Teaching Plan of M.A/M.Sc in Statistics

Department of Statistics

Assam University :: Silchar

Session: 2024-25

Paper Code	Paper	Total Credits	Marks
	FIRST SEMESTER		
STS 500	Orientation	**0**	
STS 501	Real Analysis & Linear Algebra (Core)	**4**	**100**
STS 502	Probability Theory (Core)	**4**	**100**
STS 503	Distribution Theory (Core)	**4**	**100**
STS 504	Survey Sampling (SEC)	**3**	**100**
STS 505	Statistical Computing in Excel and R (ALIF)	**3**	**100**
STS 506	Compulsory Community Engagement Course (CCEC)	**2**	**100**
	Total	**20**	**600**
	SECOND SEMESTER		
STS 551	Statistical Inference-I (Core)	**4**	**100**
STS 552	Linear Models and Regression (Core)	**4**	**100**
STS 553	Stochastic Processes (Core)	**4**	**100**
STS 554	Fundaments of Data Collection and Analysis (IDC-Open paper)	**3**	**100**
STS 555	R Programming (ALIF)	**3**	**100**
STS 556	Python Programming (VBC)	**2**	**100**
	Total	**20**	**600**
	THIRD SEMESTER		
STS 601	Statistical Inference-II (Core)	**4**	**100**
STS 602	Industrial Statistics and Optimization Techniques (IDC)	**4**	**100**
STS 603	(i) Applied Statistics-I (ECC) (ii) Biostatistics (ECC)	**4**	**100**
STS 604	Statistical Computing in SPSS (ALIF)	**3**	**100**
STS 605	Dissertation (Research Project-Part I)	**5**	**100**
	Total	**20**	**500**
	FOURTH SEMESTER		
STS 651	Design and Analysis of Experiments (Core)	**4**	**100**
STS 652	Multivariate Analysis (Core)	**4**	**100**
STS 653	(i) Applied Statistics-II (ECC) (ii) Reliability and Survival Analysis (ECC)	**4**	**100**
STS 654	Dissertation (Research Project-Part II)	**8**	**200**
		20	**500**

Paper Number: STS 501

REAL ANALYSIS & LINEAR ALGEBRA

(This course is taught by Dr. Vivek Verma and Dr. Tanusree Deb Roy)

Course Co-ordinator: TANUSREE DEB ROY

WEEK	TOPICS TO BE COVERED	UNIT	COMMENT
First	Fundament concepts of Sequence and its types.	I	Dr. Vivek Verma
	Properties and conceptualization of Convergent sequences, bounded sequences	I	Dr. Vivek Verma
	Brief Introduction of course	III	Dr. Tanusree Deb Roy
	Concept of Integrals	III	Dr. Tanusree Deb Roy
	Concept of Double Integral	III	Dr. Tanusree Deb Roy
Second	Conceptualization of Subsequence, Divergent sequence	I	Dr.Vivek Verma
	Properties of Monotone sequence, Cauchy sequence	I	Dr. Vivek Verma
	Concept of Multiple Integrals	III	Dr. Tanusree Deb Roy
	Problems on double integral	III	Dr. Tanusree Deb Roy
	Problems on multiple integrals	III	Dr. Tanusree Deb Roy
Third	Cauchy’s general principle of convergence	I	Dr. VivekVerma
		I	Dr. VivekVerma
	Multiple integrals by repeated integration	III	Dr.Tanusree Deb Roy
	Multiple integrals by repeated integrationcont…	III	Dr.Tanusree Deb Roy
	Change of variables in multiple integral	III	Dr. Tanusree Deb Roy
Fourth	Infinite series and its properties	I	Dr. VivekVerma
		I	Dr.VivekVerma
	Concept of Improper Integral	III	Dr.Tanusree Deb Roy
	Improper Integralcont…	III	Dr.Tanusree Deb Roy
	Differentiation under the sign of integral	III	Dr.Tanusree Deb Roy
Fifth	Different tests of convergence of series	I	Dr.VivekVerma
		I	Dr.VivekVerma
	Concept of matrix	IV	Dr.Tanusree Deb Roy
	Linear Transformations	IV	Dr.Tanusree Deb Roy
	Rank of a matrix	IV	Dr.Tanusree Deb Roy
Sixth	Different tests of convergence of series	I	Dr.VivekVerma
		I	Dr.VivekVerma
	Nullity of a linear transformation	IV	Dr.Tanusree Deb Roy
	Rank-nullity theorem	IV	Dr.Tanusree Deb Roy
	Matrix representation of linear transformations	IV	Dr.Tanusree Deb Roy
Seventh	Different tests of convergence of series	I	Dr.VivekVerma
		I	Dr.VivekVerma
	Inner product spaces	IV	Dr.Tanusree Deb Roy
	Norm of a matrix	IV	Dr.Tanusree Deb Roy

	Orthogonality of a matrix	IV	Dr.Tanusree Deb Roy
Eighth	Continuous functions and their properties, uniform continuity	II	Dr.VivekVerma
		II	Dr.VivekVerma
	Orthogonal projection of a matrix	IV	Dr.Tanusree Deb Roy
	Gram-Schmidt orthogonalization process	IV	Dr.Tanusree Deb Roy
	Eigenvalues of a matrix	V	Dr.Tanusree Deb Roy
Ninth	Continuous functions and their properties, uniform continuity	II	Dr.VivekVerma
		II	Dr.VivekVerma
	Eigenvectors of a matrix	V	Dr.Tanusree Deb Roy
	Diagonalizable matrices	V	Dr.Tanusree Deb Roy
	Triangular matrices	V	Dr.Tanusree Deb Roy
Tenth	Mean value theorems, Taylor's theorem and their applications	II	Dr.VivekVerma
		II	Dr.VivekVerma
	Matrix polynomials	V	Dr.Tanusree Deb Roy
	Cayley-Hamilton theorem	V	Dr.Tanusree Deb Roy
	Generalized inverse of a matrix	V	Dr.Tanusree Deb Roy
Eleventh	Functions of several variables: continuity and differentiability	II	Dr.VivekVerma
		II	Dr.VivekVerma
	Problems based on Generalized inverse of a matrix	V	Dr.Tanusree Deb Roy
	Moore and Penrose inverse	V	Dr.Tanusree Deb Roy
	Problems on Moore and Penrose inverse	V	Dr.Tanusree Deb Roy
Twelfth	Maxima-minima of functions of one real variable	II	Dr.VivekVerma
		II	Dr.VivekVerma

	Quadratic forms	V	Dr.Tanusree Deb Roy
	Quadratic forms problems	V	Dr.Tanusree Deb Roy
	Problems based on triangular matrices	V	Dr.Tanusree Deb Roy
Thirteenth	Maxima-minima of functions of several variables	II	Dr.VivekVerma
		II	Dr.VivekVerma
	Discussion on any topic of Unit III	III	Dr.Tanusree Deb Roy
	Discussion on any topic of Unit IV	IV	Dr.Tanusree Deb Roy
	Discussion on any topic of Unit V	V	Dr.Tanusree Deb Roy
Fourteenth	Constrained maxima-minima of functions and their applications	II	Dr.VivekVerma
		II	Dr.VivekVerma
	Revisions of theory and problems	III	Dr.Tanusree Deb Roy
	Revisions of theory and problems	IV	Dr.Tanusree Deb Roy
	Revisions of theory and problems	V	Dr.Tanusree Deb Roy
Fifteenth	Constrained maxima-minima of functions and their applications	II	Dr.VivekVerma
		II	Dr.VivekVerma
	Revision		Dr.Tanusree Deb Roy
	Revision		Dr.Tanusree Deb Roy
	Revision		Dr.Tanusree Deb Roy

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(TANUSREE DEB ROY)

Paper Number: STS 502 (CORE PAPER)

PROBABILITY THEORY

(This course is taught by Dr. Rama Shanker and Dr. Jonali Gogoi)

Course Coordinator : JONALI GOGOI

WEEK	TOPICS TO BE COVERED	UNIT	TEACHERS
First	Classes of Sets	I	Dr. Jonali Gogoi
	Fields, Borel field	I	Dr. Jonali Gogoi
	Generating functions and its importance in Statistics	IV	Dr. Rama Shanker
	Probability generating function (pgf) and its properties	IV	Dr. Rama Shanker
Second	Problems on sets, field, Borel field	I	Dr. Jonali Gogoi
	Sigma-fields	I	Dr. Jonali Gogoi
	Problems on pgf	IV	Dr. Rama Shanker
	Moment generating function (mgf) and its properties	IV	Dr. Rama Shanker
Third	Minimal sigma-field	I	Dr. Jonali Gogoi
	Problems on sigma-fields and minimal sigma-fields	I	Dr. Jonali Gogoi
	Problems, limitations and applications of mgf	IV	Dr. Rama Shanker
	Factorial moment generating function(fmgf) and its properties	IV	Dr. Rama Shanker
Fourth	Sequence of sets	I	Dr. Jonali Gogoi
	Limits of a sequence of sets	I	Dr. Jonali Gogoi
	Problems on fmgf	IV	Dr. Rama Shanker
	Characteristic function and its properties	IV	Dr. Rama Shanker
Fifth	Probability measure,	I	Dr. Jonali Gogoi
	Integration with respect to measure	I	Dr. Jonali Gogoi
	Problems on characteristic function	IV	Dr. Rama Shanker
	Theorems on characteristic functions	IV	Dr. Rama Shanker
Sixth	Probability space, Basic terminologies of Probability	II	Dr. Jonali Gogoi
	Theorems on probability	II	Dr. Jonali Gogoi
	Problems on inversion theorem of characteristic function	IV	Dr. Rama Shanker
	Joint characteristic functions	IV	Dr. Rama Shanker
Seventh	Problems	II	Dr. Jonali Gogoi
	Theorem of total probability	II	Dr. Jonali Gogoi
	Law of large numbers and its importance	V	Dr. Rama Shanker
	Weak law of large numbers (WLLN)	V	Dr. Rama Shanker
Eighth	Theorems on compound probability	II	Dr. Jonali Gogoi
	Problems	II	Dr. Jonali Gogoi
	Problems on WLLN	V	Dr. Rama Shanker
	Khinchin’s WLLN	V	Dr. Rama Shanker
Ninth	Independence of events	II	Dr. Jonali Gogoi
	Conditional probability	II	Dr. Jonali Gogoi

	Problems on Khinchin’s WLLN	V	Dr. Rama Sh
	Kolmogorov’s Theorem	V	Dr. Rama Sh
Tenth	Problems on Independence of events and Conditional probability	II	Dr. Jonali Go
	Bayes’ Theorem and its applications	II	Dr. Jonali Go
	Strong Law of large Numbers (SLLN)	V	Dr. Rama Sh
	Problems on SLLN	V	Dr. Rama Sh
Eleventh	Bayes’ Theorem and its applications	II	Dr. Jonali Go
	Bayes’ Theorem and its applications	II	Dr. Jonali Go
	Central Limit Theorem (CLT) and Its importance	V	Dr. Rama Sh
	De Moivre’s Laplace CLT	V	Dr. Rama Sh
Twelfth	Random Variable and its properties	III	Dr. Jonali Go
	Mathematical expectation and inequalities involving random variables viz. Markov’s, Holder’s, Minkowski’s and Jenson’s Inequalities	III	Dr. Jonali Go
	Liapounove’s CLT	V	Dr. Rama Sh
	Lindberge Levy CLT	V	Dr. Rama Sh
Thirteenth	Probability distribution (discrete and continuous),	III	Dr. Jonali Go
	Distribution function	III	Dr. Jonali Go
	Revision	IV	Dr. Rama Sh
	Revision	IV	Dr. Rama Sh
Fourteenth	Bi-dimensional random variables	III	Dr. Jonali Go
	Multi-dimensional random variables	III	Dr. Jonali Go
	Revision	IV	Dr. Rama Sh
	Revision	V	Dr. Rama Sh
Fifteenth	Marginal and conditional distributions	III	Dr. Jonali Go
	Stochastic independence	III	Dr. Jonali Go
	Revision	V	Dr. Rama Sh
	Revision	V	Dr. Rama Sh

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(JONALI GOGOI)

Course Coordinator

Paper Number: STS 503 (CORE –PAPER)

DISTRIBUTION THEORY

(Course is taught by Dr. Tanusree Deb Roy and Dr. Rama Shanker)

Course Co-ordinator: TANUSREE DEB ROY

WEEK	TOPICS TO BE COVERED	UNIT	TEACHERS
First	Brief Introduction of course	I	Dr. Tanusree Deb Roy
	Introduction on Discrete Distribution	I	Dr. Tanusree Deb Roy
	Bivariate Normal distribution (BND)	III	Dr. Rama Shanker
	Properties of BND	III	Dr. Rama Shanker
	Bernoulii distribution with properties	I	Dr. Tanusree Deb Roy
Second	Concept of Binomial distribution	I	Dr. Tanusree Deb Roy
	Properties of Binomial distribution with derivation	I	Dr. Tanusree Deb Roy
	Problems of BND	III	Dr. Rama Shanker
	Applications of BND	III	Dr. Rama Shanker
	Concept of Poisson distribution	I	Dr. Tanusree Deb Roy
Third	Properties of Poisson distribution with derivation	I	Dr. Tanusree Deb Roy
	Problems based on Binomial distribution and Poisson distribution	I	Dr. Tanusree Deb Roy
	Chi-square distribution	III	Dr. Rama Shanker
	Properties and Theorems on chi-square distribution	III	Dr. Rama Shanker
	Concept of Negative binomial distribution	I	Dr. Tanusree Deb Roy
Fourth	Properties of Negative binomial distribution with derivation	I	Dr. Tanusree Deb Roy
	Concept of Geometric distribution	I	Dr. Tanusree Deb Roy
	Applications of Ch0square distribution	III	Dr. Rama Shanker
	t-distribution	III	Dr. Rama Shanker
	Properties of Geometric distribution with derivation	I	Dr. Tanusree Deb Roy
Fifth	Concept of Hyper geometric distribution	I	Dr. Tanusree Deb Roy
	Properties of Hyper geometric distribution with derivation	I	Dr. Tanusree Deb Roy
	Properties and theorems on t-distribution	III	Dr. Rama Shanker
	Problems on t-distribution	III	Dr. Rama Shanker
	Concept of Power Series distribution	I	Dr. Tanusree Deb Roy
Sixth	Concept of Pitman family of distribution	I	Dr. Tanusree Deb Roy
	Concept of Continuous distribution	II	Dr. Tanusree Deb Roy
	Applications of t-distribution		Dr. Rama Shanker
	F-distribution	III	Dr. Rama Shanker
	Properties of Normal distribution with derivation	II	Dr. Tanusree Deb Roy
Seventh	Properties of Exponential distribution with derivation	II	Dr. Tanusree Deb Roy
	Problems based on Normal and Exponential distribution	II	Dr. Tanusree Deb Roy
	Properties and theorems on F-distribution	III	Dr. Rama Shanker
	Applications of F-distribution	III	Dr. Rama Shanker
	Gamma distribution its properties with their derivation	II	Dr. Tanusree Deb Roy
Eighth	Beta type I distribution its properties with their derivation	II	Dr. Tanusree Deb Roy
	Beta type II distribution its properties with their derivation	II	Dr. Tanusree Deb Roy

	Relationship between chi-square, t and F distributions	III	Dr. Rama Shanker
	Non-central chi-square distribution	IV	Dr. Rama Shanker
	Problems based on Gamma and beta distribution	II	Dr. Tanusree Deb Roy
Ninth	Weibull distribution its properties with their derivation	II	Dr. Tanusree Deb Roy
	Cauchy distribution its properties with their derivation	II	Dr. Tanusree Deb Roy
	Properties and Applications of Non-central chi-square distribution	IV	Dr. Rama Shanker
	Non-central t distribution	IV	Dr. Rama Shanker
	Log normal distribution	II	Dr. Tanusree Deb Roy
Tenth	Introduction on order statistics with application	V	Dr. Tanusree Deb Roy
	Distribution of r-th order and joint order statistics	V	Dr. Tanusree Deb Roy
	Properties and Applications of non-central t-distribution	IV	Dr. Rama Shanker
	Non-central F-distribution	IV	Dr. Rama Shanker
	Distribution of range and moments of order statistics	V	Dr. Tanusree Deb Roy
Eleventh	Moments of order statistics	V	Dr. Tanusree Deb Roy
	Problems based on order statistics	V	Dr. Tanusree Deb Roy
	Properties and Applications of non-central F-distribution	IV	Dr. Rama Shanker
	Compound distribution	IV	Dr. Rama Shanker
	Concept of mixture distribution	V	Dr. Tanusree Deb Roy
Twelfth	Problems based on mixture distribution	V	Dr. Tanusree Deb Roy
	Introduction on Extreme value distribution	V	Dr. Tanusree Deb Roy
	Neyman’s Type A distribution	IV	Dr. Rama Shanker
	Properties and Applications of Neyman’s Type A distribution	IV	Dr. Rama Shanker
	Discussion of different types of Extreme value distribution	V	Dr. Tanusree Deb Roy
Thirteenth	Application of Extreme value distribution	V	Dr. Tanusree Deb Roy
	Problems based on Cauchy distribution	II	Dr. Tanusree Deb Roy
	Polya-eggenberger distribution	IV	Dr. Rama Shanker
	Inverse Polya-eggenberger distribution	IV	Dr. Rama Shanker
	Problems based on log normal distribution	II	Dr. Tanusree Deb Roy
Fourteenth	Revisions of theory	I	Dr. Tanusree Deb Roy
	Revisions of theory	II	Dr. Tanusree Deb Roy
	Truncated discrete distribution	IV	Dr. Rama Shanker
	Truncated continuous distribution	IV	Dr. Rama Shanker
	Revisions of theory	V	Dr. Tanusree Deb Roy
Fifteenth	Revisions of Problems	I	Dr. Tanusree Deb Roy
	Revisions of Problems	II	Dr. Tanusree Deb Roy
	Revisions of Unit III	III	Dr. Rama Shanker
	Revisions of Unit IV	IV	Dr. Rama Shanker
	Revisions of Problems	V	Dr. Tanusree Deb Roy

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(TANUSREE DEB ROY)

Course Coordinator

Paper Number: STS 504 (SEC –PAPER)

SURVEY SAMPLING

(Course is taught by Dr. Rama Shanker, Dr. Jonali Gogoi and Dr. Vivek Verma)

Course Co-ordinator: TANUSREE DEB ROY

WEEK	TOPICS TO BE COVERED	UNIT	TEACHERS
First	Basic ideas and distinctive features of sampling techniques	I	Dr. Jonali Gogoi
	Basic ideas and distinctive features of sampling techniques	I	Dr. Jonali Gogoi
	Errors in survey	V	Dr. Vivek Verma
	Introduction to Double sampling Technique (DST)	IV	Dr. Rama Shanker
Second	Simple Random Sampling (SRS)	I	Dr. Jonali Gogoi
	Review of important results in simple random sampling	I	Dr. Jonali Gogoi
	Errors in survey	V	Dr. Vivek Verma
	DST with unequal probability of selection	IV	Dr. Rama Shanker
Third	Problems on SRS	I	Dr. Jonali Gogoi
	Stratified random sampling	I	Dr. Jonali Gogoi
	Errors in survey with application	V	Dr. Vivek Verma
	Advantages, disadvantages and Applications of DST	IV	Dr. Rama Shanker
Fourth	Problems on Stratified random samplng	I	Dr. Jonali Gogoi
	Estimation with different type of allocation of strata	I	Dr. Jonali Gogoi
	Non sampling errors	V	Dr.Vivek Verma
	Cluster sampling with equal cluster size	IV	Dr. Rama Shanker
Fifth	Proportional allocation and optimum allocation	I	Dr. Jonali Gogoi
	Sampling with varying probabilities (uunequal probability sampling)	II	Dr. Jonali Gogoi
	Non sampling errors with application	V	Dr. Vivek Verma
	Cluster sampling with unequal cluster sizes	IV	Dr. Rama Shanker
Sixth	Sampling with varying probabilities (uunequal probability sampling)	II	Dr. Jonali Gogoi
	Sampling with varying probabilities (uunequal probability sampling)	II	Dr. Jonali Gogoi
	Randomized response technique	V	Dr. Vivek Verma
	Advantages, disadvantages and applications of Cluster sampling	IV	Dr. Rama Shanker
Seventh	Sampling with varying probabilities (uunequal probability sampling)	II	Dr. Jonali Gogoi
	PPS with replacement/without replacement methods [including Lahiri’s scheme]	II	Dr. Jonali Gogoi
	Randomized response technique	V	Dr. Vivek Verma
	Two-stage sampling with varying sizes of first stage units	IV	Dr. Rama Shanker

Eighth	PPS with replacement/without replacement methods [including Lahiri’s scheme]	II	Dr. Jonali Gogoi
	Horwitz and Des Raj estimators for a general sample size 2	II	Dr. Jonali Gogoi
	Randomized response technique	V	Dr. Vivek Verma

	Advantages, disadvantages and applications of Two-stage sampling	IV	Dr. Rama Shanker
Ninth	Horwitz and Des Raj estimators for a general sample size 2	II	Dr. Jonali Gogoi
	Murthy’s estimator for sample size 2	II	Dr. Jonali Gogoi
	Randomized response technique	V	Dr. Vivek Verma
	Multi-stage sampling	IV	Dr. Rama Shanker
Tenth	Ratio method of estimation	III	Dr. Jonali Gogoi
	Merits and demerits of ratio method of estimation	III	Dr. Jonali Gogoi
	Randomized response technique	V	Dr. Vivek Verma
	Advantages, disadvantages and applications of Multi-stage sampling	IV	Dr. Rama Shanker
Eleventh	Problems	III	Dr. Jonali Gogoi
	Ratio method of estimation (Hartley Ross and Jacknife estimators)	III	Dr. Jonali Gogoi
	Basics of Non-randomized sampling	V	Dr. Vivek Verma
	Systematic sampling	IV	Dr. Rama Shanker
Twelfth	Ratio method of estimation (Hartley Ross and Jacknife estimators)	III	Dr. Jonali Gogoi
	Ratio method of estimation (Hartley Ross and Jacknife estimators)	III	Dr. Jonali Gogoi
	Basics of distance sampling	V	Dr. Vivek verma
	Theorems on systematic sampling	IV	Dr. Rama Shanker
Thirteenth	Regression method of estimation	III	Dr. Jonali Gogoi
	Regression method of estimation including its optimum property	III	Dr. Jonali Gogoi
	Snowball sampling	V	Dr. Vivek verma
	Theorems on systematic sampling	IV	Dr. Rama Shanker
Fourteenth	Problems	III	Dr. Jonali Gogoi
	Separate and combined ratio estimator	III	Dr. Jonali Gogoi
	Network sampling	V	Dr. Vivek verma
	Advantages, disadvantages and applications of Systematic sampling	IV	Dr. Rama Shanker
Fifteenth	Separate and combined ratio estimator	III	Dr. Jonali Gogoi
	Problems	III	Dr. Jonali Gogoi
	Network sampling	V	Dr. Vivek verma
	Revisions	IV	Dr. Rama Shanker

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(JONALI GOGOI)

Course Coordinator

Paper Number: STS 505 (ALIF - Paper)

STATISTICAL COMPUTING IN EXCEL

AND R

(This course is taught entirely by Dibyojyoti

Bhattacharjee) Course Co-ordinator: Dibyojyoti

Bhattacharjee

WEEK	TOPICS TO BE COVERED	UNIT	TEACHER
First	Getting Started in Microsoft Excel	I	All the classes by Dibyojyoti Bhattacharjee
	Use of formula in Excel	I	
	Use of Mathematical Functions	I	
Second	Statistical Functions in Excel	I	
	Graphics in Excel	I	
Third	Working with Grouped Frequency Distribution Bar Chart, Pie Chart, Frequency Polygon, Histogram, error bar plot, Ogive	I	
	Line diagram, Scatter diagram, Radar Plot, Doughnut plot, Bubble Plot	I	
Forth	Use of Data Analysis Toolpak	II	
	Random number generation from different distributions	II	
	Regression (simple, linear and non- linear)	II	
Fifth	t-tests, Z-tests	II	
	Multiple Regression	II	
Sixth	One-way and Two-way ANOVA in Excel	II	
	Optimization Using Solver	II	
Seventh	Matrix Algebra	II	
	Solution of equations using matrix method	II	
Eighth	Eigen Values and Eigen Vectors in Excel	IV	
Ninth	Introduction to R Programming	IV	
	Importing and Exporting Data in R	IV	
Tenth	Matrix Algebra in R	IV	
Eleventh	Descriptive statistics Computation involving single variable in R	V	
	Descriptive statistics involving two variables in R	V	
Twelfth	Statistical Graphics in R: Basic Graphs- Bar, Pie, line, histograms	V	
Thirteenth	Box-plot, Scatter plot, Filtered Scatter Plot, Q-Q Plot	V	
Fourteenth	Common parametric tests in R	V	
Fifteenth	ANOVA – one way and two way (with single and multiple-observations per cell)	V	

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(Dibyojyoti Bhattacharjee)
Course Coordinator

Paper Number: STS 551

STATISTICAL INFERENCE-I
(This course is taught by Dr. Rama Shanker)
Course Co-ordinator: Dr. RAMA SHANKER

WEEK	TOPICS TO BE COVERED	UNIT	NAME OF TEACHER
First	Brief Introduction of the course	I	Dr. Rama Shanker
	Estimation concept and examples	I	Dr. Rama Shanker
	Unbiasedness and its results	I	Dr. Rama Shanker
	Examples on Unbiasedness	I	Dr. Rama Shanker
Second	Examples on consistency	I	Dr. Rama Shanker
	Efficiency and some results	I	Dr. Rama Shanker
	Examples on Efficiency	I	Dr. Rama Shanker
	Concepts of sufficiency with examples	I	Dr. Rama Shanker
Third	Examples on sufficiency	I	Dr. Rama Shanker
	Minimal sufficiency	I	Dr. Rama Shanker
	Some examples on minimal sufficient statistics	1	Dr. Rama Shanker
	Neyman factorization criterion	I	Dr. Rama Shanker
Forth	Completeness	I	Dr. Rama Shanker
	Exponential family of distributions	I	Dr. Rama Shanker
	Rao-Cramer's inequality	II	Dr. Rama Shanker
	Examples on Rao-cramer's inequality	II	Dr. Rama Shanker
Fifth	Chapman's Robin's inequality	II	Dr. Rama Shanker
	Bhattacharya's bound and mean square error	II	Dr, Rama Shanker
	Best linear unbiased estimator	II	Dr. Rama Shanker
	Rao-Blackwell theorem	II	Dr. Rama Shanker
Sixth	Problems on Rao-Blackwell theorem	II	Dr. Rama Shanker
	Lehmann-Scheffe's theorem	II	Dr. Rama Shanker
	Problems on Lehmann-Scheffe's theorem	II	Dr. Rama Shanker
	Maximum likelihood estimation (MLE)	III	Dr. Rama Shanker
Seventh	Properties of MLE	III	Dr. Rama Shanker
	Problems on MLE	III	Dr. Rama Shanker
	Method of moments and examples	III	Dr. Rama Shanker
	MLE in censored and truncated distributions	III	Dr. Rama Shanker
Eighth	Method of minimum chi-square and modified minimum chi-square	III	Dr. Rama Shanker
	Pitman estimation for location	III	Dr. Rama Shanker
	Pitman estimation for scale	III	Dr. Rama Shanker
	Hypothesis testing concepts		Dr. Rama Shanker
Ninth	Basic terminology of hypothesis testing	III	Dr. Rama Shanker
	Neyman Pearson lemma	IV	Dr. Rama Shanker
	Examples on Neyman Pearson lemma	IV	Dr. Rama Shanker
	UMP tests with examples	IV	Dr. Rama Shanker
	Numerical examples on MP and UMP tests	IV	Dr. Rama Shanker

Tenth	Numerical examples on MP and UMP tests	IV	Dr. Rama Shanker
	Numerical examples on MP and UMP tests	IV	Dr. Rama Shanker
	Miscellaneous examples on hypothesis testing	IV	Dr. Rama Shanker
Eleventh	Miscellaneous examples on Hypothesis testing	IV	Dr. Rama Shanker
	Concept of Interval estimation	V	Dr. Rama Shanker
	Examples of Interval estimation	V	Dr. Rama Shanker
	Pivotal quantity method of confidence interval	V	Dr. Rama Shanker
Twelfth	Examples on pivotal quantity method of constructing confidence interval	V	Dr. Rama Shanker
	General method of constructing confidence interval	V	Dr. Rama Shanker
	Large sample confidence Intervals	V	Dr. Rama Shanker
	Examples on Large sample confidence Intervals	V	Dr. Rama Shanker

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	NAME OF TEACHER
Thirteenth	Shorted confidence interval	V	Dr. Rama Shanker
	Construction of Shorted confidence interval	V	Dr. Rama Shanker
	Examples on construction of shorted confidence interval	V	Dr. Rama Shanker
	Examples on construction of shorted confidence interval	V	Dr. Rama Shanker
Fourteenth	Revision of Unit I	I	Dr. Rama Shanker
	Revision of Unit I	I	Dr. Rama Shanker
	Revision of Unit II	II	Dr. Rama Shanker
	Revision of Unit II	II	Dr. Rama Shanker
Fifteenth	Revision of Unit III	III	Dr. Rama Shanker
	Revision of Unit III	III	Dr. Rama Shanker
	Revision of Unit IV	IV	Dr. Rama Shanker
	Revision of Unit IV	IV	Dr. Rama Shanker

Note: The plan is tentative but any change in the plan shall be recorded in the comment column.

(RAMA SHANKER)

Course Coordinator

Paper Number: STS- 552
Linear Models and Regression
Course Co-ordinator- Dr. Jonali Gogoi

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	TEACHER
First	Linear Model	I	Dr. Jonali Gogoi
	Gauss-Markov Model	I	Dr. Jonali Gogoi
	Estimation of Linear Parametric functions and BLUE's	I	Dr. Jonali Gogoi
	Fit of polynomial regression in one variable	IV	Dr. Vivek Verma
	Basic concept of generalized linear models	V	Dr. Vivek Verma
Second	Properties of BLUEs	I	Dr. Jonali Gogoi
	Regression lines and their properties	I	Dr. Jonali Gogoi
	Estimation and tests of hypothesis associated with the parameters	I	Dr. Jonali Gogoi
	Fit of polynomial regression in one variable	IV	Dr. Vivek Verma
	Basic concept of generalized linear models	V	Dr. Vivek Verma
Third	Least Square Regression	I	Dr. Jonali Gogoi
	Properties of least square regression	I	Dr. Jonali Gogoi
	Confidence Intervals	I	Dr. Jonali Gogoi
	Fit of polynomial regression in several variables	IV	Dr. Vivek Verma
	Basic concept of generalized linear models	V	Dr. Vivek Verma
Forth	Confidence Intervals and bands for Slope	I	Dr. Jonali Gogoi
	Confidence Intervals and bands for Intercept	I	Dr. Jonali Gogoi
	Goodness of fit	I	Dr. Jonali Gogoi
	Fit of polynomial regression in several variables	IV	Dr. Vivek Verma
	Logit transformation	V	Dr. Vivek Verma
Fifth	Residual Analysis	I	Dr. Jonali Gogoi
	Outliers, effects of outliers	I	Dr. Jonali Gogoi
	Transformation of variables	I	Dr. Jonali Gogoi
	Fit of polynomial regression in several variables	IV	Dr. Vivek Verma
	Logit transformation	V	Dr. Vivek Verma
Sixth	Interclass Correlation	I	Dr. Jonali Gogoi
	Correlation Ratio	I	Dr. Jonali Gogoi
	Multiple Regression	II	Dr. Jonali Gogoi
	Use of orthogonal polynomials	IV	Dr. Vivek Verma
	Maximum likelihood estimation in GLM	V	Dr. Vivek Verma
Seventh	Estimation and tests of hypothesis associated with parameters of multiple regression	II	Dr. Jonali Gogoi
	Least Square Estimator	II	Dr. Jonali Gogoi
	Properties of Least Square Estimator	II	Dr. Jonali Gogoi
	Use of orthogonal polynomials	IV	Dr. Vivek Verma
	Maximum likelihood estimation in GLM	V	Dr. Vivek Verma
Eighth	Confidence Intervals	II	Dr. Jonali Gogoi
	Confidence intervals for mean	II	Dr. Jonali Gogoi
	Regression Coefficients	II	Dr. Jonali Gogoi
	Gompertz non-linear growth models	IV	Dr. Vivek Verma
	Maximum likelihood estimation in GLM	V	Dr. Vivek Verma
Ninth	Prediction in multiple regression	II	Dr. Jonali Gogoi
	Collinearity	II	Dr. Jonali Gogoi
	Analysis of regression residuals	II	Dr. Jonali Gogoi
	Gompertz non-linear growth models	IV	Dr. Vivek Verma
	Maximum likelihood estimation in GLM	V	Dr. Vivek Verma
	Check for normality of the error terms in multiple regression	II	Dr. Jonali Gogoi
	Inverse regression	II	Dr. Jonali Gogoi
	Two-phase linear regression	II	Dr. Jonali Gogoi
	Gompertz non-linear growth models	IV	Dr. Vivek Verma
	Tests of hypothesis: Wald test	V	Dr. Vivek Verma
Eleventh	Two-phase linear regression inclusion of qualitative variable as regressors	II	Dr. Jonali Gogoi
	Multiple Correlation	II	Dr. Jonali Gogoi
	Partial Regression	II	Dr. Jonali Gogoi
	logistic non-linear growth models	IV	Dr. Vivek Verma
	Tests of hypothesis: LR test& score test	V	Dr. Vivek Verma
Twelfth	Auto-Correlation	III	Dr. Jonali Gogoi
	Detection and Removal of Auto-Correlation	III	Dr. Jonali Gogoi

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	TEACHER
	Variance Covariance of Least Square Estimators	III	Dr. Jonali Gogoi
	logistic non-linear growth models	IV	Dr. Vivek Verma
	Test for overall regression	V	Dr. Vivek Verma
Thirteenth	Estimation of error variance with auto-correlation	III	Dr. Jonali Gogoi
	Multicollinearity	III	Dr. Jonali Gogoi
	logistic non-linear growth models	IV	Dr. Vivek Verma
	Multiple logistic regression	V	Dr. Vivek Verma
Fourteenth	Detection and Correction of Multicollinearity	III	Dr. Jonali Gogoi
	Problem of Correlated errors	III	Dr. Jonali Gogoi
	Fit of polynomial regression using logistic non-linear growth models	IV	Dr. Vivek Verma
	Multiple logistic regression-Forward method	V	Dr. Vivek Verma
Fifteenth	Ridge Regression	III	Dr. Jonali Gogoi
	Difference between linear regression and ridge regression	III	Dr. Jonali Gogoi
	Fit of polynomial regression using Gompertz non-linear growth models	IV	Dr. Vivek Verma
	Multiple logistic regression- Backward methods	V	Dr. Vivek Verma

Dr. Jonali Gogoi

(Course Coordinator)

Paper Number: STS 553 (CORE –PAPER)
STOCHASTIC PROCESSES
(Course is taught by Dr.Tanusree Deb Roy)
Course Co-ordinator: TANUSREE DEB ROY

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	COMMENT
First	Fundament concepts of Stochastic Process	I	Dr.Tanusree Deb Roy
	Markov Chains: Definitions, Examples, transition probability matrix	I	
	Classification of states of a Markov Chains	I	
	Higher transition probabilities in Markov Classification of states and chain	I	
Second	Stability of a Markov System and Limiting behaviour	I	Dr.Tanusree Deb Roy
	Irreducible chain and ergodic chain	I	
	Absorption probabilities	I	
	Markov Processes with discrete state space	II	
Third	Poisson process: Definitions and Examples	II	Dr.Tanusree Deb Roy
	Basic Properties of Poisson Processes	II	
	Generalization of the Poisson Process	II	
	Simple Birth and Death Processes	II	
Fourth	General Birth and Death Process, Polya Process	II	Dr.Tanusree Deb Roy
	Martingales: Definitions and Examples, Supermartingales	II	
	Submartingales and Martingale convergence theorems	II	
	Concept of Random walk	III	
Fifth	Gambler's ruin problem	III	Dr.Tanusree Deb Roy
	Correlated random walk	III	
	Introduction on Brownian motion: Definition and Example,	III	
	Wiener process	III	
Sixth	Branching Process	IV	Dr.Tanusree Deb Roy
	Discrete time branching processes	IV	
	Generating Function Relations for Branching Processes	IV	
	Extinction probabilities their Examples	IV	
Seventh	Stationary Processes: Definitions and Examples	IV	Dr.Tanusree Deb Roy
	Problems on Stationary Processes	IV	
	Ergodic Theory	IV	
	Problems on Ergodic Theory	IV	
Eighth	Problems related to Branching Process	IV	Dr.Tanusree Deb Roy
	Renewal Processes: Definition and Related Concept	V	
	Examples of Renewal Processes	IV	
	Problems related to Renewal Processes	IV	
Ninth	Concept on Stopping time	V	Dr.Tanusree Deb Roy
	Examples on Stopping time	V	
	Problems on Stopping time	V	
	Wald's Equation derivation	V	
Tenth	Derivation of Renewal Equation	II	Dr.Tanusree Deb Roy
	Problems related to renewal equation	V	
	Elementary Renewal Theorem	V	
	Problems related to Elementary Renewal Theorem	V	
Eleventh	Derivation of The Renewal Theorem	V	
	Problems related to Renewal Theorem	V	
	Concept on Delayed Renewal Process	V	
	Problems on Delayed Renewal Process	V	Dr.Tanusree Deb Roy
Twelfth	Concept on Equilibrium Renewal Processes	V	

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	COMMENT
	Problems on Equilibrium Renewal Process	V	Dr.Tanusree Deb Roy
	Discussion on any topic of Unit I	I	
	Discussion on any topic of Unit I	I	
Thirteenth	Discussion on any topic of Unit II	II	Dr.Tanusree Deb Roy
	Discussion on any topic of Unit II	II	
	Discussion on any topic of Unit III	III	
	Discussion on any topic of Unit III	III	
Fourteenth	Discussion on any topic of Unit IV	IV	Dr.Tanusree Deb Roy
	Discussion on any topic of Unit IV	IV	
	Discussion on any topic of Unit V	V	
	Discussion on any topic of Unit V	V	
Fifteenth	Revision		Dr.Tanusree Deb Roy
	Revision		
	Revision		
	Revision		

Note: The plan is tentative but any change in the plan shall be recorded in the comment column.

(TANUSREE DEB ROY)

Course Coordinator

Paper Number : STS 505

R Programming (ALIF)

Course Co-ordinator: Dibyojyoti Bhattacharjee

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	TEACHER
First	Reading and Writing CSV files, Installing packages in R	I	All the classes by Dibyojyoti Bhattacharjee
Second	Constructing Frequency Distribution Table in R	I	
	Graphical Representation of Frequency Distribution	I	
Third	Scatter Plot, Box Plot, Violine Plot	I	
	Jittered plot, Jittered Plot superimposed over box plot	I	
Forth	Correlation Matrix and its Visualization	II	
	Computation of Descriptive Statistics, Lowess Fit	II	
Fifth	Applications of Functions in R	II	
	Advanced Graphics: Box Plot, Violine Plot, Dot Plot	II	
Sixth	One Way and Two Way ANOVA in R	III	
	Analysis of Covariance in R	III	
Seventh	Non-parametric Tests	III	
Eighth	Distribution Fitting	IV	
Ninth	Distribution Fitting	IV	
Tenth	Simulation from Distributions	IV	
Eleventh	Linear and Non-linear Regression in two variables	V	
	Multiple Regression in R	V	
Twelfth	Checking the Assumptions of Multiple Regression	V	
Thirteenth	Sensitivity Analysis of Multiple Regression	V	
Fourteenth	Working with Binary Logistic Regression	V	
Fifteenth	Assumption Verification of Logistic Regression Sensitivity Analysis and Visualization concerning Logistic Regression	V	

Note: The plan is tentative but any change in the plan shall be recorded in the comment column.

(Dibyojyoti Bhattacharjee)

Course Coordinator

Paper Number: STS 556 (VBC)

Python Programming
(Course is taught by Dr.Tanusree Deb Roy)
Course Co-ordinator: TANUSREE DEB ROY

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	COMMENT
First	Introduction to Python Programming	I	Dr.Tanusree Deb Roy
	Python Identifiers, Class names, Variable names, Identifier naming rules	I	
	Implementation of Python, Modes of Programming in Python	I	
	Basic elements of Python, Python Applications, Features of Python Programming	I	
Second	Comments for understanding Python code	II	Dr.Tanusree Deb Roy
	Comment syntax, Python Single Line comment	II	
	Mutiline comment in python, and writing Python comments	II	
	Variables in python, Declaration of variables	III	
Third	Different types of variables in Python, Assigning values to Variables	II	Dr.Tanusree Deb Roy
	Initialization of variables	III	
	Reading and writing of variables	III	
	Variable naming restrictions	III	
Fourth	Types of Python variables and their characterization	III	Dr.Tanusree Deb Roy
	Data Types in Python	IV	
	Python Numbers, Python Strings	IV	
	Manually computing measures of central tendency in Python (Mean, Median, Mode, etc.)	IV	
Fifth	Manually computing measures of dispersion in Python (Variance, St. Deviation, Quartile Deviation, etc.)	IV	Dr.Tanusree Deb Roy
	Python set, Python Boolean data type	IV	
	Introduction to Python Arithmetic	V	
	Basic Mathematical Operations in Python	V	
Sixth	Basic mathematical operations for variables	V	Dr.Tanusree Deb Roy
	Relational Operators	V	
	Increment and Logical Operators	V	
	Decrement Operators, Branching Programs	V	
Seventh	Python Identifying Operators, Python Operators Precedence	V	
	Introduction and implementation of IDE	V	
	Installation of basic libraries: Numpy, Pandas, etc.	Based on all Units	
	Plots in Python: Bar, Histogram	Based on all Units	
Eighth	Plots in Python: Boxplot, Scatter, etc.	Based on all Units	Dr.Tanusree Deb Roy
	Plots in Python (more than two variables	Based on all Units	
	Simple programming using Python	Based on all Units	
	Simple programming using Python cont.	Based on all Units	
Ninth	Problems based on Descriptive Statistics	Based on all Units	Dr.Tanusree Deb Roy
	Problems based on Descriptive Statistics cont.	Based on all Units	
	One sample t-test in Python	Based on all Units	
	Paired sample t-test in Python	Based on all Units	
Tenth	Independent sample t-test using Python	Based on all Units	Dr.Tanusree Deb Roy
	Non-parametric test using Python	Based on all Units	
	Non-parametric test using Python (1)	Based on all Units	
	Non-parametric test using Python (2)	Based on all Units	
Eleventh	z-test for proportion	Based on all Units	
	Problem on ANOVA using Python	Based on all Units	
WEEK	**TOPICS TO BE COVERED**	**UNIT NUMBER**	**COMMENT**
	Problem on ANOVA using Python cont.	Based on all Units	Dr. Tanusree Deb Roy
	Fitting of some important distributions using Python Libraries	Based on all Units	

Twelfth	Fitting of some important distributions using Python Libraries cont.	Based on all Units	Dr. Tanusree Deb Roy
	Fitting of important distributions without using Python Libraries	Based on all Units	
	Fitting of important distributions without using Python Libraries (1)	Based on all Units	
	Fitting of important distributions without using Python Libraries (2)	Based on all Units	
Thirteenth	Fitting of important distributions without using Python Libraries (3)	Based on all Units	Dr. Tanusree Deb Roy
	Discussion on any topic of Unit I	I	
	Discussion on any topic of Unit II	II	
	Discussion on any topic of Unit III	III	
Fourteenth	Discussion on any topic of Unit IV	IV	Dr. Tanusree Deb Roy
	Discussion on any topic of Unit V	V	
	Problem Discussion using Python	Based on all Units	
	Problem Discussion using Python (1)	Based on all Units	
Fifteenth	Problem Discussion using Python (2)	Based on all Units	Dr.Tanusree Deb Roy
	Revision		
	Revision		
	Revision		

Note: The plan is tentative but any change in the plan shall be recorded in the comment column.

(TANUSREE DEB ROY)

Course Coordinator

Paper Number: STS 601

STATISTICAL INFERENCE-II

(This course is taught by Dr. Rama Shanker and Dr. Vivek Verma)

Course Co-ordinator: RAMA SHANKER

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	COMMENT
First	Brief Introduction of the course	I	Dr. Rama Shanker
	Theory of Likelihood Ratio test (LRT)	I	Dr. Rama Shanker
	LRT for testing mean of normal population	I	Dr. Rama Shanker
	Concept of prior	IV	Dr. Vivek Verma
Second	LRT for testing variance of normal population	I	Dr. Rama Shanker
	LRT for testing equality of means of two normal population	I	Dr. Rama Shanker
	LRT for testing equality of variances of two normal populations	I	Dr. Rama Shanker
	Concept of posterior distributions	IV	Dr. Vivek Verma
Third	LRT for testing the equality means of several normal populations	I	Dr. Rama Shanker
	LRT for testing equality of variances of several normal populations	I	Dr. Rama Shanker
	Consistency and unbiasedness of LRT	I	Dr. Rama Shanker
	Types of prior and relevant information	IV	Dr. Vivek Verma
Forth	Similar regions and Similar tests,	I	Dr. Rama Shanker
	Asymptotic distribution of LRT	I	Dr. Rama Shanker
	Monotone Likelihood Ratio test, Monotone Likelihood Ratio (MLR) with examples	I	Dr. Rama Shanker
	Types of prior and relevant information	IV IV	Dr. Vivek Verma
Fifth	MLR in exponential family of distributions	II	Dr. Rama Shanker
	Uses of MLR in finding UMP test	II	Dr, Rama Shanker
	Brief Introduction of sequential probability Ratio test (SPRT)	II	Dr. Rama Shanker
	Bayes' risk and Bayes rules	IV IV	Dr. Vivek Verma
Sixth	Operating characteristics(OC) function and Average sample number (ASN)	II	Dr. Rama Shanker
	Determination of OC and ASN functions-problems	II	Dr. Rama Shanker
	Determination of OC and ASN functions-Problems	II	Dr. Rama Shanker
	Bayesian estimation of parameters	IV IV	Dr. Vivek Verma
Seventh	Economy of SPRT with examples	II	Dr. Rama Shanker
	Ultimate Termination of SPRT with probability one	II	Dr. Rama Shanker
	Some standard examples for SPRT	II	Dr. Rama Shanker
	Parametric functions under various loss functions	IV IV	Dr. Vivek Verma
Eighth	Introduction with advantages and disadvantages of Non-parametric tests	III	Dr. Rama Shanker
	confidence interval and estimation in non-parametric test	III	Dr. Rama Shanker
	Sign test for one sample problems and theorem	III	Dr. Rama Shanker
	Parametric functions under various loss functions	IV IV	Dr. Vivek Verma

Ninth	Sign test for two samples problems with theorems and problems	III	Dr. Rama Shanker
	Bayesian interval estimation- credible intervals	V V	Dr. Vivek Verma
Tenth	Wilcoxon-sign rank tests for one sample with theorems and examples Mann-Whitney U tests with theorems and examples	III	Dr. Rama Shanker
	Highest posterior density regions and their applications	V	Dr. Vivek Verma
Eleventh	Run tests with theorem and examples	III	Dr. Rama Shanker
	Run tests with theorem and examples	III	Dr. Rama Shanker
	Run tests with theorem and examples	III	Dr. Rama Shanker
	Comparison with classical confidence intervals, Bayesian prediction	V	Dr. Vivek Verma
Twelfth	Mann-Whitney U Test-Theory	III	Dr. Rama Shanker
	Mann-Whitney U Test-Theory-Problems	III	Dr. Rama Shanker
	Relationship between Mann-Whitney U test and Wilcoxon Test	III	Dr. Rama Shanker
	Comparison with classical confidence intervals, Bayesian prediction	V	Dr. Vivek Verma
Thirteenth	Ch-square goodness of fit test	III	Dr. Rama Shanker
	Kolmogorov-Smirnov One sample test	III	Dr. Rama Shanker
	Kolmogorov-Smirnov Two sample test	III	Dr. Rama Shanker
	Bayesian testing of hypothesis problem	V	Dr. Vivek Verma
Fourteenth	Revision of Likelihood ratio tests with problems	I	Dr. Rama Shanker
	Revision of Likelihood ratio tests with problems	I	Dr. Rama Shanker
	Revision of SPRT	II	Dr. Rama Shanker

	Prior odds, Bayes factor for various types of hypothesis problems.	V	Dr. Vivek Verma
Fifteenth	Revision of SPRT	II	Dr. Rama Shanker
	Revision of Non-parametric test	III	Dr. Rama Shanker
	Prior odds, Bayes factor for various types of hypothesis problems.	V	Dr. Vivek Verma

(RAMA SHANKER)

Course Coordinator

Paper Number: STS 602 (IDC –PAPER)

INDUSTRIAL STATISTICS AND OPTIMIZATION TECHNIQUES

(Course is taught by Dr. Rama Shanker, Dr. Jonali Gogoi and Dr. Tanusree Deb Roy)

Course Co-ordinator: RAMA SHANKER

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	COMMENT
First	Brief Introduction of course	I	Dr. Rama Shanker
	Convex sets and properties	I	Dr. Rama Shanker
	Inventory Theory: Introduction	III	Dr. Jonali Gogoi
	Classification of Inventory Models	III	Dr. Jonali Gogoi
	Introduction on Queuing Theory	IV	Dr. Tanusree Deb Roy
Second	Problems on convex sets, Supporting and separating hyper planes	I	Dr. Rama Shanker
	Linear Programming Problem (LPP)- Formulation and Graphical Solution	I	Dr. Rama Shanker
	Deterministic Inventory Models (Model I)	III	Dr. Jonali Gogoi
	Deterministic Inventory Models (Model II)	III	Dr. Jonali Gogoi
	Structure of a queuing system	IV	Dr. Tanusree Deb Roy
Third	LPP-Simplex Method	I	Dr. Rama Shanker
	Artificial variable technique: Big-M Method	I	Dr. Rama Shanker
	Deterministic Inventory Models (Model III)	III	Dr. Jonali Gogoi
	Deterministic Inventory Models (Model IV)	III	Dr. Jonali Gogoi
	Classification of queuing models	IV	Dr. Tanusree Deb Roy
Forth	Artificial variable technique: Two-Phase method	I	Dr. Rama Shanker
	Artificial Free Simplex Method	I	Dr. Rama Shanker
	Deterministic Inventory Models (Model V)	III	Dr. Jonali Gogoi
	Deterministic Inventory Models (Model VI)	III	Dr. Jonali Gogoi
	Description on Model 1: (M|M|1):(∞|FCFS) or (Birth and Death Model)model	IV	Dr. Tanusree Deb Roy
Fifth	Duality-Theory and Problems	I	Dr. Rama Shanker
	Dual simplex Method	I	Dr, Rama Shanker
	Probabilistic Inventory Models (Model VII)	III	Dr. Jonali Gogoi
	Probabilistic Inventory Models (Model VIII)	III	Dr. Jonali Gogoi
	Characteristics and problem associated with Model 1	IV	Dr. Tanusree Deb Roy
Sixth	Integer Programming Problem-Gomory Cut Method	I	Dr. Rama Shanker
	Integer Programming Problem-Branch and Bound Method	I	Dr. Rama Shanker
	Probabilistic Inventory Models (Model IX)	III	Dr. Jonali Gogoi
	Probabilistic Inventory Models (Model X)	III	Dr. Jonali Gogoi
	Description on Model 2: (M|M|1):(N|FCFS)	IV	Dr. Tanusree Deb Roy
Seventh	Transportation Problems-Theory	II	Dr. Rama Shanker
	Transportation problems-Theory	II	Dr. Rama Shanker
	Examples on Deterministic Inventory Models	III	Dr. Jonali Gogoi
	Examples on Probabilistic Inventory Models	III	Dr. Jonali Gogoi
	Characteristics and problem associated with Model 2	IV	Dr. Tanusree Deb Roy
Eighth	NWCR, MMM and VAM for initial Basic feasible of Transportation problem	II	Dr. Rama Shanker
	Optimal Solution of	II	Dr. Rama Shanker

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	COMMENT
	Transportation Problem-MODI method		
	Statistical Quality Control (SQC): Introduction	V	Dr. Jonali Gogoi
	3-sigma control limits and probability limits	V	Dr. Jonali Gogoi
	Description on Model 3: (M|M|C):(∞|FCFS)	IV	Dr. Tanusree Deb Roy
Ninth	Special cases of Transportation Problems	II	Dr. Rama Shanker
	Special cases of Transportation Problems	II	Dr. Rama Shanker
	Process control and Product control	V	Dr. Jonali Gogoi
	Control charts for Variables	V	Dr. Jonali Gogoi
	Characteristics and problem associated with Model 3	IV	Dr. Tanusree Deb Roy
Tenth	Assignment problems-Theory	II	Dr. Rama Shanker
	Solution of Assignment problems using Hungarian Method	II	Dr. Rama Shanker
	Control charts for Variables	V	Dr. Jonali Gogoi
	Control charts for Variables	V	Dr. Jonali Gogoi
	Description on Model 4: (M|M|C):(N|FCFS)	IV	Dr. Tanusree Deb Roy
Eleventh	Solution of Assignment problems using Hungarian Method	II	Dr. Rama Shanker
	Some special cases of Assignment problems	II	Dr. Rama Shanker
	Control charts for Attributes	V	Dr. Jonali Gogoi
	Control charts for Attributes	V	Dr. Jonali Gogoi
	Problem associated with Model 4	IV	Dr. Tanusree Deb Roy
Twelfth	Some special cases of Assignment problems	II	Dr. Rama Shanker
	Non-Linear Programming(NLP) problem-Theory	II	Dr. Rama Shanker
	Natural tolerance limits and specification limits	V	Dr. Jonali Gogoi
	Modified Control Charts	V	Dr. Jonali Gogoi
	Discussions on the Theory and Problems in Queuing Theory	IV	Dr. Tanusree Deb Roy
Thirteenth	Kuhn Tucker conditions of NLP	II	Dr. Rama Shanker
	Problems on NLP	II	Dr. Rama Shanker
	Sampling inspection plans by attributes (Single Sampling plan)	V	Dr. Jonali Gogoi
	Sampling inspection plans by attributes (Double sampling plan)	V	Dr. Jonali Gogoi
	Continuation of the Discussions on the Theory and Problems in Queuing Theory	IV	Dr. Tanusree Deb Roy
Fourteenth	Quadratic Programming-Beal's method	II	Dr. Rama Shanker
	Quadratic Programming- Wolf's method	II	Dr. Rama Shanker
	Sampling inspection plans by attributes (Sequential sampling plan)	V	Dr. Jonali Gogoi
	Sampling inspection plans by variables	V	Dr. Jonali Gogoi
	Revisions of Problems	IV	Dr. Tanusree Deb Roy
Fifteenth	Revisions of theory and Problems	I	Dr. Rama Shanker
	Revisions of theory and Problems	II	Dr. Rama Shanker
	Revisions of theory and problems	III	Dr. Jonali Gogoi
	Revisions of theory and problems	V	Dr. Jonali Gogoi
	Revisions of Problems	IV	Dr. Tanusree Deb Roy

(RAMA SHANKER)

Course Coordinator

Paper Number : STS 603 (ii) (ECC)

Biostatistics

Course Co-ordinator (STS 603): Dr. Vivek Verma

(The entire paper is assigned to Dr. Vivek Verma)

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	COMMENT
First	Introduction to Epidemiology, Principles of Epidemiologic investigations Different epidemiologic measures (risk, relative risk, odds, odds ratio, incidence, prevalence)	I I I	
Second	Different epidemiologic measures (risk, relative risk, odds, odds ratio, incidence, prevalence) Design and analysis of cohort and case-control studies.	I I I	
Third	Design and analysis of matched studies. Concept of causality and its measurement.	I I I	
Forth	Introduction, Ethical issues in clinical trials Types of clinical trials,	II II II	
Fifth	Types of clinical trials, Randomized clinical trials: Randomization for balancing treatment assignments	II II II	
Sixth	Randomized clinical trials: Randomization for balancing treatment assignments	II II II	
Seventh	Random allocation rule, truncated binomial design, biased coin designs Incorporating covariate information.	III III III	
Eighth	Random allocation rule, truncated binomial design, biased coin designs Incorporating covariate information.	III III III	
Ninth	Randomization to favor the better performing treatments for binary responses (play-the winner and randomized-play-the –winner rules).	III III III	
Tenth	Mendel's laws, Estimation of allele frequencies,	IV IV IV	
Eleventh	Hardy-Weinberg law, Mating tables, Genotype frequencies with imbreeding,	IV IV IV	
Twelfth	Disequillibrum constant, Imbreeding coefficient	IV IV IV	
Thirteenth	Models of natural selection and mutation,	V V V	
Fourteenth	Linkage analysis: Elston-Stewart algorithm	V V V	
Fifteenth	Linkage analysis: QTL mapping.	V V V	

(Vivek Verma)

Course Coordinator

Paper Number : STS 605
STATISTICAL COMPUTING IN SPSS (ALIF)
Course Co-ordinator: Dibyojyoti Bhattacharjee
(The entire paper is assigned to Dibyojyoti Bhattacharjee)

WEEK	TOPICS TO BE COVERED	UNIT	COMMENT
First	Getting Started in SPSS	I	
	Arranging the variable view to input primary data, Data Entry	I	
	Data coding	I	
Second	Basic Graphical tools in SPSS	I	
	Graphics in SPSS	I	
	Descriptive Statistics involving Single variable in SPSS	II	
Third	Descriptive Statistics involving two variables in SPSS	II	
	Regression-linear and non-linear in SPSS	II	
	Multiple Regression in SPSS	II	
Forth	Multiple regression-checking the assumptions and dummy variables	II	
	Basic Parametric Tests in SPSS	III	
	Z test for proportions, t-tests for means in SPSS	III	
Fifth	ANOVA -One Way, Two Way in SPSS	III	
	Two-way ANOVA with multiple number of observations per cell in SPSS	III	
	Latin Square Design Experiment in SPSS	III	
Sixth	Wilcoxon Signed Rank Test,Mann-Whitney U Test, Wilcoxon Matched Pair Signed Rank Test, Median test in SPSS	III	
	Run test (one sample, two samples), Wald-Wolfowitz Run Test, Kolmogrov-Smirnov (one sample and two sample tests) in SPSS	III	
	Kruskal-Wallis One-way ANOVA, Binomial test, McNemar’s Test in SPSS	III	
Seventh	Cochran’s Q Test, Kendall’s Coefficient of Concordance in SPSS	III	
	Collection and analysis of Likert Scale type data in SPSS	IV	
	Time Series Analysis - Theory	Prerequisite for Time Series Practical in Unit IV	
Eighth	Time Series Analysis – Theory		
Ninth	Sequence Charts, Forecasting Models in SPSS	IV	
	Fitting ARIMA (p, d, q) models for forecasting in SPSS	IV	
	Choosing appropriate Time Series model in SPSS	IV	
Tenth	Fitting binary logistic regression model in SPSS	IV	
	Report Writing following analysis of binary logistic regression in SPSS	IV	
Eleventh	Factor Analysis in SPSS	V	
Twelfth	Using Principal Component Analysis for composite index development	V	
Thirteenth	Multivariate Analysis of Variance (MANOVA) in SPSS	V	
Fourteenth	Cluster analysis- k-mean clustering and hierarchical clustering in SPSS	V	
	Cluster analysis- hierarchical clustering in SPSS		
Fifteenth	Discriminant Analysis in SPSS	V	

(Dibyojyoti Bhattacharjee)

Course Coordinator

Paper Number :STS 651
STS 651 - Design and Analysis of Experiments (Core) (V)
[Co-ordinator: Dr. Jonali Gogoi]

WEEK	TOPICS TO BE COVERED	UNIT	TEACHER
First	Review of linear estimation	I	Dr. Jonali Gogoi
	Linear Models, Types of Analysis of Variance (AOV) Model	I	
	AOV, Examples, Assumptions	I	
	Introduction to Block Designs	V	Dr. Vivek Verma
Second	Statistical Analysis of One-Way ANOVA	I	Dr. Jonali Gogoi
	Statistical Analysis of Two-Way ANOVA	I	
	Statistical Analysis of Two-Way Classified data with more than one observations per cell	I	
	Incomplete Block Designs	V	Dr. Vivek Verma
Third	Analysis of Covariance (ANOCOVA)	I	Dr. Jonali Gogoi
	Uses of ANOCOVA	I	
	Orthogonal Contrast	II	
	Incomplete Block Designs	V	Dr. Vivek Verma
Fourth	Applications of ANOVA	II	Dr. Jonali Gogoi
	ANOVA for Linearity of regression	II	
	ANOVA for Testing the Homogeneity of a group of regression Coefficients	II	
	Connectedness in Design	V	Dr. Vivek Verma
Fifth	Multiple Linear Regression model	II	Dr. Jonali Gogoi
	Non parametric ANOVA	II	
	Kruskal-Wallis Test	II	
	Concepts and Connectedness	V	Dr. Vivek Verma
Sixth	Examples of Kruskal-Wallis Test	II	Dr. Jonali Gogoi
	Friedman’s Two-Way Analysis of Variance by Ranks	II	
	Examples on Friedman’s Test	II	
	Orthogonality in Block Designs	V	Dr. Vivek Verma
Seventh	Design of Experiment: Definition of some important Theorems related to Design of Experiment	III	Dr. Jonali Gogoi
	Basic principles of Design	III	
	Statistical Analysis of Completely Randomized Design (CRD)	III	
	Orthogonality in Block Designs	V	Dr. Vivek Verma
Eighth	Applications, advantages and disadvantages of CRD	III	Dr. Jonali Gogoi
	Statistical Analysis of Randomized Block Design (RBD)	III	
	Applications, advantages and disadvantages of RBD	III	
	BalanceBlock Designs	V	Dr. Vivek Verma
Ninth	Latin Square Design (LSD) and its Analysis	III	Dr. Jonali Gogoi
	Advantages and disadvantages of LSD	III	
	Efficiency of a Design	III	
	Conceptualization of Balance Incomplete Block Design (BIBD)	V	Dr. Vivek Verma
Tenth	Efficiency of RBD over CRD	III	Dr. Jonali Gogoi
	Efficiency of LSD over CRD	III	
	Efficiency of LSD over RBD	III	
	BIBD Types and its utility	V	Dr. Vivek Verma
Eleventh	Missing Plot Technique, Estimation of Missing Observation in RBD	III	Dr. Jonali Gogoi
	Estimation of Missing Observation in LSD	III	
	Graeco-Latin Square Design	III	
	Analysis in BIBD	V	Dr. Vivek Verma
Twelfth	Quasi-Latin Square Design	III	Dr. Jonali Gogoi
	Factorial Experiments (FE), Advantages and	IV	

WEEK	TOPICS TO BE COVERED	UNIT	TEACHER
	Disadvantages of FE		
	Statistical Analysis of 2^2 F.E.	IV	
	Intrablock and Inter block information	V	Dr. Vivek Verma
Thirteenth	Statistical Analysis of 2^3 F.E.	IV	Dr. Jonali Gogoi
	Statistical Analysis of 3^2 F.E.	IV	
	Statistical Analysis of 3^3 F.E.	IV	
	Resolvable and affine resolvable designs	V	Dr. Vivek Verma
Fourteenth	Confounding	IV	Dr. Jonali Gogoi
	Types of Confounding	IV	
	Advantages and Disadvantages of Confounding	IV	
	Split-plot Design	V	Dr. Vivek Verma
Fifteenth	Confounding in 2^3 F.E.	IV	Dr. Jonali Gogoi
	Symmetrical F.E.	IV	
	Symmetrical F.E.s (s^m, where s is a prime or a prime power)	IV	
	Strip-plot Design	V	Dr. Vivek Verma

Paper Number : STS 652

MULTIVARIATE ANALYSIS (Core)

Course Co-ordinator: Dibyojyoti Bhattacharjee

WEEK	TOPICS TO BE COVERED	UNIT NUMBER	TEACHER
First	Introduction to Multivariate Analysis Arrangement of Data and Variables	I	All the classes by Dibyojyoti Bhattacharjee
Second	Application of Multivariate Analysis	I	
	Graphical Representation of Multivariate Data	I	
Third	Multivariate normal distribution its properties and characterization	I	
	Maximum likelihood estimators of parameters of Multivariate Normal Distribution	I	
Forth	Problems on Multivariate Normal Distribution	I	
Fifth	Multinomial distribution and its properties	I	
Sixth	Wishart matrix- distribution, characteristic function and properties Multivariate	II	
Seventh	The Multivariate General Linear Model	II	
Eighth	Mahalanobis D^2- its applications and properties	III	
Ninth	Hotelling's T^2 statistic and its applications	III	
Tenth	Likelihood Ratio Test for mean vectors, Variance-Covariance matrix	III	
Eleventh	Discriminant Analysis	IV	
Twelfth	Canonical Correlation	IV	
	Factor Analysis	IV	
Thirteenth	Principal Component Analysis and MANOVA	V	
Fourteenth	Introduction to Machine Learning and Techniques for Classification	V	
Fifteenth	Lazy Learning and Probabilistic Learning techniques, Cluster Analysis	V	

Note: The plan is tentative but any change in the plan shall be recorded in the comment column.

(Dibyojyoti Bhattacharjee)

Course Coordinator

Paper Number: STS 653 (ii)

RELIABILITY AND SURVIVAL ANALYSIS
(This course is taught by Dr. Rama Shanker and Dr. Vivek Verma)
Course Co-ordinator: RAMA SHANKER

WEEK	TOPICS TO BE COVERED	UNIT	COMMENT
First	Brief Introduction of the course	I	Dr. Rama Shanker
	Reliability and Its importance	I	Dr. Rama Shanker
	Description of Various terminologies used in reliability	I	Dr. Rama Shanker
	Censoring and types of censoring	IV	Dr. Vivek Verma
	Some practical examples on censoring	IV	Dr. Vivek Verma
Second	Numerical computation of reliability terminologies	I	Dr. Rama Shanker
	Derivation of reliability related functions for exponential distribution	I	Dr. Rama Shanker
	Derivation of reliability related functions for gamma distribution	I	Dr. Rama Shanker
	Hazard and survival function	IV	Dr. Vivek Verma
	Numerical examples on hazard and survival function	IV	Dr. Vivek Verma
Third	Derivation of reliability related functions for Weibull distribution	I	Dr. Rama Shanker
	Derivation of reliability related functions for normal and log-normal distributions	I	Dr. Rama Shanker
	Some practical examples on reliability	1	Dr. Rama Shanker
	Estimation of survival function	IV	Dr. Vivek Verma
	Nelson-Aalen method	IV	Dr. Vivek Verma
Fourth	Concepts of Aging-IFR and IFRA	II	Dr. Rama Shanker
	Numerical examples on Aging and computation	II	Dr. Rama Shanker
	Classes of distributions and Their Dual	II	Dr. Rama Shanker
	Kaplan-Meier’s method	IV	Dr. Vivek Verma
	Examples on Kaplan-Meier’s method	IV	Dr. Vivek Verma
Fifth	Coherent system as Binary function	II	Dr. Rama Shanker
	Numerical examples on Coherent system as Binary function	II	Dr, Rama Shanker
	Minimal cut with examples	II	Dr. Rama Shanker
	Some examples on Kaplan-Meier’s method	IV	Dr. Vivek Verma
	Some examples on Kaplan-Meier’s method	IV	Dr. Vivek Verma
Sixth	Paths set with examples	II	Dr. Rama Shanker
	Computation of path set from numerical example	II	Dr. Rama Shanker
	Some practical examples of minimal cut and paths set	II	Dr. Rama Shanker
	Proportional risk with examples	V	Dr. Vivek Verma
	Practical examples on Proportional risk	V	Dr. Vivek Verma
Seventh	Series system of reliability	III	Dr. Rama Shanker
	Examples on series system of reliability	III	Dr. Rama Shanker

WEEK	TOPICS TO BE COVERED	UNIT	COMMENT
	Parallel system of reliability	III	Dr. Rama Shanker
	Cox regression with examples	V	Dr. Vivek Verma
	Parametric methods for analysis of survival data	V	Dr. Vivek Verma
Eighth	Examples on Parallel system of reliability	III	Dr. Rama Shanker
	Series and parallel combinations	III	Dr. Rama Shanker
	Practical examples on Series and parallel combinations	III	Dr. Rama Shanker
	Parametric methods for analysis of survival data	V	Dr. Vivek Verma
	Parametric methods for analysis of survival data	V	Dr. Vivek Verma
Ninth	Complex system analysis	III	Dr. Rama Shanker
	Examples on complex system analysis	III	Dr. Rama Shanker
	K out of N system of configuration	III	Dr. Rama Shanker
	Non-parametric methods for analysis of survival data	V	Dr. Vivek Verma
	Non-parametric methods for analysis of survival data	V	Dr. Vivek Verma
Tenth	Derivation of reliability for K out of N system of configuration	III	Dr. Rama Shanker
	Numerical Computation of reliability for K out of N system of configuration	III	Dr. Rama Shanker
	Numerical Computation of reliability for K out of N system of configuration	III	Dr. Rama Shanker
	Non-parametric methods for analysis of survival data	V	Dr. Vivek Verma
	Non-parametric methods for analysis of survival data	V	Dr. Vivek Verma
Eleventh	Derivation of G system of independent components	III	Dr. Rama Shanker
	Computation of G system of independent components	III	Dr. Rama Shanker
	Computation of G system of independent components	III	Dr. Rama Shanker
	Competing risks and its computation	V	Dr. Vivek Verma
	Competing risks and its computation	V	Dr. Vivek Verma
Twelfth	Practical applications of series and parallel system of reliability	III	Dr. Rama Shanker
	Practical applications of series and parallel system of reliability	III	Dr. Rama Shanker
	Practical applications of series and parallel system of reliability	III	Dr. Rama Shanker
	Crude, Net and partially crude probabilities	V	Dr. Vivek Verma
	Interrelationship Crude, Net and partially crude probabilities	V	Dr. Vivek Verma
Thirteenth	Practical applications of K out of N system of	III	Dr. Rama Shanker

WEEK	TOPICS TO BE COVERED	UNIT	COMMENT
	reliability		
	Practical applications of K out of N system of reliability	III	Dr. Rama Shanker
	Practical applications of K out of N system of reliability	III	Dr. Rama Shanker
	Estimation of Crude, Net and partially crude probabilities	V	Dr. Vivek Verma
	Estimation of Crude, Net and partially crude probabilities	V	Dr. Vivek Verma
Fourteenth	Revision of Unit I	I	Dr. Rama Shanker
	Revision of Unit I	I	Dr. Rama Shanker
	Revision of Unit II	II	Dr. Rama Shanker
	Revision of Unit IV	IV	Dr. Vivek Verma
	Revision of Unit IV	IV	Dr. Vivek Verma
Fifteenth	Revision Unit II	II	Dr. Rama Shanker
	Revision of Unit III	III	Dr. Rama Shanker
	Revision of Unit III	III	Dr. Rama Shanker
	Revision of Unit V	V	Dr. Vivek Verma
	Revision of Unit V	V	Dr. Vivek Verma

Note: The plan is tentative but any change in the plan shall be recorded in the comment column.

(RAMA SHANKER)

Course Coordinator