SRI PADMAVATI MAHILA VISVAVIDYALAYAM::TIRUPATI
DEPARTMENT OF STATISTICS
COURSE STRUCTURE FOR THE SELF – SUPPORTING COURSE
[Revised Syllabus w.e.f.2021]

Course: M.Sc., Statistics

In the department of Statistics the curriculum comprise three components core, elective and fundamental aspects of the subjects and throw open avenues for applications .The students have the freedom to choose from a stream of elective courses. The list of elective courses is regularly updated. The choice based credit system (CBCS) is introduced in the year 2014. CBCS provides flexibility to introduce innovative and interdisciplinary programmes. A minimum of 96 credits is prescribed out of which 80 are the core courses and16 for optional/electives and 4credits each for soft skills such as communicative English, foundation course in Computer Applications and Gender studies.

Objectives:

1. To train students with high level skills in becoming professionals, analysis experts and consultants by embedding computer intensive methodology in statistics.
2. To develop knowledge and expertise in computer related software training, data analysis and interpretation in application areas that are suitable to science, society, business and industry.

Programme Outcomes:

- PO1: The M.Sc Statistics is designed with a view to catering to present day requirements of the society.
- PO2: In sector Research and Development fields, Higher studies, Planning commission, Medical and Social Researches, Finance/Econometric Modeling using Big –Data.
- PO3: Moreover, the course structure intends to inculcate strong laboratory skills(using R-Programming, SPSS and Excel) So that students can take up independent industrial projects, consultancy in any areas of Designing of Experiments, Sample surveys, Statistical Quality Control, Operations Research, Stochastic Processes, Econometrics etc.,
- PO4: This P.G. programme enhances analytical skills among students, developing the understanding of Statistical theory and its real life applications

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visva Vidyalayam
TIRUPATI - 517 502 A.P.

Programme Specific Outcomes :

- PSO1: To provide high level of analytical an application skills to the students to make them efficient and proficient in their fields of choice.
- PSO2: Students will gain proficiency in using statistical software for data analysis.
- PSO3: Students can prepare for qualifying Indian Statistical Services Examination.

Duration: Two years (Four Semesters)

Eligibility: B.A. / B.Sc. with Statistics and Mathematics as main subjects (in all the three years) on average of 50% marks.

Admission - Through SPMVV CET

Course Type: Self - Finance

Seats : 50+5(EWS)

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visvavidyalayam
TIRUPATI - 517 502 A.P

SRI PADMAVATI MAHILA VISVAVIDYALAYAM: TIRUPATI

DEPARTMENT OF STATISTICS

M.Sc Statistics (Semester-I & Semester-II)

S.No	Programme Out Comes	STCC101	STCC102	STCC103	STCC104	STCC105	STCC201	STCC202	STCC203B	STCC204C	STCC204	STCC205
1	Formulating & Tackling Statistics	X	X	X	X	X	X	X	X	X	X	X
2	Fundamental/Systematic understanding of academic field of Statistics	X	X	X	X	X	X	X	X	X	X	X
3	Research of development fields		X	X	X	X	X	X	X	X	X	
4	Procedural knowledge in government/public service & private sectors			X	X		X	X				X
5	Disciplinary subject area of Statistics	X	X	X	X	X	X	X	X	X	X	X
6	Industrial projects & Consultancy services		X		X		X	X	X	X		X
7	Analyze the real problems	X	X	X					X	X	X	X
8	Generic skills & global competencies						X	X				X
9	Statistical Softwares						X	X				X
10	Professional behavior						X	X				X

* X-denotes mapping between Programme Out Comes and Course Out Comes

Head I/c

M.Sc Statistics (Semester-III & Semester-IV)

S.No		STEEC301A/B (External Elective)		STCC302	STCC303	STCC304	STCC305	STCC401	STCC402	STCC403	STCC404
1	Formulating & Tackling Statistics		X	X	X	X	X	X	X		X
2	Fundamental/Systematic understanding of academic field of Statistics		X	X	X	X	X	X	X		X
3	Research of development fields	X	X	X	X	X	X	X	X	X	X
4	Procedural knowledge in government/public service & private sectors	X	X	X	X	X	X	X	X	X	X
5	Disciplinary subject area of Statistics		X	X	X	X	X	X	X		X
6	Industrial projects & Consultancy services	X	X	X	X	X	X	X	X		X
7	Analyze the real problems	X	X	X	X	X	X	X	X		X
8	Generic skills & global competencies	X		X	X	X	X		X	X	X
9	Statistical Softwares			X	X	X	X		X		X
10	Professional behavior	X	X	X	X	X	X	X	X	X	X

* X-denotes mapping between Programme Out Comes and Course Out Comes

Head I/c

DEPT. OF STATISTICS

Sri Padmavati Mahila Visvavidyalayam

TIRUPATI - 517 502. A.P.

SRI PADMAVATI MAHILA VISVAVIDYALAYAM
DEPARTMENT OF STATISTICS
COURSE STRUCTURE FOR THE SELF – SUPPORTING COURSE
[Revised Syllabus w.e.f.2021]

Semester	Subject Code	Paper	Title	Marks
I	STCC	101	Probability and Distribution Theory	100 (80+20)
	STCC	102	Linear Models and Applied Regression Analysis	100 (80+20)
	STCC	103	Stochastic Processes	100 (80+20)
	STCC	104	Sampling Theory	100 (80+20)
	STCC	105	Statistical Inference – I (Theory of Estimation)	100 (80+20)
	STCC	106	Practical – I	100
II	STCC	201	Statistical Inference – II (Testing of Hypothesis)	100(80+20)
	STCC	202	Multivariate Analysis	100(80+20)
	STIEC	203A	MOOCs	100
	STIEC	203B	Econometrics	
	STIEC	203C	Linear Algebra and Matrix Theory	
	STCC	204	Mathematical Programming	100(80+20)
	STCC	205	Programming in R	100(80+20)
	STCC	206	Practical –II	100
III	STEEC	301	External Elective	100(80+20)
	STEEC	302	Design and Analysis of Experiments	100(80+20)
	STCC	303	Statistical Quality Control & Reliability	100(80+20)
	STCC	304	Data Analysis Using SPSS	100(80+20)
	STCC	305	Research Methodology	100(80+20)
	STCC	306	Practical - III	100
IV	STEEC	301	Biostatistics	100(80+20)
	ST CC	401	MOOC'S /Operations Research	100(80+20)
	ST CC	402	Time Series Analysis & Forecasting Methods	100(80+20)
	ST CC	403	Human values and Professional Ethics	100(80+20)
	ST CC	404	Project Study (Methodology /Survey based /Computer Intensive)	200
	ST CC	405	Practical - IV	100

Head I/c
DEPT. OF STATISTICS
Sri Padmavati Mahila Visvavidyalayam
TIRUPATI - 517502 A.P.

SRI PADMAVATI MAHILA VISVAVIDYALAYAM::TIRUPATI
DEPARTMENT OF STATISTICS
CHOICE BASED CREDIT SYSTEM (CBCS) COURSE STRUCTURE
M.SC STATISTICS SYLLABUS 2020-21

I Semester (Previous)

Course Code	Title of the Course	Core/ Foundation/ Elective	Hours of Teaching	No. of Credits	Marks		Total
			Theory & Practicals		Internal	External	
STCC101	Probability and Distribution Theory	Core	4+2	4	20	80	100
STCC102	Linear Models and Applied Regression Analysis	Core	4+2	4	20	80	100
STCC103	Stochastic Processes	Core	4+2	4	20	80	100
STCC104	Sampling Theory	Core	4+2	4	20	80	100
STCC105	Statistical Inference – I (Theory of Estimation)	Core	4+2	4	20	80	100
STCC 106	Practical – I	Core	–	4	*	100	100
Total			20+10	24	100	500	600
FC1	Communicative English and Soft Skills	Foundation Course -1	2	2	*	*	50

Subject Type: CC – Core Course Essential course for the degree of M.Sc Statistics

FC –Foundation Course

*** One Practical Examination is conducted for all the papers at the end of the semester.**

Head/c
DEPT. OF STATISTICS

SRI PADMAVATI MAHILA VISVAVIDYALAYAM::TIRUPATI
DEPARTMENT OF STATISTICS
CHOICE BASED CREDIT SYSTEM (CBCS) COURSE STRUCTURE
M.SC STATISTICS SYLLABUS 2020-21

II Semester(Previous)

Course Code	Title of the Course	Core/ Foundation / Elective	Hours of Teaching Theory & Practicals	No. of Credits	Marks		Total
					Internal	External	
STCC201	Statistical Inference – II (Testing of Hypothesis)	Core	4+2	4	20	80	100
STCC202	Multivariate Analysis	Core	4+2	4	20	80	100
STIEC 203A	MOOCs	Internal Elective	4	4	*	*	100
STIEC 203B	Econometrics						
STIEC 203C	Linear Algebra and Matrix Theory		4+2		20	80	100
STCC204	Mathematical Programming	Core	4+2	4	20	80	100
STCC205	Programming in R	Core	4+2	4	20	80	100
STCC 206	Practical – II	Core	-	4	*	100	100
Total			20+10	24	100	500	600
FC2	Computer Applications	Foundation Course -2	2	2	*	*	50

Subject Type: CC – Core Course Essential course for the degree of M.Sc Statistics

FC –Foundation Course

IE – Internal Elective: Choice to the students to opt for one paper

*** One Practical Examination is conducted for all the papers at the end of the semester.**

Head
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI

SRI PADMAVATI MAHILA VISWAVIDYALAYAM::TIRUPATI
DEPARTMENT OF STATISTICS
CHOICE BASED CREDIT SYSTEM (CBCS) COURSE STRUCTURE
M.SC STATISTICS SYLLABUS 2020-21

III Semester(Final)

Course Code	Title of the Course	Core/ Foundation / Elective	Hours of Teaching Theory & Practicals	No. of Credits	Marks		Total
					Internal	External	
STEEC301	External Elective	External	4	4	20	80	100
STCC302	Design and Analysis of Experiments	Core	4+2	4	20	80	100
STCC303	Statistical Quality Control & Reliability	Core	4+2	4	20	80	100
STCC304	Data Analysis Using SPSS	Core	4+2	4	20	80	100
STCC305	Research Methodology	Core	4	4	20	80	100
STCC 306	Practical – III	Core	-	4	*	100	100
Total			20+6	24	100	500	600
FC3	Gender studies and Self Defence	Foundation Course -3	2	2	*	*	50

EXTERNAL ELECTIVE

Course Code	Title of the Course	Core/ Foundation/ Elective	Hours of Teaching Theory & Practicals	No. of Credits	Marks		Total
					Internal	External	
STEEC301	Biostatistics	External Elective	4	4	20	80	100

Subject Type: CC – Core Course Essential course for the degree of M.Sc Statistics
FC –Foundation Course
EE – External Elective: Offered by the Dept. of Statistics Bio-Statistics to other Departments. Minimum strength to offer the course is 10 students .
*** One Practical Examination is conducted for all the papers at the end of the semester.**

Head i/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visvavidyalayam
TIRUPATI - 517

SRI PADMAVATI MAHILA VISVAVIDYALAYAM::TIRUPATI
DEPARTMENT OF STATISTICS
CHOICE BASED CREDIT SYSTEM (CBCS) COURSE STRUCTURE
M.SC STATISTICS SYLLABUS 2020-21

IV Semester(Final)

Course Code	Title of the Course	Core/ Foundation/ Elective	Hours of Teaching Theory & Practicals	No. of Credits	Marks		Total
					Internal	External	
STCC 401	MOOCs/Operations Research	Core	4+2	4	20	80	100
STCC 402	Time Series Analysis & Forecasting Methods	Core	4+2	4	20	80	100
STCC 403	Human values and Professional Ethics	Core	4	4	20	80	100
STCC 404	Project Study (Methodology /Survey based /Computer Intensive)	Core	4	8	*	200	200
STCC 405	Practical – IV	Core	-	4	*	100	100
	Total		**4+2**	**24**	**60**	**540**	**600**

Subject Type: CC – Core Course Essential course for the degree of M.Sc Statistics

* **One Practical Examination is conducted for all the papers at the end of the semester**

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI - 517 502 A.P

SRI PADMAVATI MAHILA VISVAVIDYALAYAM::TIRUPATI
DEPARTMENT OF STATISTICS
CHOICE BASED CREDIT SYSTEM (CBSC)
SEMESTER – I
ST CC 101: PROBABILITY AND DISTRIBUTION THEORY

Objective:

- The probability estimate is computed using mathematical equations that manipulate the data to determine the likelihood of an independent event occurring.
- Functions of one and several random variables are considered such as sums, differences, products and ratios.
- The central limit theorem is proved and the probability density functions are derived of those sampling distributions linked to the normal distribution. Bivariate and multivariate distributions are considered and distributions of maximum and minimum observations are derived.

Outcomes:

Student will learn

- The different probability measures
- The characteristics functions, central limit theorem, etc.,
- To apply all the discrete distributions in analyzing the data
- To use various continuous distributions whenever necessary

UNIT-I: Classes of sets, fields, σ -fields, minimal σ -field, Borel σ – field in R^N, sequence of sets, limsup and liminf of a sequence of sets. Convergence in distribution, theorem. CLT for a sequence of independent random variables under characteristic function.

UNIT-II: Measurable functions, Random variables, sequence of random variables, Monotone convergence theorem, Fatou's lemma, Dominated convergence theorem.

UNIT-III: Brief review of basic distribution theory, joint, marginal and conditional p.m. functions and p.d.functions. Functions of random variables and their distributions using Jacobian of transformations and other tools. Discrete distributions – Binomial, Poisson, N.B.D., H.G.D and its properties.

UNIT-IV: Continuous distributions - Rectangular, lognormal, exponential, gamma, beta, Cauchy, Laplace and Weibull distributions and their properties

UNIT-V: Sampling distributions: Review of central Chi Square, t and F distributions. Non-central chi-square, t and F distributions and their properties.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI - 517 502 A.P

References:

1. Ash, Robert. (1972). Real Analysis and Probability. Academic Press.
2. Billingsley, P. (P. (1986) Probability and Measure. Wiley.
3. Dudley, R.M. (1989). Real Analysis and Probability, Wadsworth and Brooks/Cole.
4. Kingman, J F C and Taylor, S. J. (1966). Introduction to Measure and Probability. Cambridge University Press.
5. Loeve, M (1963), Probability theory
6. Bhatt B.R (1998), Modern Probability theory, Wiley Eastern
7. Mukhopadhyay, P. (2002), Mathematical Statistics, Books& Allied (p) Ltd., Kolkata.
8. Chaudhary B (1983): The elements of complex analysis, Wiley Eastern.
9. Curtiss J.H (1978): Introduction to the functions of complex variables, Marcel Dekker.
10. J.N. Sharma (1996): Functions of complex variable, Krishna Prakasan Media, Meerut.
11. Dudewicz E.J and Mishra S.N (1988): Modern Mathematical Statistics, Wiley, International Students Edition.
12. Rohatgi V.K. (1984): An Introduction to probability theory and mathematical statistics.
13. Rao C.R (1973): Linear Statistical Inference and its Applications, 2/e, Wiley Eastern.
14. Pitman J. (1993): Probability, Narosa Publishing House.
15. Johnson, N.L and Kotz, S.M. (1972): Distributions in Statistics, Vol. I , II & III. Houghton and Miffin.
16. Yule, U and M.G. Kendall. An introduction to the theory of Statistics.
17. David H.A (1981): Order Statistics, II Edition, and John Wiley.
18. Feller W (1966): Introduction to probability theory and its applications, Vol. III, second edition. Wiley Eastern.
19. S.C. Gupta and V.K. Kapoor : Fundamentals of Mathematical Statistics. Sulthan and Chand Company.
20. Mukhopadhyay, P.(2002), Mathematical Statistics, Books and Allied (p) Ltd., Kolkata.
21. David H.A. and Nagaraja H.N.(2003): Order Statistics, 3/e, John Wiley & Sons.
15. Mood M.,Graybill F.A.and BoesD.C.(2001):Introduction to the theory of Staitstics, Tata McGraw-Hill, New Delhi.
16. Balakrishnan N and Saleh(2009):Continuous Bivariate Distributionsn, Springer.

STCC102: LINEAR MODELS AND APPLIED REGRESSION ANALYSIS

Objective:

- This course focuses on building a greater understanding, theoretical underpinning, and tools for applying the linear regression model and its generalizations. With a practical focus, it explores the working of multiple regression and problems that arise in applying it.

Outcomes:

By the end of this course, the students will be able to

- Regression analysis is the most common statistical modeling approach used in data analysis.
- In this course, students will learn the use of different useful tools used in regression analysis. They will learn about simple and multiple linear regression Non-Linear regression and Generalize linear models including logistic regression

UNIT-I: Two and Three variable Linear Regression models: Assumptions; OLS estimation; Tests of significance of individual regression coefficients; Testing the equality between two regressions coefficients; Test of significance of complete regression.

UNIT –II: General linear model: Assumptions; OLS estimation; BLUE; Tests of significance of individual regression coefficients; Testing the equality between two regressions coefficients; Test of significance of complete regression. Assumptions of OLS, BLUE, MLE

UNIT-III: Criteria for model selection; Goodness of fit measures; R^2 and adjusted R^2 Criteria; C_p criterion; testing the general linear hypothesis; Chow test for Equality between sets of regression coefficients in two linear models; test for structural change; restricted least squares estimation; Generalized Mean Squared error criterion.

UNIT-IV: Non-normal disturbances and their consequences; test for normality; Jarque-Bera test; Shapiro-Wilk test, Minimum Absolute Deviation (MAD) estimation; Box-Cox transformations.

UNIT-V: Non-Linear regression; Non linear least squares estimation; Maximum Likelihood estimation; Idea of computational methods; Gradient methods, Steepest descent method and Newton-raphson method; testing general Nonlinear hypothesis; Wald test, Lagrange multiplier test and likelihood ratio Test.

References:

1. Johnston, J (1984): Econometric Methods, III rd edition. MC Graw Hill.
2. Gujarathi, D (1979): Basic Econometrics, MC Graw Hill.
3. Judge, C.G., Griffiths, R.C.Hill, W.E ., Lutkephol, H and Lee, T.C (1985): The Theory and Practice of Econometrics, John Wiley and Sons.
4. Draper, N and Smith, B (1981): Applied Regression Analysis, Second Edition

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visvavidyalayam
TIRUPATI - 517 502. A.P.

STCC103: STOCHASTIC PROCESSES

Objective:

- The course is to provide the students with knowledge about the random variable, Random process and how to model the random processes in the communication system such as inference, and multiplepath phenomenon.

Outcomes:

At the end of this course students will be able to:

- To apply stochastic models for different distributions
- To use birth and death poisson processes when ever necessary
- To students the applications of Gambler's Reein problems
- To apply various inequalities in mathematical as well as statistical Analysis

UNIT-I: Introduction to stochastic processes (sp's): classification of sp's according to state apace and time domain. Countable state Markov chains (MC's), Chapman – Kolmogorov equations, calculation of n – step transition probability and its limit. Stationary distribution, classification of states,, transient MC, random walk and gambler's ruin problem.

UNIT-II: Discrete state space continuous time MC: Kolmogorov – Feller differential equations, Poisson process, birth and death process; Applications to queues and storage problems. Wiener process as a limit of random walk, first – passage time and other problems.

UNIT-III: Renewal theory: Elementary renewal theorem and applications. Statement and uses of key renewal theorem, study of residual life time process: weakly stationary and strongly stationary process.

UNIT-IV: Moving averages and auto regressive process, Branching process: Galton – Watson braching process, probability of ultimate extinction, distribution of population size.

UNIT-V: Martingale in discrete time, inequality, convergence and smoothing properties. Statistical inference in MC and Markov process.

References:

1. Adke, S.R and Manjunath, S.M (1984): An Introduction to Finite Markov Processes, Wiley Eastern.
2. Bhat, B.R (2000): stochastic Models: Analysis and Applications, New Age International, India.
3. Cinlar, E (1975): Introduction to Stochastic Processes, Prentice Hall.
4. Feller, W (1968): Introduction to Probability and its Applications, Vol. I, Wiley Eastern.
5. Harris, T.E (1963): The Theory of Branching Processes, Springer – Verlag.
6. Hoel, P.G., Port, S.C and Stone, J.C (1972): Introduction to Stochastic Processes, Houghton Miffin & Co.
7. Jagers, P (1974): Branching Process with Biological Applications, Wiley.
8. Karlin, S and Taylor, H.M (1975): A First Course in Stochastic Processes, Vol. I, and Academic Press.
9. Medhi, J (1982): Stochastic Processes, Wiley Eastern.
10. Parzen, E (1962): Stochastic Processes, Holden – Day

Head S/a
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visvavidyalayam
TIRUPATI - 517 502 A.P

STCC 104: SAMPLING THEORY

Objective:

- Sampling theory helps in estimating unknown population parameters from a knowledge of statistical measures based on sample studies.
- Sampling theory helps in determining whether observed differences are actually due to chance or whether they are really significant.

Outcomes:

At the end of this course students will be able to

- To apply various sampling methods for agricultural data.
- To explain and to compare various allocations using stratified random sampling
- To draw a conclusion about the best sampling procedure
- To use practical applications of ratio and regression of estimation.

UNIT-I: Review of basic concepts of sampling theory such as sampling design, sampling scheme, sampling strategy etc., Sampling with varying probability with and without replacement, PPS WR/WOR methods – Lahiri's sample scheme, Hansen – Hurwitz

UNIT-II: Des Raj estimators for a general sample size and Murthy estimator for a sample of size 2, Symmentrized Des Raj estimator. Hurwitz – Thompson estimator (HTE) of a finite population total / mean, expression for V(HTE) and its unbiased estimator.

UNIT-III: IPPS scheme of a sampling due to Midzuno – Sen and JNK Rao (sample size 2 only). Rao – Hartley-Cochran sampling scheme for a sample of size n with random grouping. Ratio method of Estimation.

UNIT-IV: Regression method of estimation, Two stage sampling, Multi stage sampling, Cluster sampling and Double sampling.

UNIT-V: Large scale sample survey, Errors in surveys, A mathematical model for errors of measurement, Sampling and Non-sampling errors, Sources and types of non-sampling errors, Remedies for non-sampling errors, Randomized Response Technique.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visva Vidyalayam
TIRUPATI - 517 502 A.P

References:

1. Chaudhuri. A and Mukerji. R (1988): Randomized Response Theory and Techniques, New Yory, Marcel Dekker Inc.
2. Cochran W.G (1988): Sampling Techniques III Edition (1977) Wiley.
3. Des Raj and Chandak (1988): Sampling Theory. Narosa.
4. Murthy M.N (1977): Sampling Theory and Methods. Statistical Publishing Society.
5. Sukhatme et al (1984): Sampling Theory of Surveys with Applications. Iowa State University Press & IARS
6. Sing D and Chudary F.S (1986): Theory and Analysis of Sample Survey Designs. New Age International Publishers.
7. Hedayat A.S and Sinha B.K. (1991): Design and Inference in Finite Population Sampling. Wiley.
8. Mukhopadhyay P(1996): Inferential problems in Survey Sampling. New Age International.
9. Wolter K.M (1985): Introduction to Variance Estimator. Springer. Verlag.
10. Hansen M.M and Hurwitz W.M and Mandow W.G (1954): Sample Survey Methods and Theory, Vol. I and Methods and Applications Vol. II, John Wiley and Sons.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visvavidyalayam
TIRUPATI - 517 502 A.P

STCC105: STATISTICAL INFERENCE-I (THEORY OF ESTIMATION)

Objective:

- To provide an introduction to Statistical Inference and its application to predictive satirical models.
- To appreciate the differences between inference paradigms and how they can be embedded in decision theory.
- To derive suitable point estimators of the parameters of the distribution of a random variable and give a measure of their precision.

Outcomes:

By the end of this programme, the students will be able to:

- Understand problem of statistical Inference, Problem of point estimation
- Properties of point estimator such consistency un-biasedness, sufficiency.
- Obtain estimators using estimation methods such as maximum likelihood, minimum chi-square method of moments
- Understand concept of Rao-Blackwell theorem and complete families.

UNIT-I: Point estimation: Properties of good estimators: Unbiasedness, Consistency, Efficiency and Sufficiency; complete sufficient statistic, mean square error (MSE), minimun MSE estimator, minimum variance unbiased estimator (MVUE), Cramer - Rao inequality, Battacharaya's inequality, Rao – Backwell theorem. Fisher- Neyman factorization theorem (discrete only)

UNIT-II: Exponential families, Methods of estimation: Maximum Likelihood Estimation method, method of moments, method of minimum Chi – Square, interval estimation, And shortest confidence interval.

UNIT-III: Concept of asymptotic relative efficiency. CAN, BAN, CAUN and BEST CAUN estimators, MLE in Pitman family and Double Exponential distribution Applications of asymptotic relative efficiency.

UNIT-IV: Interval estimation- Pivotal method of construction-shortest confidence intervals and their construction (minimum average width)- Construction of shortest confidence intervals in large samples.

UNIT-V: Decision theory: Simple Problems involving Quadratic error loss function – Elementary notions of minimax estimation- simple illustrations.

References:

1. C.R. Rao (1973), Linear Statistical Inference and its applications, 2nd Edition, Wiley Eastern Limited.
2. Wald, A (1947), Sequential Analysis, Wiley
3. Kale, B.K (1999): A First Course in Parametric Inference, Narosa Publishing House
4. Rohtagi, V.K (1988): An Introduction to Probability and Mathematical Statistics, Wiley Eastern Ltd., New Delhi (Student Edition)
5. Lehmann, E.L (1986), Theory of point estimation, (Student Edition)
6. Dude Wicz, E.J and Mishra, S.N (1980): Mathematical Statistics, John Wiley, N.Y
7. Casella, G and Berger, R.L (1990): Statistical Inference, Duxubury press, Belmont, USA.
8. Parimal Mukhopadhyay (2006): Mathematical Statistics, Books and Allied (p) Ltd., Kolkata.
9. Rohatgi V.K(2003): Statistical Inference, Dover Publications.
10. Lehmann, E.L and Joseph Romano (2005): Testing Statistical Hypothesis, 3/e, Springer.
11. Rajagopalam. M and Dhanavantham P (2012): Statistical Inference, PHI Learning, New Delhi.

STCC106: Practical –I Software Lab – Listed practical's.

Computer oriented practical exercises of all 5 Papers such that there must be at least 4 practical problems on each paper (Training is expected on Manual Practical work and Practical work on system using available software)

SRI PADMAVATI MAHILA VISWAVIDYALAYAM::TIRUPATI
DEPARTMENT OF STATISTICS
CHOICE BASED CREDIT SYSTEM (CBSC)
SEMESTER – II

STCC 201: STATISTICAL INFERENCE-II (TESTING OF HYPOTHESIS)

Objective:

- To differentiate between the null hypothesis and the alternative HYPOTHESIS.
- Lay out the steps for hypothesis testing. Identify common errors, applying the results of the hypothesis testing to solve common design, business.

Outcomes:

By the end of this course, the students will be able to

- Understand problem of statistical Inference, Problem of testing of hypothesis
- Construct most powerful test using NP lemma
- Understand Sequential Analysis and Sequential Probability ratio test.

UNIT-I: Testing of hypotheses: Basic concepts. Most Powerful (MP) test, Neyman – Pearson Lemma, MP test for simple hypothesis, Consistency and Unbiased tests, Uniformly Most Powerful (UMP) test, UMP Unbiased tests, similar critical regions, Lehmann – Scheffe theorem (Statement only), complete sufficient Statistics.

UNIT-II: Invariant tests, maximal invariant test, Uniformly most powerful invariant tests, Likelihood ratio test, its properties and its applications.

UNIT-III: Non-Parametric tests, Goodness of fit test: Chi-Square and Kolmogorov Smirnov test- Test for randomness, wilcoxon signed rank test- Two sample problem, Kolmogorov-Smirnov test, Wald – Woldfowitz runtest , Mann- Whitenev U test, Median test, Kruskal Wallis test and Friedman's test

UNIT-IV: Sequential Analysis – Need for sequential procedures, sequential tests of Hypotheses, Sequential Probability Ratio Test (SPRT)

UNIT-V: Stopping rule principle. Wald's fundamental identity, OC and ASN functions for SPRT with reference to Binomial, Poisson and Normal distributions.

Head i/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visva Vidyalayam
TIRUPATI - 517 502 A.P

References:

1. Lehmann, E.L (1986), Testing Statistical Hypothesis (Student Edition)
2. Zacks, S (1971), theory of Statisical Inference, John Wiley and Sons, New York
3. Gibbons, J.D (1985), Non-parametric statistical inference, 2nd Edition, Mercel Ducker Inc
4. Fraser D.A.S (1957), Non-parametric methods in Statistics, John Wiley & Sons
5. Siegal Sidney (1987), Non-parametric Statistics for behavioral sciences, 3rd Edition, Springer Verlog
6. Kendal, M.G and Stuart, A (1968), The advanced theory of statistics, Vol-II, Chales Griffin and Co., London
7. Rohatgi, V (1988), An introduction to probability and mathematical statistics, Wiley Eastern Limited, New Delhi (Student Edition)
8. Ghosh, B.K (1970), Sequential tests of statistical hypothesis, Addison-Wessly
9. Goon, A.M, Gupta, M and Das Gupta, B (1980), An outline of statistical theory, Vol-II, World Press, Calcutta.
10. Kale, B.K (1999), A first course in parametric inference, Narosa Publishing House
11. Lehman, E.L (1986), Testing sequential hypothesis (student edition)
12. Mukhopadhyay, P. (2002), Mathematical Statistics, Books and Allied (P) Ltd., Kolkata.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI - 517 502 A.P

STCC202: MULTIVARIATE ANALYSIS

Objective:

- The purposes of Multivariate analysis is to study the relationships among the P attributes, classify the n collected samples into homogeneous groups, and make inferences about the underlying populations from the sample.

Outcomes:

At the end of this course, the students will know

- Multivariate Normal distribution and its properties
- Understand Multivariate normal populations and fisher's Discriminate function.
- Understand principal components and concept of factor analysis and applications

UNIT-I: Multivariate Normal Distribution, marginal and conditional distributions, characteristics functions, Maximum likelihood estimators of parameters.

UNIT-II: Distribution of sample mean vector and dispersion matrix, distribution of quadratic form in the exponent of the multivariate normal density.

UNIT-III: Hotelling's T^2 and its applications – T^2 distribution, application of T^2 to single sample and two sample problems, optimum properties of T^2 test. Mahalanobis D^2 statistic and its distribution, Multivariate Analysis of Variance (MANOVA) of one and two-way classified data.

UNIT-IV: Classification and discrimination: procedures for classification into two multivariate normal populations, Fisher's Discriminant function, classification into more than two multivariate normal populations, Wishart distribution and its properties, concept of sample generalized variance and its distribution.

UNIT-V: Principal Components – Properties, Extraction of Principal Components and their various canonical correlation- Estimation of Canonical Correlation and variates, concept of Factor analysis and its applications.

References:

1. Anderson, T.W (1983), An introduction to Multivariate Statistical Analysis, Wiley, 2nd Edition.
2. Rao, C.R (1973), Linear Statistical Inference and its applications, 2nd edition, Wiley
3. Srivastava. M.S and Khatri, C.G (1979), An introduction to Multivariate Statistics, North Holland
4. Singh, B.M (2002), Multivariate Statistical Analysis – An introduction to theoretical aspects, South Asian Publishers, New Delhi-14
5. Johnson A.R and Wishern, D.W (1996), Applied Multivariate Statistical Analysis, Prentice Hall of India
6. Sharma, S (1996), Applied Multivariate Techniques, Wiley
7. Krishisagar, A.M (1972), Multivariate Analysis, Marcel Dekker
8. Bhuyan,K.C. (2005), Multivariate analysis and its applications, New central Book Agency (P) Ltd., Kolkata.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visva Vidya Ayam
TIRUPATI - 517 502

STIEC203-B: ECONOMETRICS

Objective:

- Econometrics deals with the measurement of economic relationships. It is an integrations of economics, mathematical economics and statistics with an objective to provide numerical values to the parameters of economic relationships.
- The econometric tools are helpful in explaining the relationships among variables.

Outcomes:

By the end of this course, the students will be able to

- Multicollinearity
- Tests for Heteroscedasticity
- Finite Distributed lag models
- Simultanious linear equations models

UNIT-I: Quick review of Inference in general linear model; multicollinearity; Sources and consequences; detection, Farrar-Glauber Test; remedies, Ridge family of estimators and its properties

UNIT-II: Heteroscedsasticity; sources and consequences; Tests for Heteroscedasticity; Glejser's test Goldfeld-Quandt test; remedies, estimation under Heteroscedasticity.

UNIT-III: Autocorrelation; sources and consequences; first order auto regressive Scheme; Durbin-Watson test; Remedies; Estimation under autocorrelation; Stochastic Regressors; Errors-in-Variables linear model; IV and ML estimation methods.

UNIT-IV: Finite Distributed lag models; Arithmetic lag; Inverted V-lag; Almon's Polynomial lag and Shiller's lag models; Infinite distributed lag models; Geometric lag model; OLS and IV methods of estimation; Koyek's two step and Wallis three step procedures; Pascal lag model.

UNIT-V: Simultanious linear equations models; identification; rank and order conditions; indirect least squares, IV and LIML methods; two stage least squares; k-class estimators; three stage least squares and FIML methods of estimation.

References:

1. Johnston, J (1984): Econometric Methods, III rd Edition, MC Graw Hill.
2. Judge, C.G., Griffiths, and Hill, R.C. et al (1985): Theory and Practice of Econometrics, John Wiley.
3. Gujarathi, D (1979): Basic Econometrics, Mc Graw hill.
4. Intrilligator, M.D (1980): Econometric Models, Techniques and Applications, Prentice Hall.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI - 517 502 A.P

STIEC 203C: LINEAR ALGEBRA AND MATRIX THEORY

Objective:

- To use mathematically correct language and notation for Linear Algebra.
- To become computational proficiency involving procedures in Linear Algebra.
- To understand the axiomatic structure of a modern mathematical subject and learn to construct simple proofs.

Outcomes:

At the end of this course students will be able to

- To apply all the discrete distributions in analyzing the data
- To use various continuous distributions whenever necessary
- To apply order statistics for distributions theory

UNIT-I: Finite dimensional Vector Spaces; VectorSpaces and Subspaces; Linear dependence and independence; Basis and dimension of a vector space; Completion theorem

UNIT-II: Inner product Spaces; Orthonormal basis and Gram-Schmidt orthogonalization process; Orthogonal projection of a vector.

UNIT-III: Algebra of matrices; Elementary transformations; Rank and Inverse of a matrix; Nullity; Partitioned matrices; Kronecker product; Generalized inverse of matrix; Moore-Penrose generalized inverse; Solutions of simultaneous equations.

UNIT-IV: Linear transformations and properties; Orthogonal and unitary transformations; Real quadratic forms; Reduction and classification of quadratic forms; Hermitian forms; Sylvesters law of inertia; Canonical reduction of quadratic form.

UNIT-V: Characteristic roots and vectors; Cayley – Hamilton theorem; Minimal polynomial; Similar matrices; Spectral decomposition of a real symmetric matrix; Reduction of a pair of real symmetric matrices; Hermitian matrices.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI - 517 502 A.P

References:

1. Graybill, F.A. (1983). Matrices with applications in statistics, 2nd ed. Wadsworth, Belmont (California).
2. Rao, C. R. (1985). Linear statistical inference and its applications, Wiley Eastern Ltd., New Delhi.
3. Searle, S. R. (1982). Matrix Algebra useful for Statistics, John Wiley and Sons, Inc.
4. Bellman, R. (1970), Introduction to Matrix Analysis, 2nd ed. McGraw Hill, New York.
5. Campbell, H.G. (1980), Linear Algebra with Applications, 2nd Edition, Prentice-Hall, Englewood Cliffs (new Jersey), 1980.
6. Biswas, S. (1984), Topics in Algebra of Matrices, Academic Publications.
7. Hadley, G. (1987), Linear Algebra, Narosa Publishing House.
8. Halmos, P.R. (1958), Finite-dimensional Vector Spaces 2nd ed. D.Van Nostrand Company, Inc.
9. Hoffman, K. and Kunze, R. (1971). Linear Algebra, 2nd ed., Prentice Hall
10. Rao, A.R. and Bhimasankaram, P. (1992), Linear Algebra, Tata McGraw Hill Publishing Company Ltd.
11. Rao, C.R. and Mitra, S.K. (1971), Generalized Inverse of Matrices and its Applications, John Wiley and Sons, Inc.
12. Narayan, S. (1970), Theory of Matrices, S. Chand &Company, New Delhi.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI - 517 502 A.P

STCC204: MATHEMATICAL PROGRAMMING

Objective:

- Build a mathematical programming model of a real life situation understand the basic properties of the linear and Nonlinear programming.
- Apply branch and bound algorithms to solve integer programming problems.

Outcomes:

By the end of this course, the students will be able to

- Understand the concept of optimization problem, theory of duality.
- Explain and solve linear programming problem using simplex method, dual simplex method and carry out sensitivity analysis of LPP. Solve optimization problems using Dynamic Programming problem approach.
- Understanding basic concept of Goal Programming and Quadratic Programming Problem

UNIT-I: (Review of Linear Programming Problem (LPP)-Simplex, Big M and Two Phase methods)-Revised simplex method-Duality in LPP-Dual Simplex method-Some important theorems on duality

UNIT-II: Revised Simplex Method –Post optimal Aanlysis-Sensitivity Analysis-Variation in cost vector and requirement vector-Addition and deletion of single variable and single constraint

UNIT-III: Integer Programming Problem (IPP)- Gomory's cutting plane algorithm-Mixed IPP-Branch and Bound technique

UNIT-IV: Dynamic programming problem (DPP)-Bellman's principle of optimality- General formulation-computation methods and application of DPP-Solving LPP through DPP approach.

UNIT-V: Non-linear programming - Kuhn Tucker conditions. Wolfe's algorithm for solving Quadratic Programming Problems. Goal Programming and Stochastic Programming. Quadratic Programming Problem (Graphical method)

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visva Vidyalayam
TIRUPATI - 517 502 A.P

References:

1. Taha H.A (1982) Operational Research: An Introduction; Macmillan.
2. Hiller F. Sand Leiberman G.J. (1962) Introduction to Operations Research; Holden Day
3. Kanti Swarup; Gupta P.K. and Singh M.M (1985) Operations Research; Sultan Chand & Sons.
4. Philips D.T, Ravindran A and Solberg J Operations Research, Principles and Practice.
5. Churchman C.W; Ackoff R.L and Arnoff E.L (1957) Introduction to Operations Research; John Wiley
6. Hadley G (1964) Non-Linear and Dynamic programming Addison Weslay.
7. Mckinsey J.C.C(1952) Introduction to the theory of games McGraw Hill.
8. P.K. Gupta; D.S. Hira Operations Research S.CHand.
9. Murthy. K.G (1976) Linear and Combinatorial programming; John Wiley
10. Wagner H.M (1973) Principles of O.R with applications to managerial Decisions; Prentice Hall.
11. Starr M.K. and Miller D.W (1962) Inventory control theory and practice; Prince Hall
12. Kleinrock L. (1975) Queuing systems vol.1, Theory; John Wiley.
13. Saaty T.L (1961) : Elements of Queuing Theory with Applications.
14. Gross D and Harris. C.M (1974) Fundamentals of queuing theory; John Wiley

Head i/c
CONVENER
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI - 517 502 A.P

STCC205: PROGRAMMING IN R

Objective:

- To Enrich the skills to draw valued inference and appropriate decision making in scientific way under multivariable scenario.
- To Get familiar with R programming language
- To Elucidate the theory behind each statistical technique along with limitations

Outcomes:

By the end of this course, the students will be able to

- R is a dynamic language and an open software for statistical computing that combines the features of object oriented and functional programming. It provides a wide variety of highly extensible statistical and graphical techniques
- Students will learn how to perform professional level data analysis and create 2D and 3D graphics.
- All students while learning R syntax that they can store ,annotate and adapt for their own analyses.

UNIT-I: R language Essentials: Assignments, creating vectors, vectorized arithmetic, creating matrices, operations on matrices, lists, data frames-creation, Data entry-reading from text file, data editor; examples. Indexing, sorting and conditional selection; examples.

UNIT II: R Programming: conditional statements-if and if else; loops-for, while, do-while, functions-built-in and user defined; Data entry – reading from test file, data editor; examples.

UNIT –III: Descriptive Statistics & graphics: Obtaining summary statistics; generating tables; bar plots, pie charts, Box plots, Histogram; exercises.

UNIT IV: Probability and Distributions: Generating samples from discrete and continuous distributions; plotting density and cumulative density curves; Q-Q plot. Random sampling obtaining density, cumulative density and quantile values for discrete and continuous distributions.

UNIT V: Correlation: Pearson, Spearman and Kendall's; Regression- fitting, obtaining residuals and fitted values; one sample two sample tests for mean, paired samples, one way ANOVA – Tukey HSD and Two way ANOVA- pair wise, t. test, Cluster Analysis, Linear Regression, Logistic Regression, Forecasting, Decision Tree.

References:

1. Introductory Statistics with R by Peter Dalgaard, Springer, 2nd edition, 2008.
2. The R Book by Michael J.Crawley, John Wiley and Sons, Ltd., 2007.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visva Vidyalayam
TIRUPATI - 517 502

STCC206 Practical –II Software Lab – Listed practicals.

Computer oriented practical problems of all 5 Papers such that there must be at least 4 practical problems on each paper (Training is expected on Manual Practical work and Practical work on system using available software)

SRI PADMAVATI MAHILA VISWAVIDYALAYAM::TIRUPATI
DEPARTMENT OF STATISTICS
CHOICE BASED CREDIT SYSTEM (CBSC)
SEMESTER – III

External Elective -STEE-: 301-BIOSTATISTICS

Objective:

- The field encompasses the methodology and theory of statistics as applied to problems in the life and health sciences.
- Biostatisticians are trained in the skilled application of statistical methods to the solution of problems encountered in public health and medicine.

Outcomes:

At the end of third semester, the students will have knowledge of

- Define the principal concepts about biostatistics.
- Recognize the definition of statistics, its subject and its relation with the other sciences.
- Restate the principal concepts about biostatistics.
- Collect data relating to variable/variables which will be examined and calculate descriptive statistics from these data.

UNIT-I: Structure of Biological assay , Types of Biological assays: Direct assays, Potency ratio, Fieller's theorem, Behren's distribution, Two generalizations of Fieller's theorem.

UNIT-II: Quantitative dose-response relationships, Linear dose-response regression, Parallel line bioassay, Slope Ratio Bioassay, Quantal responses, Estimation of median effective dose, Transformations: Probit and Logit transformations.

UNIT-III: Basic Biological concepts: Gene, Chromosomes, Alleles, Concepts of Geno types and Phenotypes, Family studies, Basic mating from single gene cross, Matrix approach to basic matings of single gene cross, Checker board method, Mendal's law of heredity: Genotypes and Pheno type ratios, Branching system method.

UNIT-IV: Types of matings, Random Mating, Concept of Gene pool, Gene frequency, Hardy–Weinberg law of equilibrium, Calculation of Gene frequencies, Genotypic frequency, Generation matrix approach to inbreeding

UNIT-V: Estimation of Gene frequencies in ABO blood group system, Maximum Likelihood Method, Minimum Chi-Square method, Genetic parameters; Heritability Coefficients, Genetic Correlations, Repeatability, selection index; Inbreeding coefficient.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI - 517 502 A.P

References:

1. D.J. Finney (1971): Statistical Methods in Biological Assay, Charles Griffen and Company, London.
2. D.J. Finney (1971): Probit Analysis, 3rd Edition, S.Chand and Company Ltd, New Delhi.
3. William D. Stansfield. (1969): Theory and Problems of Genetics, Schaum's Outline Series, MC Graw Hill, New York.
4. Oscar Kempthorne (1973): An Introduction to Genetic Statistics, Jagmohan Book agency, New Delhi.
5. J.P. Jain (1992): Statistical Techniques in Quantitative Genetics, 2nd Edition, Hindustan Publishing House, New Delhi.
6. Basu, S. B. (1996), Quantitative Genitics Research Technique, Kalyani Publishers, New Delhi.

Hod i/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI - 517 502 A.P

STCC302: DESIGN AND ANALYSIS OF EXPERIMENTS

Objective:

- The designs and analysis of experiments is the design of any task that aim to describe and explain the variation of information under conditions that are hypothesized to reflect the variation.

Outcomes

At the end of third semester, the students will have knowledge of

- Elucidate the theory behind each statistical technique along with limitations.
- Build the aptitude to select to select an appropriate statistical tool based on objective hypotheses.
- Train them in computer oriented statistical analysis using MS-Excel & SPSS
- Enrich the skill to draw valid statistical inferences/conclusions in a scientific manner

UNIT-I: Review of Gauss Markov Theorem Latin squares and their construction, Mutually orthogonal Latin squares; Missing plot technique in Latin square Design, Graeco-Latin square Design;

UNIT-II: Necessity of confounding, Types of confounding, Analysis of confounded factorial designs; (Split Plot design). Analysis of Factorial Experiments involving factors with two and three levels in randomized blocks. Complete and partial confounding in 2^2, 2^3 and 3^2 factorial designs. Split Plot design (Concept only)

UNIT-III: Incomplete Block Designs; B I B D, Inter and Intra Block analysis of a BIBD, Types of BIBD, construction of BIBD's using Mutually orthogonal Latin squares.

UNIT-IV: Concepts of Youden square and lattice Design, Two – Associate PBIB design, Analysis of P B I B design.

UNIT-V: Use of design of experiments in SPC – factorial experiments, fractional factorial designs, design resolution, alias pattern, construction of half and one-fourth fractions of 2^n designs, their construction and analysis of data. Concept of orthogonal arrays and linear graphs with applications to process control.

Head S/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visva Vidyalayam
TIRUPATI - 517 502 A.P

References:

1. M.N. Das and N.C.Giri (1979), Design and Analysis of Experiments, Wiley, Eastern, . Pvt. Ltd., New Delhi.
2. C.D. Montgomery (1976), Design and Analysis of Experiments, Wiley & Sons, New York
3. M.C.Chakbravarthy, (1962), Mathematics of Design of Experiments, Asia Publishing House, Calcutta.
4. Oscar Kempthrone (1974), The Design and Analysis of Experiments, Wiley Eastern, Pvt. Ltd., New Delhi.
5. W.T. Federer (1972), Experimental Designs Theory and Application, Mac Millan Company, New York.
6. Angela Dean and Daniel Ross (1999), Design and Analysis of Experiments, Springer-Verlag.
7. D.D.Joshi (1987), Linear Estimation and Design of Experiments, Wiley Eastern, Pvt. Ltd., New Delhi.
8. P.W.M.John (1971), Statistical Design and Analysis of Experiments, Macmillan
9. F.Pukelshiem (1993), Optimal Design of Experiments, Wiley & Sons
10. D.Raghava Rao (1971), Construction and combinatorial problems in Design of Experiments, Wiley & Sons
11. Aloke Day (1986), Theory of Block Designs, Wiley Eastern, Pvt. Ltd., New Delhi.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visva Vidyalayam
TIRUPATI - 517 502 A.P

STCC303: STATISTICAL QUALITY CONTROL & RELIABILITY

Objective:

- The main objective of statistical Quality control is to achieve quality in production and service organizations, through the use of adequate statistical techniques.
- Different quality characteristics are measured and compared with pre- determined specifications, the quality norms.

Outcomes:

At the end of third semester, the students will have knowledge of

- The OC and ARL of Shewart's control charts
- Acceptance sampling plans for attribute inspection.
- Understand the structural properties of Coherent system.

UNIT-I: The OC and ARL of Shewart's control charts. Control by gauging. Moving Average and Exponentially Weighted Moving Average charts. CUSUM charts using V-mask and decision interval methods. Multivariate control charts – Control Ellipsoid, Hotelling's T^2 chart. Process monitoring and control, process capability, modified control chart. Capability indices C_p, C_{pk}, and C_{pm}.

UNIT-II: Acceptance sampling plans for attribute inspection – single, double and sequential sampling plans and their properties. Plans for inspection by variables with one-sided and two-sided specifications. MIL-STD and IS plans. Continuous sampling plans of Dodge type. Wald-Wolfowitz plans and their properties. Chain sampling and Skip lot sampling – their properties.

UNIT-III: Introduction to Reliability and its needs; Concept of distribution function, hazard function, Reliability function, MTTF, Bathtub failure rate; loss of memory property of Exponential distribution.

UNIT-IV: Life Distributions: parametric families of some common life distributions- Exponential, Weibull and gamma and its characterization- Reliability estimation of parameters using ML method.

UNIT-V: Structural properties of coherent system: components and systems, coherent structures, representation of coherent systems in terms of paths and cuts, relevant & irrelevant structure; Series and parallel system; Reliability of a coherent systems; Reliability importance of components.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visvavidyalayam
TIRUPATI - 517 502 A.P

References:

1. Montgomery D.C (1985), Introduction to Statistical Quality Control, Wiley
2. Ott. E.R (1975), Process Quality Control, Mc Graw Hill
3. Phadke, M.S (1989), Quality Engineering through Robust Design, Prentice Hall
4. Duncan, A.J (1974), Quality Control and Industrial Statistics, 3rd Ed., New York, Irwin.
5. Philip J. Ross (1989), Taguchi techniques for quality engineering, McGraw Hill
6. Banin L.J. and max Engelhardt (1991): Statistical Analysis of Reliability and Life Testing Models; Marcel Dekkar.
7. Nelson, W (1982): Applied Life Data Analysis; John Wiley.
8. Zacks, S (1992): Introduction to Reliability Analysis, Springer Verlag.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI - 517 502 A.P

STCC304: DATA ANALYSIS USING SPSS

Objective:

- Elucidate the theory behind each statistical technique along with limitations.
- Build the aptitude to select to select an appropriate statistical tool based on objective hypotheses.
- Train them in computer oriented statistical analysis using MS-Excel & SPSS
- Enrich the skill to draw valid statistical inferences/conclusions in a scientific manner

Outcomes:

By the end of this course, the students will be able to

- SPSS is a widely used program for statistical analysis in social science and it is used by various kinds of researchers for complex statistical data analysis
- This software has great importance among students and professional researches due to its capability of analyzing a wide scope as well as large amount of data.
-

UNIT-I: Data Analysis Pak in Excel, Descriptive statistics, ANOVA, t-test, F-test, Random Number Generation from different distributions, Binomial, Poisson, Uniform, Normal and from discrete distributions with given mean and variance.

UNIT-II: Multiple Correlation , Regression using Excel-Forecasting Using Excel – Moving Averages and Exponential Smoothing, Use of functions, LINEST, LOGEST, FORECAST , GROWTH and TREND for Forecasting.

UNIT-III: Data handling using SPSS: Opening Excel in SPSS, variables, labels and values. Merging files, selecting cases recoding, and sorting of data.

UNIT-IV: Descriptive statistics, cross tabs. Comparison of means, ANOVA, Posthoc analysis. Multiple Linear Regression – stepwise, forward and backward procedures and analysis of residuals.

UNIT-V: Factor analysis, factor extraction, rotation and interpretation of factors. Discriminate analysis - procedure and interpreting the model coefficients.

References:

1. Sarma, K.V.S (2010), Statistics Made Simple, Do it Yourself on PC, Prentice Hall of India.
2. Foster J.J (2001), Data Analysis using SPSS for Windows 8.0 – 10.0, A Beginner's Guide.
3. Peter Dalgaard (2008): Introductory Statistics with R, 2nd Edition, Springer, New York. (chapters 1,2,3,4,5,6 and 7)
4. Steel R.G.D and J.H. Torrie (1980), Principles and Procedures of Statistics, A Biometrical Approach, McGraw-Hill International Edition.
5. Johnson and Wichern, Multivariate Analysis, Prentice Hall

Head I/c
DEPTT. OF STATISTICS
Sri Padmavathi Mahila Visva Vidyalayam
TIRUPATI-517502

STCC-305: RESEARCH METHODOLOGY

Objective:

- To gain familiarity with a phenomenon or to achieve new insights into it (studies with this object in view are termed as exploratory or formulative research studies);
- To determine the frequency with which something occurs or with which it is associated with something else (studies with this object in view are known as diagnostic research studies);
- To test a hypothesis of a causal relationship between variables (such studies are known as hypothesis-testing research studies).

Outcomes:

After Completion of Course students will be able to:

- Identify and discuss the role and importance of research in the social sciences.
- Identify and discuss the issues and concepts salient to the research process.
- Identify and discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project.
- Identify and discuss the concepts and procedures of sampling, data collection, analysis and reporting.

Unit I : Research Significance

Types: Fundamental, Applied- Qualities of Research- Steps involved in Scientific Research.

Unit II : Planning Research:

Selection of a problem- Formulation of Research Problem- Need for literature review- sources of literature- Hypothesis formation – Types of Hypothesis.

Unit III : Research Design:

Basic principles- Features of a good design-experimental design. Sampling methods: characteristics of a good sample design, probability and non probability sampling methods.

Unit IV : Report writing

components-types of reports – layout of research report-principles of writing – references – appendices- format of publication in research journal-paper presentations: planning, preparation, visual aids-preparation of research proposal.

Unit V : Application of research results and ethics

Ethical issues-copy right-plagiarism-royalty-ethical committees- intellectual property rights and patents- types of patents-patent filling procedure.

Head I/c
DEPT. OF STATISTICS
517 502 DEPT. of Statistics
Sri Padmavathi Mahila Visva-Vidyalayam
TIRUPATI - 517 502 A.P

References

- Anthony, M. Graaziono,A.M. and Raulin, M.L.,2009. Research Methods. A Process of Inuiry. Allyn Bacon.
- Burno, R.B. 2000. Introduction to research methods. New Delhi: Sage publications
- Colin, S.M and Sheinberg, C.A 1990. Proposal Writing: New Delhi: Sage publications
- Aay, R.A. 1992. How to Write and publish a scientific paper, Cambridge University Press.
- Fink, A. 2009. Conducting research literature reviews: From the internet to paper, New Delhi: Sage publications
- Kothri, C.R. 2004. Research methodology. Methods and techniques. New Delhi. New age International Publishers.
- Leedy, P.D and Ormrd, J.E.2004: practical research: planning and design New York: prentice hall.
- Satarkar, S.V.2000. Intellectual property rights and copy rights. ESS publications
- William, C.G. 1981. Concepts of statistical influence 2nd edition. New York: Mc. Grave hill international

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visva Vidyalayam
TIRUPATI - 517 502 A.P

STCC306 :Practical –III Software Lab – Listed practicals.

Computer oriented practical exercises of all 3 Papers such that there must be at least 4 practical problems on each paper (Training is expected on Manual Practical work and Practical work on system using available software)

Head I/c

SRI PADMAVATI MAHILA VISWAVIDYALAYAM::TIRUPATI
DEPARTMENT OF STATISTICS
CHOICE BASED CREDIT SYSTEM (CBSC)
SEMESTER – IV

STCC401: OPERATIONS RESEARCH

Objective:

- Operations research is optimization, i.e, to do things best under the given circumstances.
- This general concept has great many applications, for instance, in agricultural planning, biotechnology, data analysis distribution of goods and resources, emergency and operations, engineering.

Outcomes:

By the end of this course, the students will be able to

- Understand basic concepts of inventors problems and solve various types of Economic ordering quality
- Gain knowledge about Sequencing problems and various methods to solve sequencing problems.
- Understand basic concepts of queuing models and will be able to write and solve the steady state equations for various queuing models.
- Understand different concepts of Network Analysis, Construct Network Diagrams draw conclusion from Network using PERT analysis and CPM analysis

UNIT-I: Queuing models-specifications and effectiveness measures. Steady state solutions of M/M/1 and M/M/c models with associated distributions of queue length and waiting time. M/G/1 Queue and Pollazcek Khinchine result. Steady-state solutions of M/Ek/1 and Ek/M/1 queues. Bulk queues.

UNIT-II: Nature of inventory problems, demand and supply, ABC analysis for inventory classification. Inventory models: Inventory costs, deterministic EOQ model without and with shortages. Models with price discounts. Continuous and Periodic review models – lead time and buffer stocks.

UNIT-III: Decision making in the face of competition, two-person games, pure and mixed strategies, existence of solution and uniqueness of value in zero- sum games, finding solution in 2x2, and 2xm, and mxn games. Non – zero sum games, co-operative and competitive games, equilibrium solutions and their existence in bi- matrix games. Nash equilibrium solution.

UNIT-IV: Sequencing and scheduling problems - 2 machine n job and 3- machine n-job m-machine n-job problems with identical machine sequence for all jobs, 2- job n-machine problem with different routings.

UNIT-V: Flows in networks max-flow-min-cut theorem. Project Management; PERT and CPM probability of project completion, PERT- crashing.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visvavidyalayam
TIRUPATI - 517 502 A.P

References:

1. Taha H.A (1982) Operational Research: An Introduction; Macmillan.
2. Hiller F. Sand Leiberman G.J. (1962) Introduction to Operations Research; Holden Day
3. Kanti Swarup; Gupta P.K. and Singh M.M (1985) Operations Research; Sultan Chand & Sons.
4. Philips D.T, Ravindran A and Solberg J Operations Research, Principles and Practice.
5. Churchman C.W; Ackoff R.L and Arnoff E.L (1957) Introduction to Operations Research; John Wiley
6. Hadley G (1964) Non-Linear and Dynamic programming Addison Wesley.
7. Mckinsey J.C.C(1952) Introduction to the theory of games McGraw Hill.
8. P.K. Gupta; D.S. Hira Operations Research S.CHand.
9. Murthy. K.G (1976) Linear and Combinatorial programming; John Wiley
10. Wagner H.M (1973) Principles of O.R with applications to managerial Decisions; Prentice Hall.
11. Starr M.K. and Miller D.W (1962) Inventory control theory and practice; Prince Hall
12. Kleinrock L. (1975) Queuing systems vol.1, Theory; John Wiley.
13. Saaty T.L (1961) : Elements of Queuing Theory with Applications.
14. Gross D and Harris. C.M (1974) Fundamentals of queuing theory; John Wiley.

STCC402: TIME SERIES ANALYSIS AND FORECASTING METHODS

Objective:

- This course is to equip students with various forecasting techniques and knowledge on modern statistical methods for analyzing time senior data.

Outcomes:

At the end of third semester, the students will have knowledge of

- Understand basic concepts of inventors problems and solve various types of Economic ordering quality
- Gain knowledge about Sequencing problems and various methods to solve sequencing problems.
- Understand basic concepts of queuing models and will be able to write and solve the steady state equations for various queuing models.
- Under stand different concepts of Network Analysis, Construct Network Diagrams draw conclusion from Network using PERT analysis and CPM analysis

UNIT-I: Review of Time Series Analysis. Growth models: Modified Exponential Curve, Gompertz curve, Logistic curve and their Fitting

UNIT-II: Measurement of cyclical component: Harmonic analysis, auto regression series: Markoff and Yule's series, Periodogram and correlogram analysis, measurement of irregular component: variate difference method.

UNIT-III: Need and uses of forecasting, classification and characteristics of forecasts, forecasting based on regression techniques: simple and multiple linear regression and non-linear regression techniques, moving averages smoothing methods: simple and double, multi average methods; explanatory version time series forecasting, test for trend seasonality.

UNIT-IV: Exponential smoothing methods: trend adjusted exponential smoothing, double and triple exponential smoothing, brown's one parameter adaptive method, Harrison's Harmonic smoothing methods and its applications, tracking signal.

UNIT-V: Box-Jenkin's time series methods: 1. Moving average 2. Autoregressive (AR) 3. ARMA and 4.) AR integrated MA (ARIMA) models, estimation of ARIMA model parameters, forecasting with ARIMA models, concept of Kalmon's Filters.

References:

1. Thomopouls, N.T (1980): Applied Forecasting Methods. Engle Wood Cliffs, N.J, Prentice Hall.
2. Wheel Wishart, S.C; and S. Makridaks (1980): Forecasting Methods for Management . III edition, New York. John Wiley.
3. Sullivan, William G. and Wayne Claycambe. W (1977): Fundamentals of Forecasting. Prentice Hall. Virginia.
4. Gupta. S.C and V.K. Kapoor (1995): Fundamentals of Applied Statistics. Sulthan & Chand Sons. New Delhi.
5. Bovas, Abraham and Johannes Ledolter (1983): Statistical Methods for Forecasting. John Wiley & Sons. New York.
6. Box, G.E.P and Jenkkins, G.M (1976): Time Series Analysis Forecasting and Control. Holden Day, San Francisco.
7. Anderson, T.W.(1971): The Statistical Analysis of Time Series. John Wiley, New York.
8. Markidakis, S Steven C. Wheel Wright and Victor E. Mcgee (1983): Forecasting: Methods and Applications, 2nd Edition, New York, John Wiley & Sons.

Head I/c

STCC403: HUMAN VALUES AND PROFESSIONAL ETHICS

Objectives:

- To enable students appreciate the essential complementarity between 'Values' and 'Skills' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a holistic perspective among students towards life, profession happiness based on a correct understanding of the human reality and the rest of existence such a holistic perspective forms the basis of value based living in a natural way.

Out Comes:

- The students identify the importance of human values and skills for sustained happiness.
- The students strike a balance between profession and personal happiness/ glows.
- Learn to respect others and develop civic virtue.
- Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.

UNITI

Ethics –Definitional aspects : relevance of ethics in society : scope of ethics- The philosophical basis of ethics, considerations on moral philosophy personal: and family ethics.

UNIT II

Ethics in public affairs – Ethical standards for elected representatives of the people: ethics for the bureaucracy, police and other institutions of coercive authority

UNIT III

Basic values in the civil services such as dispassion, Non –partisanship, moral integrity,objectivity,dedication to public service and empathy for weaker sections and groups in society , and non – corruptibility.

UNIT IV

Ethics and professions :- ethical values, standard and practices concerning the legal profession, medicine, Engineering, etc.

UNIT V

Ethics at the work place:-Cyber crime, plagiarism, sexual misconduct, fraudulent use of institutional resources, etc.

Reference Books:

1. A Textbook on Professional Ethics and Human Values by R S Naagarazan.
2. A Foundation Course in Human Values and Professional Ethics By R.R.Gaur,R.Sangal,G.P.Bagaria.
3. Human Values And Professional Ethics by Vaishali R khosla, Kavitha Bhagat.

Head I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Viswa Vidyalayam
TIRUPATI - 517 502 A.P

STCC404: Project Study:

- A Practical live problem has to be studied with orientation of using Statistical Methodologies, Data Collection (Primary / Secondary), (Manual / Electronic)
- Data Analysis using Exclusive Computer / Software based.
- The Project work is expected on Training, Application, Report writing, Statistical Analysis and intensified computer usage with conventional Statistical approach.
- Student has to submit a Dissertation on his / her Project work at the semester end.

STCC405: Practical

Computer oriented practical exercises of all 2 Papers such that there must be at least 5 practical problems on each paper (Training is expected on Manual Practical work and Practical work on system using available software)

Head/I/c
DEPT. OF STATISTICS
Sri Padmavathi Mahila Visvavidyalayam
TIRUPATI - 517 502 A.P