GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: PG

Branch: Bio Medical Engineering

Course / Subject Code : ME01031011

Course /Subject Name : Biostatistics

w. e. f. Academic Year:	2024-25
Semester:	1st Semester
Category of the Course:	PCC

Prerequisite:	Calculus, Linear algebra, Probability theory
Rationale:	To explain various statistics techniques for design of biological experiments, especially in medicine, pharmacy; the collection, summarization, and analysis of data from those experiments; and the interpretation of, and inference from, the results.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Understand basic concepts, ideas, and techniques often used in statistics, especially biostatistics;
02	Develop appreciation of (i) variation, (ii) importance of design to the overall quality of a study, (iii) impact of assumptions on data analysis and interpretation, and (iv) artifacts and caveats in data analysis and interpretation;
03	Carry out simple exploratory/graphical/formal/diagnostic analysis; and Know when and where to seek statisticians' help.
04	To understand concepts and interpretation of statistical results

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction of Statistics, Mathematical Statistics, Bio Statistics, Descriptive Statistics, Data types, Measures of location, Arithmetic Mean, Median, Measures of Spread, Variance and Standard Deviation, Graphically Summarize Method, Case Study.	9	15%
2.	Definition of Probability, Law of Probability, Conditional Probability, Discrete Probability Distributions, Radom Variables, Continuous Probability Distributions, Standard Normal Distribution, Case Study.	9	20%
3.	Overview of Estimation, Estimation of the Mean of a Distribution, Variance of a Distribution, Binomial Distribution, Poisson Distribution, Case Study.	9	20%
4.	Hypothesis Testing, One-Sample Inference and Mean of a Normal Distribution: Single-Sided Alternatives, Two-Sided Alternatives, Z-test, Power test, Bayesian Inference, Two-Sample Inference, t- test, f- test, Case study.	9	20%
5.	Overview of Regression and Correlation Methods, Fitting Regression Lines:-The Method of Least Squares, F -Test for Simple Linear Regression, t-Test for Simple Linear Regression, Partial and Multiple Correlation, Rank Correlation, Design and Analysis Techniques for Epidemiologic Studies	9	25%
	Total	**45**	**100**

Reference Books:

1. Fundamentals of Biostatistics, 6th edition by Bernard Rosner, 2005, 896 pages. ISBN-10: 0534418201 ISBN-13: 978-0534418205
2. Introduction to Statistics for Biomedical Engineers - Kristina M. Ropella
3. A foundation for analysis in the health sciences by Wayne S. Daniel, Biostatistics: John Wiley & Sons, 6th Ed.,
4. Primer of biostatistics by Stanton A. Glantz,,Mc Graw Hill , 2nd Ed

List of Open Source Software/learning website:

1. Resources from Vanderbilt Biostatistics: Main education page | General statistics ideas
2. Glossary of Statistical Terms: http://biostat.mc.vanderbilt.edu/twiki/pub/Main/ClinStat/glossary.pdf
3. HyperStat Online (by David Lane): http://davidmlane.com/hyperstat

4. SticiGui (by Philip Stark): http://www.stat.berkeley.edu/~stark/SticiGui/
5. Electronic Statistics Textbook (by StatSoft): http://www.statsoft.com/textbook/stathome.html
6. Electronic Encyclopedia of Statistical Examples and Exercises (EESEE): http://www.whfreeman.com/eesee/ [A good site for learning statistics with lots of examples.]

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