

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	Biostatistics	Course Code				
Dept. / Specialization	Science and Humanities	Structure (LTPC)	3	1	0	4
To be offered for	UG	Status	Core <input type="checkbox"/>		Elective <input checked="" type="checkbox"/>	
Faculty Proposing the course	Dr. M.Monisha	Type	New <input checked="" type="checkbox"/>		Modification <input type="checkbox"/>	
Recommendation from the DAC		Date of DAC				
External Expert(s)	1) Dr. Surajit Das, Associate Professor & HoD, Department of Life Science, NIT Rourkela 2) Dr. Supratim Ray, Associate Professor, Centre for Neuroscience, IISC Bangalore.					
Pre-requisite		Submitted for approval			48 th Senate	
Learning Objectives	The objective of the course is to provide students with a comprehensive and concise overview of statistical principles used in the design and analysis of biological data. This course will help students to understand the scientific method and hypothesis testing for understanding and interpreting data used in public health and Biomedical research.					
Learning Outcomes	On successful completion of the course, the student will be able to: <ul style="list-style-type: none"> • To implement appropriate experimental designs to biological investigation. • To interpret statistical output, both biologically and statistically. • To apply statistical methods to design experimental and observational studies in Biomedical, clinical and public health research. 					
Contents of the course (With approximate break-up of hours for L/T/P)	<p>Study design, data acquisition and presentation: Types of data arising in public health and clinical studies, study designs (descriptive vs. analytical and sampling methods (randomization), risk studies (descriptive, case-control and cohort studies), incidence, prevalence, sensitivity-specificity-predictive, morbidity) (9L+2T).</p> <p>Probability in Health and Medicine: Medical uncertainties and probability, elementary laws of probability, Bayes' Rule, sensitivity-specificity of a medical test, positive and negative predictive value and effect of prevalence (8L+2T).</p> <p>Null hypothesis and statistical testing: Statistical tests in medical and biological sciences, procedure for testing hypothesis, null hypothesis for medical and bioengineering applications, concept of statistical power, error types I+II, overview of tests (t-test, ANNOVA, chi-square test for goodness of fit) with biological dataset, variance analysis, correlation (linear and rank) and regression analysis, parametric and non-parametric tests (11L+2T).</p> <p>Clinical trials and Bayesian statistics: Bayesian model averaging CRM, Bayesian optimal interval design, Randomization and randomization based analysis, Phase I / II trial design, drug combination trials (6L+3T).</p> <p>Application of Biostatistics: R statistical programming language, survival analysis, estimation of survival curves, proportional hazard model, and analysis of different parametric survival functions (8L+4T).</p>					
Text Book	1. Triola, M. M., & Triola, M. F. Biostatistics for the biological and health sciences (pp. 47-48). Boston: Pearson Addison-Wesley, 2006. 2. Whitlock, M. C., & Schluter, D. The analysis of biological data (p. 700).Greenwood Village, CO: Roberts and Company Publishers, 2009. 3. Fundamentals of statistics by S.C. Gupta, Himalaya Publishing House					

	4. Biostatistical analysis by J. H. Zar, Prentice Hall.
Reference Books	<ol style="list-style-type: none"> 1. Westfall, P., & Henning, K. S. Understanding advanced statistical methods. CRC Press, 2013. 2. Raymond E. Hampton, John E. Havel. Introductory Biological Statistics, Third Edition 3rd Edition, Waveland Press, 2018.