www.youtube.com/watch?v=EYRPpw2BI1s&t=2s
2	https://www.youtube.com/watch?v=OGLxVh1J-xk
3	https://www.youtube.com/watch?v=MHrDKdk9hw0&list=PLEAYkSg4uSQ0JV1fnY3UCTRrT42Smt3IK
4	https://www.youtube.com/watch?v=N-DQ8iDlH_U&list=PLJ5C_6qdAvBFfF7qtFi8Pv_RK8x55jsUQ

Mapping of COs, POs, and PSOs														
COs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	1	2	2	0	0	2	0	1	2	3	2	2
CO2	3	3	0	1	2	1	0	2	0	2	2	3	2	1
CO3	3	3	2	2	2	1	0	2	0	2	2	2	2	2
CO4	3	3	3	3	2	1	0	2	0	2	2	2	3	2

Bloom's Taxonomy Level				
Unit	**Unit Title**	**Aligned COs**	**Learning Hours**	**BTL Level**
1	Sampling Techniques	CO1	8	U,R
2	Linear Statistical Models	CO1	8	N,E
3	Estimation	CO1	8	N,E
4	Test of hypothesis	CO1	7	A,E
5	Non-parametric Inference	CO2	7	A,E
6	Basics of Time Series Analysis & Forecasting	CO3	7	N,E

Note:

- Version 1.0.0.0 (First Digit= New syllabus/Revision in Full Syllabus, Second Digit=Revision in Teaching Scheme, Third Digit=Revision in Exam Scheme, Forth Digit= Content Revision)
- 1 Hour Lecture = 1 Credit, 1 Hour Tutorial = 1 Credit, 2 Hours Practical = 1 Credit, 2 Hours Internship/Project/Seminar = 1 Credit
- Bloom's Taxonomy Level (BTL): R: Remember, U: Understand, A: Apply, N: Analyze, E: Evaluate, and C: Create