

B.Sc., Statistics

Syllabus

AFFILIATED COLLEGES

Program Code: 22B

2025 – 2026 onwards



BHARATHIAR UNIVERSITY

(A State University, Accredited with “A++” Grade by NAAC,
Ranked 21st among Indian Universities by MHRD-NIRF)

Coimbatore - 641 046, Tamil Nadu, India

Program Educational Objectives (PEOs)	
On successful completion of the B. Sc., Statistics program, the graduates will be able to:	
PEO1	Get employment in government, public and private sectors.
PEO2	Perform data analysis and make interpretations with the knowledge attained during the course of study
PEO3	Gain knowledge to pursue higher studies in Statistics
PEO4	Use programming languages for developing codes for statistical computation
PEO5	Serve as biostatistician, statistical investigator, statistical assistant with knowledge in statistics



Program Specific Outcomes (PSOs)	
On successful completion of B. Sc. Statistics program, the students are expected to	
PSO1	Realize the importance of statistics
PSO2	Identify the areas of applications of statistics
PSO3	Write computer programs for statistical computation
PSO4	Apply statistical software for data analysis
PSO5	Understand the limitations of statistical methods
PSO6	Analyze statistical data and make interpretations



Program Outcomes (POs)	
On successful completion of the B. Sc. Statistics program, students will be able to	
PO1	Apply the theoretical knowledge in statistics to real life situations
PO2	Apply the concepts, principles and methods of statistics to various fields of study
PO3	Adopt statistical methods for data analysis
PO4	Compute statistical measures using software and programs
PO5	Get opportunities for job placements in various sectors
PO6	Acquire skills to write competitive examinations
PO7	Move for higher level learning



BHARATHIAR UNIVERSITY: COIMBATORE 641046

Branch II: B. Sc. STATISTICS (CBCS PATTERN)

(For the students admitted from the academic year 2025-2026 and onwards)

Scheme of Examination

Part	Title of the Course	Hours / Week	Examination				Credits
			Duration in Hours	Maximum Marks			
				CIA	CEE	Total	
Semester I							
I	Language – I	6	3	25	75	100	4
II	English – I	6	3	25	75	100	4
III	Core Paper I - Descriptive Statistics -I	3	3	25	75	100	4
III	Core Paper II - Descriptive Statistics -II	4	3	25	75	100	4
III	Core Practical - I (Using MS Excel)	2	-	-	-	-	-
III	Allied A: Paper I - Mathematics for Statistics – I	7	3	25	75	100	4
IV	Environmental Studies*	2	3	-	50	50	2
	Total	30		125	425	550	22
Semester II							
I	Language- II –	6	3	25	75	100	4
II	English – II	4	3	25	25	50	2
III	Core Paper III - Applied Statistics	7	3	25	75	100	4
III	Core Practical - I (Using MS Excel)	2	3	25	75	100	4
III	Allied A: Paper II Mathematics for Statistics – II	7	3	25	75	100	4
IV	Value Education <u>Human Rights</u> *	2	3	-	50	50	2
IV	Naan Mudhalvan: Language Proficiency for Employability	2	3	25	25	50 [#]	2
	Total	30		150	400	550	22
Semester III							
I	Language- III	6	3	25	75	100	4
II	English – III	4	3	25	75	100	4
III	Core Paper IV- Demographic Methods	3	3	25	75	100	4
III	Core Paper V- Probability Distribution-I	4	3	25	75	100	4
III	Allied B: Paper I Computer Programming for Statistical Analysis - I (C Programming)	4	3	20	55	75	3
III	Allied Practical (C & C++ Programming)	2	-	-	-	-	-
IV	Skill based Subject: Actuarial Statistics	3	3	25	25	50	2
IV	Tamil** / Advanced Tamil* (OR) Non-major elective - I (Yoga Human Excellence)*/ Women's Rights*	1	3	50	-	50	2
IV	Health & Wellness**	1	1	25	-	25	1
IV	Naan Mudhalvan: Digital Skills for Employability	2	2	25	25	50 [#]	2
	Total	30		245	405	650	26

Semester IV							
I	Language IV	6	3	25	75	100	4
II	English IV	6	3	25	75	100	4
III	Core Paper VI Probability Distribution-II	4	3	25	75	100	4
III	Core Practical II (Using Scientific Calculator)	3	3	25	75	100	4
III	Allied B: Paper II - Computer Programming for Statistical Analysis- II (Object Oriented Programming with C++)	4	3	20	55	75	3
III	Allied Practical (C & C++ programming)	2	3	30	45	75	3
IV	Naan Mudhalvan: Digital Skills for Employability	3	3	25	25	50 [#]	2
IV	Tamil**/Advanced Tamil* (OR) Non-major elective -II (General Awareness*)	2	3	-	50	50	2
	Total	30		175	475	650	26
Semester V							
III	Core Paper VII - Statistical Inference – I	5	3	25	75	100	4
III	Core Paper VIII - Basic Sampling Theory	5	3	25	75	100	4
III	Core Paper IX - Design of Experiments	5	3	25	75	100	4
III	Core Practical - III (Using SPSS)	2	3	-	-	-	-
III	Core Paper X - Numerical Methods	5	3	25	75	100	4
III	Elective – I	5	3	20	55	75	3
IV	Skill based Subject : Mathematical Economics	3	3	30	45	75	3
	Total	30		150	400	550	22
Semester VI							
III	Core Paper XI - Statistical Inference - II	5	3	25	75	100	4
III	Core Paper XII - Statistical Quality Control	5	3	25	75	100	4
III	Core Practical - III (Using SPSS)	4	3	20	55	75	3
III	Elective II	4	3	20	55	75	3
III	Elective III	4	3	20	55	75	3
III	Core Practical - IV (Using Scientific Calculator)	4	3	30	45	75	3
IV	Naan Mudhalvan: Project Based Learning: Advanced Platform Technology/ Data Analytics & Visualization	4	3	25	25	50 [#]	2
V	Extension Activities**	-	-	50	-	50	2
	Total	30		215	385	600	24
	Grand Total	180		1060	2490	3550	142

* No Continuous Internal Assessment (CIA). Only University Examinations.

Naan Mudhalvan Courses: External 25 marks will be assessed by Industry and internal will be offered by respective course teacher.

** No University Examinations. Only Continuous Internal Assessment (CIA).

@ Excluding the marks of Part IV

List of Elective papers (Colleges can choose any one of the paper as electives)		
Elective I	A	Psychological Statistics
	B	Actuarial Statistics III
	C	Big Data Analytics
Elective II	A	Elements of Econometrics
	B	Indian Official Statistics
	C	Genetical Statistics
Elective III	A	Operations Research
	B	Data Analytics Using R
	C	Quantitative Techniques for Managerial Decisions





First Semester

Course Code		TITLE OF THE COURSE	L	T	P	C
Core I		Descriptive Statistics – I	3	1	-	4
Pre-requisite		Basic level of mathematical computation	Syllabus Version		2025-26	
Course Objectives:						
The main objectives of this course are to:						
1. Understand the origin, significance and scope of Statistics.						
2. Know the significance of presenting data in the form of tables and diagrams.						
3. Learn computational aspects of basic statistical measures.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the scope and necessity of Statistics.				K1,K2	
2	Tabulate and represent the data in diagrams and graphs.				K2, K3	
3	Apply the formula and calculate descriptive measures of statistics.				K2, K3,K4	
4	Analyze the nature of data and interpret the measures				K2, K3,K4	
5	Analyze the data and predict the future values using curve fitting.				K4,K5	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create						
Unit:1						
Unit:1		Nature and Scope of Statistics			9 hours	
Origin, scope, limitations and misuse of Statistics. Data- Types- Primary and Secondary Data- Methods of data Collection - Classification - Tabulation of data. Measurement of Scales. Diagrammatic representation of data: One dimensional and Two dimensional diagrams – Graphic representation: Line diagram, Frequency polygon, Frequency curve, Histogram and Ogive curves.						
Unit:2						
Unit:2		Measures of Central Tendency and Dispersion			9 hours	
Measures of Central Tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean- Properties with Merits and Demerits - Empirical Relation between means. Partition values: Quartiles, Deciles and Percentiles.						
Unit:3						
Unit:3		Measures Dispersion and Shape			9 hours	
Measures of Dispersion: Absolute and Relative Measures of Range, Mean deviation, Quartile deviation and Standard deviation – Coefficient of Variation. Moments - Measures of Skewness - Pearson’s and Bowley’s Coefficient of Skewness, Coefficient of Skewness based on moments – Kurtosis and its significance.						
Unit:4						
Unit:4		Curve Fitting			9 hours	
Curve Fitting: Principle of least squares, fitting of the curves of the form $y = a + bx$, $y = a + bx + cx^2$ and curves transformable to the above form.						
Unit:5						
Unit:5		Case Study and Problems			9 hours	
Case study and Problems relating to all the above units.						

Unit:6	Contemporary Issues	2 hours
Expert lectures, Online seminars– Webinars		
	Total Lecture hours	47 hours
Text Book(s)		
1	Gupta, S.C., and Kappor, V. K. (2020). Fundamentals of Mathematical Statistics, 12 th Edition, Sultan Chand & Sons (Publisher), New Delhi, India	
2	Goon, A.M., Gupta, M. K., Dasgupta, B. (2016): Fundamentals of Statistics, Vol. I, World Press, Kolkata, India	
3	Agarwal, B. L. (2006). Basic Statistics, New Age International Private Limited, New Delhi, India.	
Reference Books		
1	Holcomb, Z. C. (2017). Fundamentals of Descriptive Statistics, Routledge, New York, US.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://nptel.ac.in/courses/111/104/111104120/	
2	https://www.iiserpune.ac.in/~bhasbapat/phy221_files/curvefitting.pdf	
Course Designed By: Dr.J.Krishnan		

Mapping with Programme Outcomes										
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO2	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

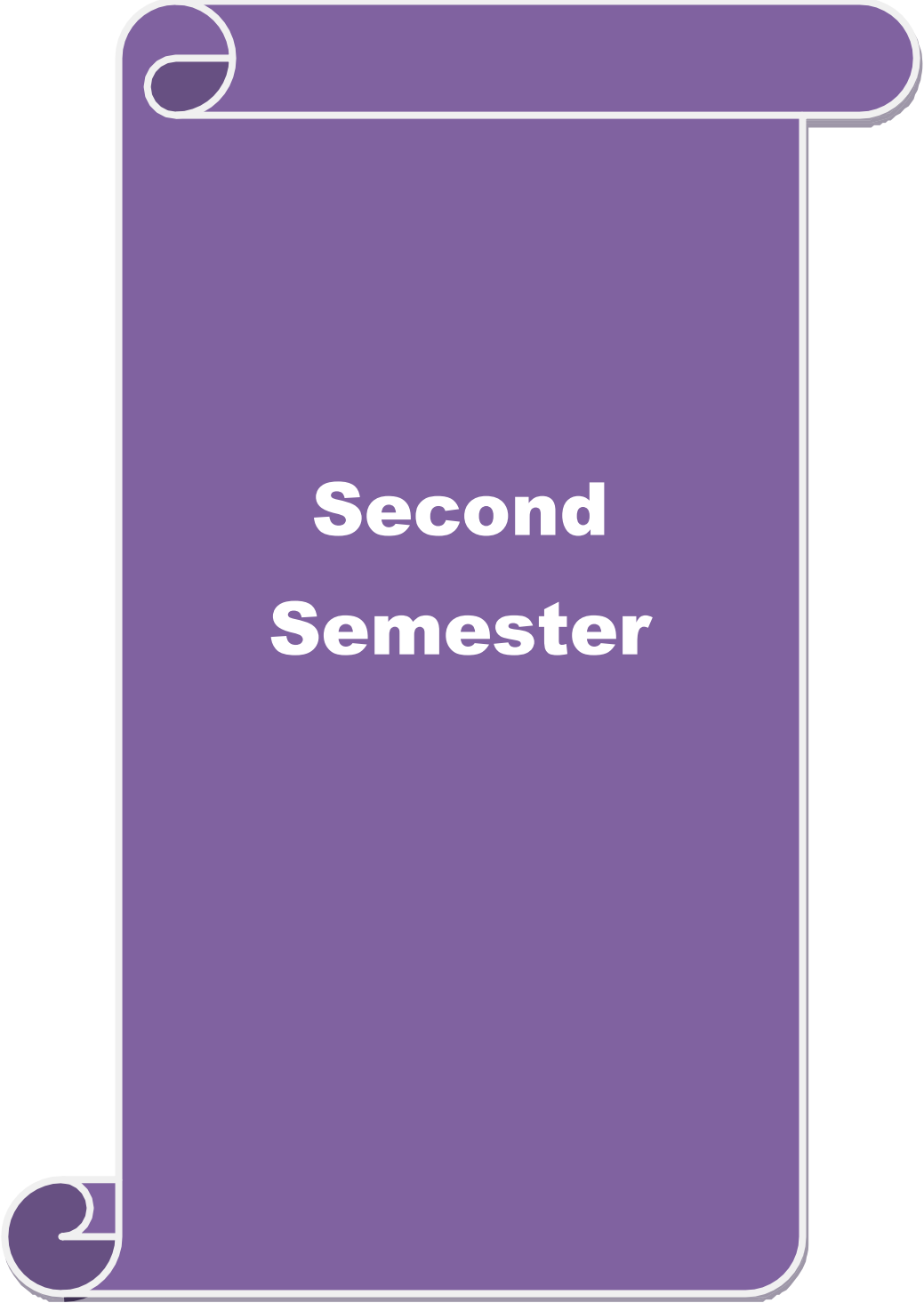
*S-Strong; M-Medium; L-Low

Course code		TITLE OF THE COURSE	L	T	P	C
Core II		Descriptive Statistics – II	3	1	-	4
Pre-requisite		Basic level on mathematical computation	Syllabus Version		2025 - 2026	
Course Objectives:						
The main objectives of this course are to:						
1. Understand the relationship between two variables.						
2. Know the concept of association of attributes and methods.						
3. Be familiar with the theoretical probability and its concepts.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Measure and interpret the degree of relationship between variables.				K1, K2, K3	
2	Estimate the average relationship using regression.				K3, K4, K5	
3	Interpret the association of attributes applying different methods.				K3, K4, K5	
4	Understand the concepts of probability and relate to real life situations				K1, K2	
5	Apply the theorems in practical problems with conditional probability				K3, K4	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create						
Unit:1	Correlation and Regression				9 hours	
Linear Correlation-Scatter diagram, Pearson’s Coefficient of Correlation, Correlation in bivariate frequency table, Rank Correlation, Coefficient of Concurrent Deviation. Properties and its derivations. Regression – Types – Line of Regression and its derivation - Regression coefficients – Properties of regression coefficients – Comparison of correlation and regression.						
Unit:2	Association of Attributes				9 hours	
Association of attributes: Relation between class frequencies, consistency of data, independence of attributes, criterion of independence. Association of attributes: Yule’s coefficient of association, Yule’coefficient of colligation.						
Unit:3	Basics of Probability				9 hours	
Probability: Sample space - Concepts of events - axioms of probability - Algebraic operations on events-Definitions of probability.						
Unit:4	Properties of Probability				9 hours	
Generalized addition and Multiplication Theorem of probability - independent events – Conditional probability, Inverse probability – Baye’s Theorem – Simple problems.						
Unit:5	Case Study and Problems				9 hours	
Case study and problems related to all the above units						
Unit:6	Contemporary Issues				2 hours	
Expert lectures, online seminars– webinars						
	Total Lecture hours				47 hours	

Text Book(s)	
1	Gupta, S.C., and Kappor, V. K. (2020). Fundamentals of Mathematical Statistics, 12 th Edition, Sultan Chand & Sons (Publisher), New Delhi, India.
2	Gupta, S. P. (2011). Statistical Methods, 4 th Edition, Sultan Chand & Sons (Publisher), New Delhi, India.
3	Agarwal, B. L. (2006). Basic Statistics, New Age International Private Limited, New Delhi, India.
Reference Books	
1	Holcomb, Z. C. (2017). Fundamentals of Descriptive Statistics, Routledge, New York, US.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/111/106/111106112/
2	https://nptel.ac.in/courses/111/105/111105090/
3	https://nptel.ac.in/courses/111/105/111105042/
Course Designed By: Dr. Sampath Kumar .R	

Mapping with Programme Outcomes										
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO3	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium; L-Low



Second Semester

Course code		TITLE OF THE COURSE	L	T	P	C
Core III		Applied Statistics	3	1	-	4
Pre-requisite		Basic level on statistical computation	Syllabus Version		2025-2026	
Course Objectives:						
The main objectives of this course are to:						
1. be acquainted with the knowledge of Time series analysis.						
2. understand the significance of index numbers and its types.						
3. Have an idea about demographic data and vital statistics measures.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Identify the components of time series and the method of measuring trend.				K1, K2	
2	Apply the different measures of variations to forecast the data.				K2, K3, K4	
3	Constructing and evaluating index numbers and its interpretation				K2, K3	
4	Understand the importance of cost of living index numbers and its construction				K1, K2	
5	To know the importance of different scaling techniques in statistics				K3, K4, K5	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1						
Time Series and Measures of Trend						
9 hours						
Concept – components of time series –additive and multiplicative models-Resolving components of a time series-measuring trend: Graphic, semi-averages, moving average and principle of least squares methods.						
Unit:2						
Measures of Seasonal Variation						
9 hours						
Seasonal variation- measuring seasonal variation: method of simple averages, ratio to trend method, ratio to moving average method and link relative method- Cyclical and Random fluctuations- variate difference method.						
Unit:3						
Index numbers						
9 hours						
Index numbers - Meaning - Definition - Uses and Types – Price Index numbers – Un-weighted Index Numbers – Simple aggregative method – Simple average of Price relative method - Weighted Index Numbers – Weighted Aggregative Price Index - Laspeyre’s Price Index, Paasche’s Price Index, Dorbish & Bowley’s Price Index, Marshall Edgeworth Price Index and Fisher’s Index Number - Weighted Average of Price Relatives Method.						
Unit:4						
Cost of living index numbers						
9 hours						
Criteria of a Good Index Number : Unit Test, Time Reversal Test, Factor Reversal Test and Circular Test – Construction of Fixed Base and Chain Base Index Numbers - Cost of Living Index Numbers – Uses – Construction - Aggregate Expenditure and Family Budget Methods						
Unit:5						
Measurements and Scaling Techniques						
9 hours						
Measurement and Scaling techniques - Categorical variables - Data types - Metric, Interval and Ratio data. Non-Metric data – Nominal and Ordinal data. Scales of measurement - Comparative scale, Paired comparison scale, Rank order scale, Constant sum scale, Non-comparative scale - Continuous rating scale, Itemized rating scale - Likert scale and Guttman scale						

Unit:6	Contemporary Issues	2 hours
Expert lectures, online seminars – webinars		
	Total Lecture hours	47 hours
Text Book(s)		
1	Gupta, S.C., and Kappor, V. K. (2019). Fundamentals of Applied Statistics, Fourth Edition, Sultan Chand & Sons (Publisher), New Delhi, India	
2	Goon, A.M., Gupta, M. K., Dasgupta, B. (2016): Fundamentals of Statistics, Vol. II, World Press, Kolkata, India	
3	Agarwal, B. L. (2006). Basic Statistics, New Age International Private Limited, New Delhi, India.	
Reference Books		
1	Parimal, M. (1999), Applied Statistics, 2 nd Edition, Books & Applied Ltd., Kolkata, India	
Related O2nd Editiononline Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.stat.berkeley.edu/~bartlett/courses/153-fall2010/lectures/1.pdf	
2	http://www.gdcboysang.ac.in/About/droid/uploads/EconomicsPart4.pdf	
3	http://ocw.jhsph.edu/courses/demographicmethods/PDFs/idm-sec1.pdf	
Course Designed By: Dr.J.Krishnan		

Mapping with Programme Outcomes										
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO3	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium; L-Low



Third Semester

Course code		TITLE OF THE COURSE	L	T	P	C
Core IV		CORE PAPER-IV DEMOGRAPHIC METHODS	3	-	1	4
Pre-requisite		Basic level on mathematical computation	Syllabus Version		2025- 2026	
Course Objectives:						
The main objectives of this course are to know the:						
1. Registered information of vital events.						
2. Measurement of the events such as birth rates, life tables and population projection techniques.						
3. Different methods of population projection techniques.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Know basic of vital statistics and demographic methods					K1,K2
2	Understand the uses of fertility measures					K2
3	Understand the uses of mortality measures					K4, K3
4	Know the importance of life table and its construction					K3,K4
5	Know different methods of population estimates and population projections.					K5,K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create						
Unit:1						
Introduction to Demographic			9 hours			
Demography - Definition - Importance of Demographic data – Sources of Demographic data - Population Census – Uses - Registration method - Vital Registration - Population Register - Records - Sample surveys - International publications - Demography in Sociology, Economics and Health planning.						
Unit:2						
Fertility Measures			9 hours			
Fertility measurements - Rates and Ratios – Fertility – Factors affecting Fertility – Fertility Measures - Crude Birth Rate (CBR), General, Specific and Total Fertility Rates – Growth Rates - Gross Reproduction Rate (GRR) - Net Reproduction Rate (NRR) - Simple Problems.						
Unit:3						
Mortality Measures			9 hours			
Mortality Measurements: Crude death rate – Specific death rates – Standardized death rates – Direct and Indirect methods – Comparative mortality index – Infant mortality rate – Maternal mortality rate – Gompertz's and Makeham's law of graduation of mortality rates						
Unit:4						
Life Table and Migration			9 hours			
Life Table – Assumptions - Description of various columns of a Life table –Relationship between life table functions - Construction of a Life table - Uses of a Life table - Simple Problems. Migration - Definition – Types of Migration - Effects of Migration.						
Unit:5						
Population Estimates and Projection			9 hours			
Population Projection – Types - Methods of population projection – Importance - limitations – Population estimates and projection – Mathematical Method – Arithmetic Method and Geometric Method - Growth Component Method – Logistic curve – Basic ideas of Stationary and Stable population.						

Unit:6	Contemporary Issues	2 hours
Expert lectures, Online seminars– Webinars		
	Total Lecture hours	47 hours
Text Book(s)		
1	Fundamentals of Applied Statistics by Guptha ,S.C and Kapoor ,V.K (S.Chand &Co)	
2	An introduction to the study of population by Mishra D.E (South India publishers, Madras)	
3	Fundamentals of Demography by DR.Hansraj (Surjeet publications Delhi)	
Reference Books		
1	Indian Population Problems by Agarwala, S.N (Tata Mc Graw Hill, Bombay)	
2	Fundamentals of StatisticsVol.II by Goon A.M Guptha,M.K and Das Guptha (world press)	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.encyclopedia.com/social-sciences/encyclopedias-almanacs-transcripts-and-maps/mortality-measurement	
2	https://www.researchgate.net/publication/338790033_Techniques_of_life_table_construction_A_review	
3	https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1728-4457.2009.00265.x	
Course Designed By: Dr.J.Krishnan		

Mapping with Programme Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO2	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium; L-Low

Course code		TITLE OF THE COURSE	L	T	P	C
Core V		CORE PAPER-V PROBABILITY AND DISTRIBUTIONS-I	4	-	1	4
Pre-requisite		Basic level on mathematical computation.	Syllabus Version		2023 - 2024	
Course Objectives:						
The main objectives of this course are to know the: 1. the concept of random variable and its types. 2. discrete and continuous probability distributions. 3. mathematical expectation , variance , central limit theorem and law of large numbers, Tchebychev's inequality, convergence in probability.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the concept of random variable and classification				K1,K2	
2	Understand the probability mass functions and probability density function				K2, K3	
3	Know the mathematical expectation, variance and moment generating function and characteristic function and their properties.				K2, K3,K4	
4	Know the concepts of generating function and its properties				K2, K3,K4	
5	Understand and apply the theorems on probability and random variables				K4,K5	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create						
Unit:1 Random Variable and Probability Distribution Functions 9 hours						
Random variables –discrete and continuous random variables –distribution function-properties- probability mass function and probability density function –various statistical measures of continuous probability distribution – simple problems						
Unit:2 Marginal and Conditional Distributions 9 hours						
Joint, marginal and conditional distribution functions and density functions- independence of random variables –Transformation of variables (one and two dimensional-concepts only) – simple problems						
Unit:3 Mathematical Expectation 9 hours						
Mathematicalexpectation – properties – addition and multiplication theorems – Cauchy Schwartz inequality, conditional expectation and conditional variance – simple problems						
Unit:4 Probability Generating Functions 9 hours						
Moment generating function, cumulant generating function, characteristic function and their properties – simple problems						
Unit:5 Theorems on probability of random variable 9 hours						
Tchebychev's inequality, convergence in probability, weak law of large numbers and central limit theorem (Statement and proof only)						

Unit:6		Contemporary Issues	2 hours
Expert lectures, Online seminars– Webinars			
		Total Lecture hours	47 hours
Text Book(s)			
1	Fundamentals of Mathematical statistics by Guptha, S.C & Kapoor, V.K (Sulthan chand & sons)		
2	Introduction to Mathematical statistics by Hogg.R.V and and Craig ,A.G. (Amerin		
Reference Books			
1	Introduction to probability and probability distributions by John Benjamin ofosu and Christian Akrong Hesse		
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]			
1	https://mathcs.clarku.edu/~djoyce/ma217/moment.pdf		
2	https://www.itl.nist.gov/div898/handbook/eda/section3/eda36.htm		
3	https://www.toppr.com/guides/fundamentals-of-business-mathematics-and-statistics/theoretical-distribution/theoretical-distribution/		
Course Designed By:T. Santhi			

Mapping with Programme Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO2	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium; L-Low

Course code		TITLE OF THE COURSE	L	T	P	C
Skill based subject		ACTUARIAL STATISTICS	3	1		2
Pre-requisite		Basic level on statistical computation	Syllabus version		2023 - 2024	
Course Objectives:						
The main objectives of this course are to know the:						
1. On completion of this course the students should have understood the different statistical tools and life table concepts used in life insurance field.						
2. To enable the students to understand the sound and gain knowledge in financial line insurance and life products						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand simple and compound interest concept					K1,K2
2	Understand the concept of redemption of loan					K2, K3
3	Know the mortality table concept					K2, K3,K4
4	Know The strength of our Actuarial Statistics subjects is the emphasis on understanding statistical concepts and methods					K2, K3,K4
5	Know the net premium for assurance and annuity plans					K3,K4,K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create						
Unit:1						
Simple and compound interest		9 hours				
Simple and compound interest –Present value and accumulated value at fixed rate/varying rate of interest –Effective rate of interest corresponding to a nominal and effective rate –simple problems- Annuity – Classifications of annuities – Present and accumulated values of annuities – Immediate annuity due and deferred annuity						
Unit:2						
Redemption of loans		9 hours				
Redemption of loans – Redemption of loans by installments payable times in a year Interest being p.a. effective. Role of Exponential probability distribution in general insurance - Vital Statistics – meaning and uses of vital statistics – Measures of mortality (Basic concepts)						
Unit:3						
Mortality table		9 hours				
Mortality Table – Columns of a mortality table – Completing an incomplete mortality table and uses of mortality table – Expectation of life – Computing probabilities of survival and death using mortality tables						
Unit:4						
Principles of insurances		9 hours				
Principles of insurances - Types of assurance: Temporary assurance, pure endowment, Endowment assurance and whole life assurance –Expression for present value of assurance benefits under-Temporary assurance, pure Endowment assurance and whole life assurance – Simple problems.						

Unit:5		Natural premium	9 hours
Net premium for assurance and annuity plans: Natural premium – Level annual premium- Mathematical expression for level annual premium under temporary assurance, pure Endowment assurance and whole life assurance-Simple problems involving the calculation of level annual premium /net annual premium under the four types of plan only.			
Unit:6		Contemporary Issues	2 hours
Expert lectures, Online seminars– Webinars			
		Total Lecture hours	47 hours
Text Book(s)			
1	Mathematical basis of Life Assurance (IC-81) Published by Insurance Institute of India, Bombay.		
2	Gupta, S.C. and Kapoor, V.K. (1999) Fundamentals of Applied Statistics (3 rd Edition), Sultan Chand & Co., New Delhi, (for Unit III only).		
	.		
Reference Books			
1	Frenk Ayres., J.R(1993), Theory and problems of Mathematics Fiance , Schaum’s Outline Seeries , McGraw-Hill book Company ,Singapore		
2	MN. Mishra and S.B. Mishra, Insurance Principles and practice, S .Chand & Co, New Delhi. Shaillaja R Deshmuk (2009),Actuarial Statistics and Introduction using R, University press, India		
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]			
1	https://archive.nptel.ac.in/courses/111/105/111105043/		
2	https://onlinecourses.nptel.ac.in/noc21_ma74/preview		
3	https://actuaries.org.uk/qualify/curriculum/actuarial-statistics/		
Course Designed By: K. GUNASEKARAN			

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO2	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium; L-Low



Fourth Semester

Course code		TITLE OF THE COURSE	L	T	P	C
Core VI		CORE PAPER-VI PROBABILITY AND DISTRIBUTIONS – II	3	-	1	4
Pre-requisite		Basic level on mathematical computation	Syllabus Version		2023-2024	
Course Objectives:						
The main objective of this course are to know the:						
1. Definition, derivation and Properties of discrete and continuous probability distributions namely Binomial, Poisson,.....Normal.						
2. Derivation of M.G.F., Cumulants, recurrence relation for the probability distributions.						
3. Application of Binomial, poisson and Normal probability distributions.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Know the definition and properties of Binomial, Poisson and Negative Binomial distributions.				K1,K2	
2	Understand the moments, M.G.F. of hyper-geometric distributions and Multinomial distributions.				K2, K3	
3	Know the normal distribution and Bivariate normal distribution and mean, median, mode and M.G.F and cumulants, mean deviation, characteristic function of normal distribution.				K2, K3,K4	
4	Know Gamma and Betta distributions of I and II kind.				K2, K3,K4	
5	Understand functions of normal variable leading to‘t’ and ‘F’ distribution and interrelation.				K4,K5	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create						
Unit:1			Binomial and Poisson Distributions			12 hours
Binomial, Poisson and Negative-Binomial distributions – Moments, m.g.f, characteristic function – c.g.f and its properties, recurrence relation for the probabilities - simple problems.						
Unit:2			Geometric and Hyper- Geometric Distributions			12 hours
Geometric distribution – Hyper-geometric distribution - Binomial as a limiting form of Hyper-geometric distribution – Multinomial distribution – Mean – variance – m.g.f and their properties.						
Unit:3			Normal Distribution and its Properties			12 hours
Normal distribution – limiting form of Binomial distribution - properties – median – mode - moments m.g.f - mean deviation, area property, simple problems – Rectangular distribution- moments, m.g.f. characteristic function, mean deviation						
Unit:4			Gamma and Beta Distributions			12 hours
Exponential – Gamma - Beta distributions of I and II kind – constants - properties						
Unit:5			Distribution of Sampling Distributions of t, F and χ^2			12 hours
Functions of normal random variable leading to χ^2 , t and F distributions – Derivatives – properties - Assumptions – inter relationship between the distributions.						

Unit:6	Contemporary Issues	2 hours
Expert lectures, Online seminars– Webinars		
	Total Lecture hours	62 hours
Text Book(s)		
1	Fundamentals of Mathematical statistics by Guptha, S.C & Kapoor, V.K (Sulthan chand & sons)	
2	Introduction to Mathematical statistics by Hogg.R.V and and Craig ,A.G. (Amerin	
Reference Books		
1	A.K. Sharma (2005), Text book of Probability and Theoritical distributions, Discovery publishing House.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://stattrek.com/probability-distributions/binomial.aspx	
2	https://www3.nd.edu/~rwilliam/stats1/x21.pdf	
3	https://mathworld.wolfram.com/GammaDistribution.html	
Course Designed By: Dr.J.Krishnan		

Mapping with Programme Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO2	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium; L-Low



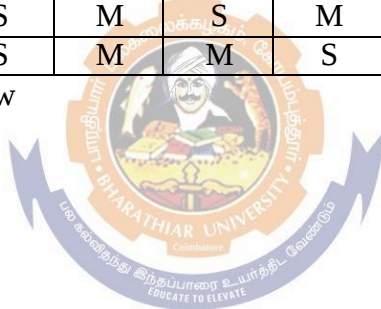
Fifth Semester

Course code		TITLE OF THE COURSE	L	T	P	C
Core VII		STATISTICAL INFERENCE – I	3	1	-	4
Pre-requisite		Basic level on statistical computation	Syllabus Version		2025 - 2026	
Course Objectives:						
The main objectives of this course are to:						
1. Understand the parametric estimation and Deviation of standard error.						
2. Know the point estimation & its methods, Interval estimation.						
3. Have an idea about correlation and regression problems.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the parametric estimation and basics of statistical inference					K1, K2
2	Study the concept of efficient estimator					K2, K3,
3	Apply the formula and calculate the Sufficient statistics					K3, K4
4	Apply and analyzing the methods of various estimation in statistical inference					K3, K4
5	Apply the concept of interval estimation in standard distributions					K4, K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1						
Statistical inference			15 Hours			
Statistical Inference - Basic Concepts - Population, Sample, Statistic, Parameter, Parameter Space. Point estimation - Meaning – Characteristics of estimators – Unbiasedness – Simple problems - Consistency – Invariance Property of consistent estimator – Sufficient condition for consistency - Simple problems.						
Unit:2						
Efficiency			15 Hours			
Efficiency: Efficient Estimators - Simple problems - Most Efficient Estimator - Simple problems - Minimum Variance Unbiased Estimators - Uniqueness of MVUE - Theorems on MVUE.						
Unit:3						
Sufficiency			15 Hours			
Sufficiency – Neymann Factorization theorem – Cramer-Rao Inequality – Assumptions - Conditions for equality - Minimum Variance Bound Estimator – Simple problems based on Normal, Exponential and Cauchy distributions - Rao-Blackwell Theorem.						
Unit:4						
Methods of Estimation			15 Hours			
Methods of Estimation - Method of Maximum Likelihood - Properties of MLE (Without Proof)- Simple theorems - Methods of Minimum variance -Method of moments - Simple Examples.						
Unit:5						
Interval Estimation			15 Hours			
Interval Estimation - Confidence interval and Confidence limits - Simple problems based on Normal distribution and Uniform distribution - Confidence intervals for Large samples - Simple problems based on Poisson distribution and Exponential distributions.						
Unit:6						
Contemporary Issues			2 hours			
Expert lectures, online seminars – webinars						
			Total Lecture hours		77 Hours	

Text Book(s)	
1	Introduction to mathematical statistics by Hoel P.G : (Wiley International)
2	Statistical methods by Snedecor, GW and Cochran, WG (Oxford and I B H)
3	Introduction to mathematical Statistics by Hogg V and Craig .R (Amerind)
Reference Books	
1	Theory and application of Statistics Vol. II by Ramasamy, M.M
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://stattrek.com
2	http://www3.govst.edu
3	http://analyse-it.com
Course Designed By: Dr.J.Krishnan	

Mapping with Programme Outcomes										
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO3	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium; L-Low



Course code		TITLE OF THE COURSE	L	T	P	C
Core VIII		BASIC SAMPLING THEORY	3	1	-	4
Pre-requisite		Basic level on statistical computation	Syllabus Version		2025 - 2026	
Course Objectives:						
The main objectives of this course are to: 1. Understand the sample and census surveys. 2. Know the various sampling methods. 3. Have an idea about sampling and non-sampling errors.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basic sample survey methods and techniques				K1, K2	
2	Study the simple random sampling of unbiased estimates of the mean and the variance of the population				K2, K3,	
3	Apply the formula and calculate the stratified random sampling				K3, K4	
4	Analyze the systematic sampling of unbiased estimates of the mean and the variance of the population.				K3, K4	
5	Analyze the Systematic sampling of unbiased estimates of the mean and the variance of the population.				K1, K2	
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1	Sample Survey Methods and Techniques				15 Hours	
Sample Survey - Concept of Population and Sample – Census and Sample surveys – Merits and Limitations of Sampling technique – Design, Organization and Execution of Sample Survey – Principal Steps in Sample Surveys – Principles of Sample survey - Preparation of Questionnaire and Schedules – Pilot Survey – Sampling and Non-Sampling Errors						
Unit:2	Simple Random Sampling				15 Hours	
Simple Random Sampling - Selection of Simple Random Sample – Merits and Drawbacks of Simple Random Sampling – Simple Random Sampling With and Without Replacement – Unbiased Estimate of Mean and Variance – Simple Random Sampling of Attributes – Estimation of mean and variance - Determination of sample size.						
Unit:3	Stratified Random Sampling				15 Hours	
Stratified Random Sampling - Concept and Advantages of Stratification – Principal advantages of Stratified Random Sampling - Unbiased Estimate of the Mean and Variance – Proportional and Optimum Allocation – Neyman’s Allocation - Comparison of Stratified and Simple Random Sampling.						
Unit:4	Systematic Random Sampling				15 Hours	
Systematic Random Sampling - Concept, Merits and Demerits of Systematic Sampling - Estimation of the Mean and Variance – Comparison of Simple, Stratified and Systematic Sampling – Population with Linear Trend - Circular Systematic sampling.						
Unit:5	Cluster Sampling				15 Hours	
Cluster Sampling - Introduction – Equal Cluster Sampling – Estimation of mean and its variance – Relative efficiency of Cluster sampling. Two-stage Sampling - Introduction – Two-stage sampling with equal First-stage units with respect to Simple Random Sampling –Estimation of the Mean and its Variance.						
Unit:6	Contemporary Issues				2 hours	
Expert lectures, online seminars – webinars						
	Total Lecture hours				77 Hours	

Text Book(s)	
1	Sampling theory and Methods by Murthy, M.N (Statistical publishing)
2	Sampling Techniques by Cochran, W.G (Wiley Est)
Reference Books	
1	Sampling theory of survey with applications by Sukathme P.V and sukathme B.V (Asia pub.House)
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.scribbr.com
2	http://www.investopedia.com
3	http://www.surveygizmo.com
Course Designed By: Dr.J.Krishnan	

Mapping with Programme Outcomes										
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO3	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium; L-Low



Course code		TITLE OF THE COURSE	L	T	P	C
Core IX		DESIGN OF EXPERIMENTS	3	1	-	4
Pre-requisite		Basic level on statistical computation	Syllabus Version		2025-2026	
Course Objectives:						
The main objectives of this course are to:						
1. Understand the Analysis of variance.						
2. Know the Replication, randomization & local control techniques.						
3. Have an idea about efficiencies of various designs and the concept of ANOCOVA.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the Analysis of variance.					K2, K3
2	Study the Real life applications of randomization and local control techniques.					K1, K2
3	To compare and analyze simple designs of CRD, RBD and LSD					K3, K4
4	Apply the formula & calculate the analysis of covariance.					K3, K4
5	Evaluate & Interpret the 2 ² and 2 ³ factorial designs.					K2, K3
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1	Linear models and Analysis of variance					15 Hours
ANOVA - Definition – Assumptions – Importance – Linear Models – Fixed Effect Model – Random Effect Model – One-way ANOVA for Fixed Effect Model – Least Square Estimates of Parameters and the Variances - Sum of squares – Two-way ANOVA for Fixed Effect Model - Least Square Estimates of Parameters and the Variances – Sum of squares.						
Unit:2	Fundamentals of experimentation					15 Hours
Fundamentals of Experimentation – Plot and pen techniques – Determination of shape and size of plots – Uniformity trials – Design of Experiments - Fundamentals – Terminology in design of experimental design – Experimental error – Replication, randomization and local control techniques – Principles of experimental design – Size and shape of the plots.						
Unit:3	Statistical Analysis of Simple Designs					15 Hours
Statistical analysis of different experiments: CRD, RBD and LSD and their efficiencies						
Unit:4	Missing Plot and Analysis of Covariance					15 Hours
Missing plot techniques (at most two values) - Analysis of covariance (ANCOVA) with one concomitant variable to CRD and RBD.						
Unit:5	Factorial Experiments					15 Hours
Concept of confounding: Complete and partial confounding – Statistical analysis of 2 ² , 2 ³ factorial experiments – Advantages and Limitations						
Unit:6	Contemporary Issues					2 hours
Expert lectures, online seminars – webinars						
			Total Lecture hours		77 Hours	
Text Book(s)						
1	Experimental designs by Cochran W.G and Cox G.M (john Wiley)					
2	Experimental design: Theory and applications by Federar, WT (Oxford and IBH)					
3	Statistical theory in research by Anderson RL and Bangrtt TA (McGraw HILL)					

Reference Books	
1	Fundamentals of Statistics by Goon, A.M., Guptha M.K and Das Guptha (World press)
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://online.stat.psu.edu
2	http://www.frontiersin.org
3	http://www.statisticshowto.com
Course Designed By: Dr.J.Krishnan	

Mapping with Programme Outcomes										
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO3	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium; L-Low



Course code		TITLE OF THE COURSE	L	T	P	C
Core X		CORE PAPER-X NUMERICAL METHODS	5	-	1	4
Pre-requisite		Basic level of mathematical computation	Syllabus Version	2025-2026		
Course Objectives:						
The main objectives of this course are to know the:						
1. Estimate functional relationship.						
2. Interpolate and extrapolate the value of dependent variable.						
3. Maxima and Minima using differentiation and integral value of the estimated function.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand finite differences, interpolation for equal intervals using Newton – Gregory forward and backward interpolation formulae.			K1,K2		
2	Understand central difference interpolate formulae, Gauss forward and backward formulae.			K2, K3		
3	Know the interpolation for unequal intervals by Newton’s divided difference formula.			K2, K3,K4		
4	Understand the concepts of numerical differentiation			K2, K3,K4		
5	Understand numerical integration – Trapezoidal, Simpson’s 1/3 rd and 3/8 th rules and Weddle’s Rule			K4,K5		
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create						
Unit:1		Finite differences			15 hours	
Finite Differences - Operators – Forward and Backward Difference Operators – Operator E and their basic Properties (without proof) - Interpolation with Equal Intervals - Newton’s Forward and Backward Difference Formulae – Simple Problems						
Unit:2		Central Difference Interpolation			15 hours	
Central difference interpolation formulae, Gauss forward and backward formulae, Stirling’s, Bessel’s and Laplace – Everett’s formulae, summation of series – Simple problems						
Unit:3		Interpolation (For Unequal Intervals)			15 hours	
Interpolation for unequal intervals: Newton's divided difference formula and Lagrange’s formulae, Inverse interpolation – Simple problems						
Unit:4		Numerical Differentiation			15 hours	
Numerical differentiation: Newton’s Forward and Newton’s Backward difference formula to compute the derivative – Derivative using Stirling’s formula (Upto Second order only) – Maxima and Minima – Simple problems						
Unit:5		Numerical Integration			15 hours	
Numerical integration : Trapezoidal rule, Simpson’s 1/3 rd and 3/8 th rules – Weddle’s Rule - Simple problems						

Unit:6	Contemporary Issues	2 hours
Expert lectures, Online seminars– Webinars		
	Total Lecture hours	77 hours
Text Book(s)		
1	Introductory Methods of Numerical Analysis by Sastry, SS (1998), (Printice Hall of India, New Delhi. Third Edn),	
2	Numerical Methods by Kandasamy. P. Thilagavathy,. K and Gunavathy.K (2003), S.Chand & Co, New Delhi.	
Reference Books		
1	Numerical Methods with worked examples by Woodford, Chris Philips	
2	Computer Oriented Numerical Methods by Rajaraman	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://nptel.ac.in/content/storage2/courses/122104019/numerical-analysis/Rathish-kumar/rathish-oct31/fratnode8.html	
2	https://nptel.ac.in/courses/111/107/111107105/	
3	https://onlinecourses.swayam2.ac.in/cec20_ma11/preview	
Course Designed By: Dr.J.Krishnan		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO2	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

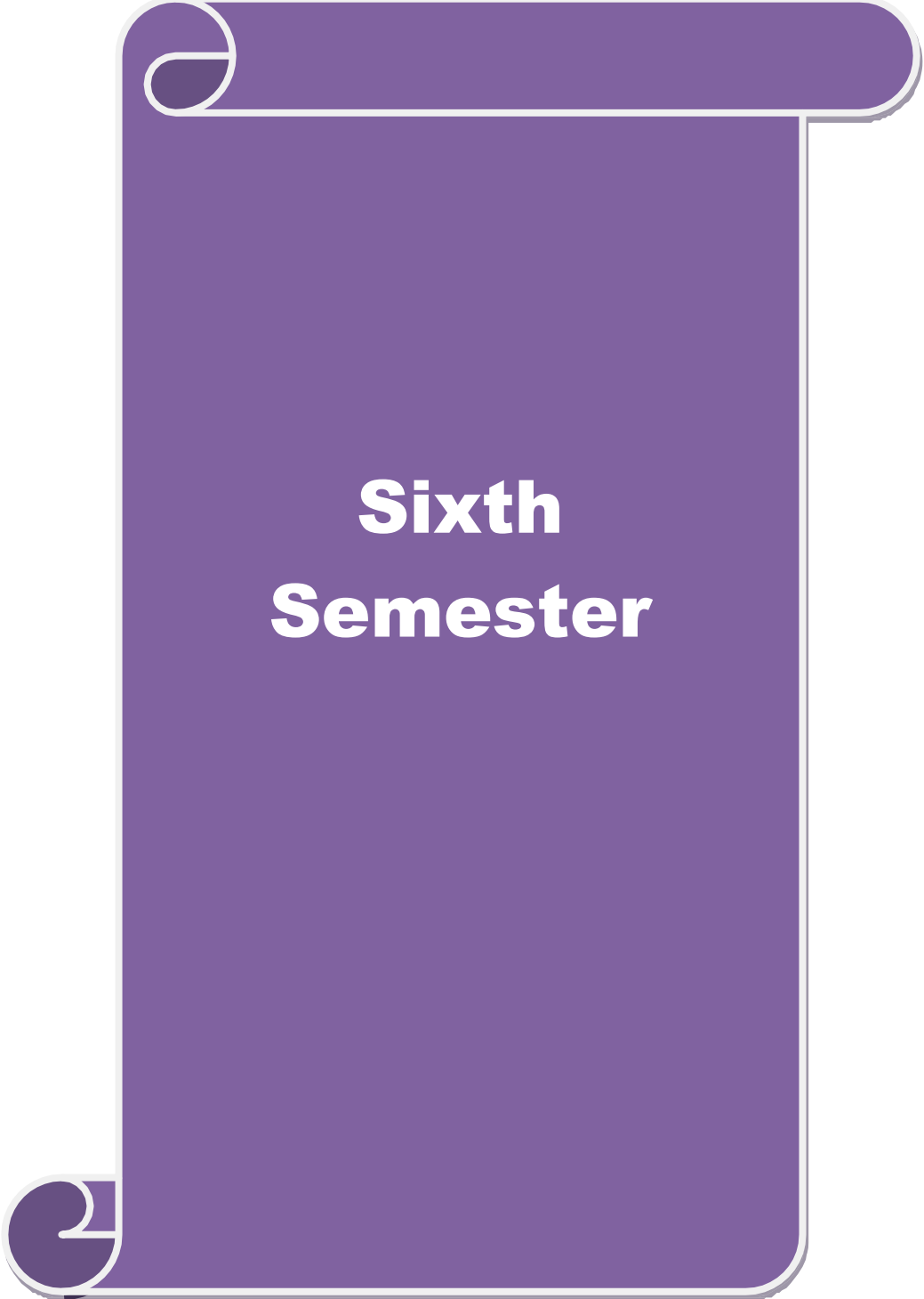
*S-Strong; M-Medium; L-Low

Course code		TITLE OF THE COURSE	L	T	P	C
Skill based subject		MATHEMATICAL ECONOMICS	3	1		3
Pre-requisite		Basic level on economic computation	Syllabus Version		2023-2024	
Course Objectives:						
The main objectives of this course are to know the:						
1. On successful completion of this course, students will understand the economic Concepts and theories, which use mathematical tools and techniques to refine the verbal logic.						
2. To enable the students to learn the application of Mathematical tools in Economics						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the economic dynamics and solve problems through adjustments with time					K1,K2
2	Successfully use mathematics in economics and business applications					K2, K3
3	Identify, solve and interpret the characteristics of each family of functions					K2, K3,K4
4	Know the mathematical methods to represent theories and analyze problems in economics					K2, K3,K4
5	Know the acquire mathematical skills used in economic analysis					K4,K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create						
Unit:1						
		Nature of Economics	9 hours			
Introduction-Nature of Economics-Economic Laws – scope of mathematical methods in Economics. Concept of utility – Marginal concept –Law of diminishing marginal utility – utility function and curve. Scale of preferences – indifference curve and their properties – indifference map- utility index.						
Unit:2						
		Price effect	9 hours			
Price effect, income effect and substitution effect with respect to indifference curve analysis. Price determination – concept of equilibrium – stability of price and quantity-price fixation under perfect competition – Monopoly –Duopoly – concept of Oligopoly.						
Unit:3						
		Cost function and curve	9 hours			
Cost function and curve – Average, Marginal and overhead costs – short term and long term costs – cost elasticity – comparison of market value and normal value. Production function-factors of production. Law of Returns – Returns to scale – constant product curves- Marginal productivity law – Marginal rate of substitution – Elasticity of Productivity – Cobb – Douglass production function and its properties.						
Unit:4						
		National income	9 hours			
National Income – Methods of Estimation – uses of National income estimates – Computational difficulties in India. Economic Models – uses of models in Economic Theories.						

Unit:5	Propensity to consume	9 hours
Propensity to Consume – Models of multiplier and accelerator – Harrod – Domar Growth models – Cobweb model - Leontief ‘s input output analysis – Closed and Open Systems – Dynamic version of this model.		
Unit:6	Contemporary Issues	2 hours
Expert lectures, Online seminars– Webinars		
	Total Lecture hours	47 hours
Text Book(s)		
1	S .P. Singh, AnilK . Parashar : Econometrics and Mathematical Economics. & H.P .Singh	
2	Metha and Madnani : Mathematics for Economists (Sultan Chand & Sons)	
Reference Books		
1	Jathar and Beri : Elementary Principles of Economics(Oxford University Press 10 th Ed.) 1969.	
2	Lange O : Introduction to Econometrics (Pergamon Press -1959)	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://archive.nptel.ac.in/courses/109/103/109103188/	
2	https://www.classcentral.com/course/swayam-mathematical-economics-14187	
3	https://onlinecourses.nptel.ac.in/noc21_hs104/preview	
Course Designed By: K. GUNASEKARAN		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO2	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium; L-Low



Sixth Semester

course code		TITLE OF THE COURSE	L	T	P	C
Core XI		CORE PAPER-XI STATISTICAL INFERENCE-II	5	1	1	4
Pre-requisite		Basic knowledge in probability distributions	Syllabus Version	2025 - 2026		
Course Objectives:						
The main objectives of this course are to know the:						
1. The methods of testing the hypothesis on different distributions.						
2. Type of statistics to which such test procedure can be used.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand testing of statistical hypothesis.			K1,K2		
2	Understand the concept of most powerful test and uniformly most powerful test based on normal, 't' and 'F' distributions.			K2, K3		
3	Understand test of significance, tests based on normal, 't' and 'F' distributions.			K2, K3,K4		
4	Understand Contingency table, goodness of fitness.			K2, K3,K4,K6		
5	Understand free and non-parametric tests, Mann-Whitney tests.			K4,K5		
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create						
Unit:1						
Testing of statistical analysis			15 hours			
Testing of Statistical hypothesis: Statistical hypothesis - simple and composite hypothesis, null and alternative hypotheses - sample and parameter space – two types of errors – critical region – power of the test – Neyman pearson lemma – simple problems						
Unit:2						
Uniformly Most Powerful Tests			15 hours			
Most powerful tests-uniformly most powerful and unbiased tests based on Normal, t, and χ^2 and F distributions - likelihood ratio criterion – definition and simple problems						
Unit:3						
Test of Significance			15 hours			
Tests of Significance - Large Sample Tests - Mean, difference of two Means, Single proportion, difference of Two proportions. Small Sample Tests - t-test for single Mean, difference of two Means, Paired t-test – Test of Correlation Co-efficient						
Unit:4						
Contingency table			15 hours			
F-test for variances - Contingency Tables - Yate's correction – Chi-Square Test - Test for Goodness of Fit and Independence of Attributes. – Tests of homogeneity of variances, correlation and proportions						
Unit:5						
Non - parametric test			15 hours			
Non-Parametric Tests – Introduction - Advantages and Disadvantages - Sign test, Run test, Median test and Mann-Whitney 'U' test (One Sample and Two Sample Problems) - Kolmogorov's Smirnov One Sample Test - Kruskal Wallis Test.						

Unit:6	Contemporary Issues	2 hours
Expert lectures, Online seminars– Webinars		
	Total Lecture hours	77 hours
Text Book(s)		
1	Introduction to Mathematical statistics by Hogg, R.V and Craig, AG (amrend)	
2	Introduction to Mathematical statistics by Hoel, P.G (Wiley International)	
3	Statistical Methods by Snedecor, G.W and Cochran W. G (oxford and IBH)	
Reference Books		
1	Introduction to Mathematical Statistics by Brunk .H.D (Gann Co)	
2	Practical Non-parametric Statistics by Conover (wiley International)	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://online.stat.psu.edu/stat502/lesson/1/1.2	
2	https://onlinecourses.nptel.ac.in/noc20_ma55/preview	
3	https://www.coursera.org/learn/statistical-inference	
Course Designed By: Dr.J.Krishnan		

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO2	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium; L-Low

Course code		TITLE OF THE COURSE	L	T	P	C
Core XII		CORE PAPER-XII STATISTICAL QUALITY CONTROL	5	-	1	4
Pre-requisite		Basic knowledge in probability distributions and statistical computation	Syllabus Version	2025 - 2026		
Course Objectives:						
The main objectives of this course are to know the:						
1. Various tools used such as control charts, sampling plans, and quality system standards.						
2. Reliability concepts to control the quality of industrial outputs.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand need for SQC.			K1,K2		
2	Understand control chart for attributes np, p, c and u chart.			K2, K3		
3	Know the acceptance sampling for attributes and basic definitions involved in acceptance sampling inspection plans			K2, K3,K4		
4	Know the acceptance sampling for attributes – single, double sampling plans.			K2, K3,K4		
5	Know the acceptance sampling for attributes – Sequential sampling plans and its properties			K4,K5		
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create						
Unit:1		Introduction to Statistical Quality Control	15 hours			
Concepts of Quality – Quality of design – Quality of conformance and performance - Statistical Quality Control – Meaning – Basic concepts of SQC – Uses – Causes of variation – Process Control – Basis of Control Charts – Uses of control charts - 3 sigma control limits.						
Unit:2		Control Charts	15 hours			
Control Charts - Criteria for deducting lack of control - Control Charts for Variables – x and R Charts - Control Chart for attributes - p and np charts - Control Charts for number of defects - c Charts (for fixed and varying sample size) – Comparison of attribute and variable control charts.						
Unit:3		Acceptance Sampling	15 hours			
Product Control - Acceptance Sampling – Meaning – Applications in Industry - Producer's Risk and Consumer's Risk - Definitions of AQL, IQL, LQL - Measures of performance - Concept of OC Function - Type A and Type B OC curves – Attribute Sampling Plans – Designing a Sampling Plan.						
Unit:4		Single and Double Sampling Plan	15 hours			
Single Sampling Plans - Designing a Sampling Plan - Determination of the parameters in Single Sampling Plans - OC, AOQ, ASN and ATI functions of SSP. Double Sampling Plans for attributes - Operating Procedures - Conditions of Applications - OC, AOQ, ASN and ATI functions – Advantages – Disadvantages.						
Unit:5		Sequential Sampling Plan	15 hours			
Sequential Sampling Plan for Attributes – Wald's Sequential Probability Ratio Test – Operating Procedure - OC Curve – ASN Function – Five Points on OC Curve –Five Points on ASN.						
Unit:6		Contemporary Issues	2 hours			
Expert lectures, Online seminars– Webinars						
Total Lecture hours			77 hours			

Text Book(s)	
1	Fundamentals of Applied statistics by Gupta S.C and Kapoor, V.K –
2	Quality control and Industrial Management by Dunkan A.J.(Richard D.Irwin Inc.USA)
3	Statistical Quality Control by R.S. Leaven worth (Mc Graw Hill)
Reference Books	
1	Statistics of Quality control, Sampling Inspection and Reliability by Biswas S (1996)(New Age Intl)
2	Statistical Analysis of Reliability and Life Testing Models, by Bain, L.J and Englehard, M. (1991) (Maral Dekker)
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.linkedin.com/learning/excel-statistical-process-control/statistical-process-control-2
2	https://www.udemy.com/course/statistical-quality-control-sqc/
3	http://www.samplingbook.com/course
Course Designed By: Dr.J.Krishnan	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	-	-	-
CO2	S	S	M	S	S	M	M	-	-	-
CO3	S	S	M	M	S	M	S	-	-	-
CO4	S	S	S	M	S	M	M	-	-	-
CO5	S	S	S	M	M	S	M	-	-	-

*S-Strong; M-Medium ; Low - L

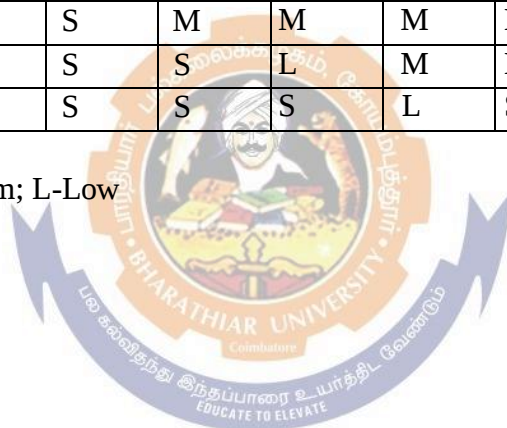
Annexure

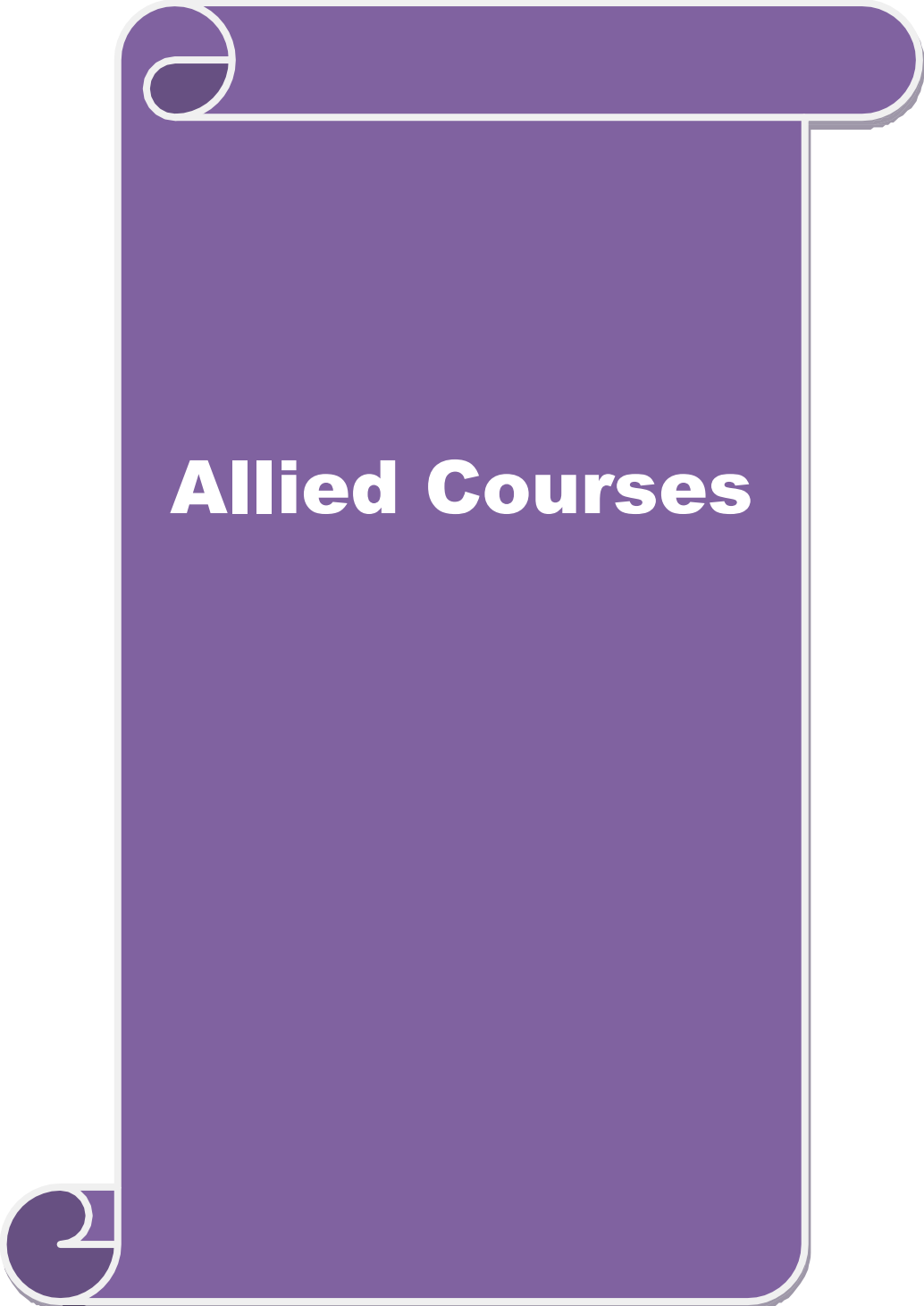
Course code	33F	TITLE OF THE COURSE	L	T	P	C
Foundation Course		HEALTH AND WELLNESS	1	-	-	1
Pre-requisite		-	Syllabus Version		2025-2026	
Course Objectives:						
The main objective of this course is to - Teaching the elements of physical, mental, emotional, social, intellectual, environmental well-being which are essential for overall development of an individual. - Addresses the dangers of substance abuse and online risks to promote emotional and mental health.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	To demonstrate proficiency in sports training and physical fitness practices.				K2	
2	To improve their mental and emotional well-being, fostering a positive outlook on health and life.				K3	
3	To develop competence and commitment as professionals in the field of health and wellness.				K4	
4	To create awareness on drug addiction and its ill effects.				K4	
K1-Remember; K2 -Understand; K3-Apply; K4 -Analyze; K5-Evaluate; K6–Create						
Unit:1		INTRODUCTION TO HOLISTIC WELL-BEING			3 hours	
Introduction to Holistic Well-being- Wellness Wheel Exercise - Breaking Bad Habits						
Unit:2		PHYSICAL WELL-BEING			3hours	
Physical Well-being- Fitness - Nutrition - Yoga - Meditation - Brain health - Heally lungs - Hygiene and Grooming						
Unit:3		EMOTIONAL WELL-BEING			2 hours	
Emotional Well-being – Stress Management-Importance of saying ‘No’ for their Physical and Mental well-being- Body Positivity and self-acceptance - Practicing Gratitude - Cultivating Kindness and Compassion- Practicing Forgiveness- Celebrating Differences - Digital Detox.						
Unit:4		INTELLECTUAL WELL-BEING			3hours	
Intellectual Well-being – Being a lifelong learner- Digital literacy - Transfer of Learning – Environmental well-being- Mental well-being – Importance of self-reflection (Discussion) - Meditation Practices.						
Unit:5		DEVELOPING LIFE SKILLS			3 hours	
Situational Awareness (Developing Life Skills) -Being Street Smart - General first aid procedure, CPR procedure, Handling emergency situations like fire, flood etc.- Digital Awareness - Understanding Addiction- Impact of substance abuse-Adverse health conditions, Social isolation, ruined future, hidden financial loss and damaging the family reputation.						
Unit:6		CONTEMPORARY ISSUES			1 hours	
Expert lectures, online seminars – webinars						
		Total Lecture hours			15 hours	

Text Book(s)	
1	Park's Text books of preventive and social medicine
2	Food and Nutrition by L. Swaminathan
Reference Books	
1	Dietics by Srilakshmi
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.youtube.com/watch?v= 5F9yTs7A10
2	https://www.youtube.com/playlist?list=PLwdnzlV3ogoVhUuHDwFHxCj325BtEGZeI
3	https://www.edx.org/learn/healthcare
4	https://open.umn.edu/opentextbooks/textbooks/662
Course Designed By: Dr.J.Krishnan	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	M	M	M	L
CO2	S	S	S	S	M	M	M	L	L	L
CO3	S	M	S	S	S	L	M	M	M	L
CO4	S	S	S	S	S	S	L	S	M	L

*S-Strong; M-Medium; L-Low





Allied Courses

Course code		TITLE OF THE COURSE	L	T	P	C
Allied B (III Semester)		Paper I Computer Programming for Statistical Analysis - I (C Programming)	4	-	2	3
Pre-requisite	Basic knowledge of computers and programming concepts		Syllabus Version		2025-26	
Course Objectives:						
The main objective of this course is to						
- Fundamentals of C programming language and program development. - Various operators, expressions and input-output operations in C. - Decision making, looping structures and user-defined functions. - Arrays, strings and pointers for data manipulation. - Structures, file handling and statistical applications using C.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
CO1	Understand the basic concepts, structure and data types of C programming.				K1, K2	
CO2	Apply operators, expressions and input-output functions in C programs.				K2, K3	
CO3	Develop programs using decision making statements, looping constructs and functions.				K2, K3, K4	
CO4	Use arrays, strings and pointers for efficient data processing.				K3, K4	
CO5	Develop programs using structures and file handling techniques for statistical applications.				K4, K5	
K1-Remember; K2 -Understand; K3-Apply; K4 -Analyze; K5-Evaluate; K6–Create						
Unit:1	Introduction to C				15 hours	
Introduction to C – Sample programs – Basic structure of C programs – Programming style – Constant, Variables and data types: Character set- C tokens – key words and identifiers – Declaration of variables – Assigning values to variables.						
Unit:2	Operators				15 hours	
Operators – Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise – Expression – Arithmetic expression – Evaluation of expressions – Type conversion in expression – Mathematical function – Managing input and output operator – Reading a character, writing a character, formatted input and output.						
Unit:3	Decision Making and Looping				15 hours	
Decision making and Branching: decision making with – IF statement – Simple IF statement – IF... ELSE statement – Switch statement – ?: Operator – GOTO statement – Looping : WHILE statement – DO Statement – FOR statement – Jumps in Loop – Function, classification of functions – Defining and declarations of functions.						
Unit:4	Arrays and Pointers				15 hours	
Array – One dimensional and two dimensional arrays – Initializing two dimensional array – handling of character strings – declaring and initializing string variables – string handling functions. Pointers – accessing the address of a variable – declaring and initializing pointers – accessing a variable through its pointers – pointers and arrays- Pointer expression.						
Unit:5	Structures and Files				15 hours	
Structure: Definition – structure initialization- arrays of structures- Files – defining, opening and closing of a file. Input / output operations on files – Error handling during Input / Output operations- Random Access to files – Simple programs based on statistics.						
Unit:6	CONTEMPORARY ISSUES				2 hours	
Expert lectures, online seminars – webinars						
				Total Lecture hours		77 hours

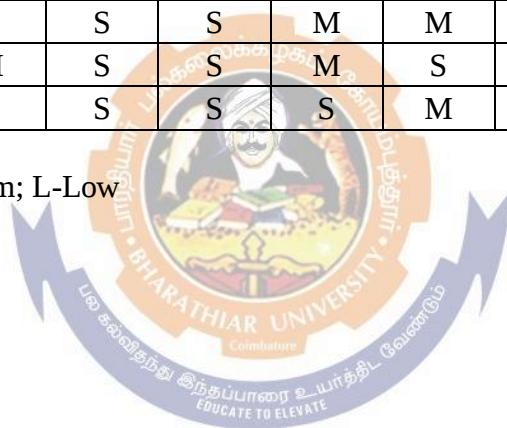
Text Book(s)

1	Programming in ANSI C by Balagurusamy, E (Tata McGraw Hill)
2	Let us C by Yaswant Kanetkar (BPB Publications, New Delhi)

Reference Books	
1	Kernighan, B.W. and Ritchie, D.M., <i>The C Programming Language</i> , 2nd Edition, Prentice Hall of India.
2	Byron S. Gottfried, <i>Programming with C</i> , Schaum's Outline Series.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses
2	https://www.geeksforgeeks.org/c-programming-language
3	https://www.programiz.com/c-programming
4	https://www.w3schools.com/c
Course Designed By: Dr.J.Krishnan	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	M	M	-	-	-
CO2	S	S	S	M	S	M	M	-	-	-
CO3	S	S	S	S	S	M	M	-	-	-
CO4	S	S	M	S	S	M	S	-	-	-
CO5	S	S	S	S	S	S	M	-	-	-

*S-Strong; M-Medium; L-Low

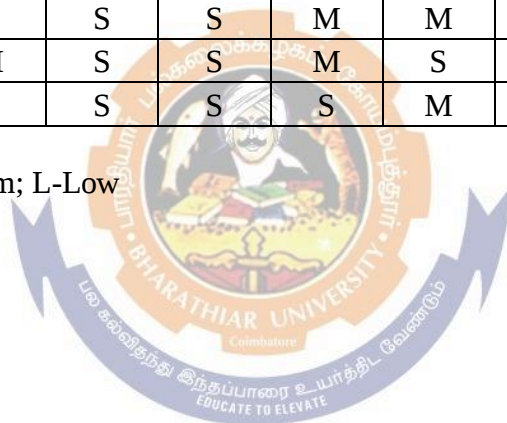


Course code		TITLE OF THE COURSE	L	T	P	C
Allied B (IV th Semester)		Paper II Computer Programming for Statistical Analysis – II (Object Oriented Programming with C++)	4	-	2	3
Pre-requisite		Knowledge of C programming fundamentals	Syllabus Version		2025-26	
Course Objectives:						
The main objective of this course is to: - Principles and concepts of Object-Oriented Programming using C++. - Functions, classes and objects for developing modular programs. - Constructors, destructors and operator overloading techniques. - Inheritance and polymorphism concepts in C++. - File handling and pointer concepts for statistical applications.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
CO1	Understand the principles, concepts and applications of Object-Oriented Programming using C++				K1, K2	
CO2	Develop programs using functions, classes and objects				K2, K3	
CO3	Apply constructors, destructors and operator overloading in program development				K2, K3, K4	
CO4	Demonstrate inheritance concepts for developing reusable programs.				K3, K4	
CO5	Develop applications using pointers, virtual functions and file operations.				K4, K5	
K1-Remember; K2 -Understand; K3-Apply; K4 -Analyze; K5-Evaluate; K6–Create						
Unit:1		Principles of OOP Concepts			15 hours	
Principles of OOP, Basic concepts of OOP – Benefits and application of OOP – C++ structure – tokens, expressions and control structures.						
Unit:2		Functions, Classes and Objects			15 hours	
Functions, classes and object – Functions prototyping – call by reference – return by reference – Inline functions – functions overloading – Friend and virtual functions – specification of class – member function – private member functions. Arrays: Arrays within class – memory allocation for objects – array of objects – static and constant member functions.						
Unit:3		Constructors, Destructors and Operator Overloading			15 hours	
Constructors – parameterized constructors – copy constructor – Dynamic constructors – Destructors – Definition of operator overloading – overloading binary operators – manipulation of strings using operators – Rules for overloading operators.						
Unit:4		Inheritance			15 hours	
Derived classes, single, multiple, hierarchical, multilevel and hybrid inheritance – Abstract classes.						
Unit:5		Pointers and Files			15 hours	
Virtual base class, pointers to objects, pointers to derived classes, virtual function – file operations.						
Unit:6		CONTEMPORARY ISSUES			2 hours	
Expert lectures, online seminars – webinars						
		Total Lecture hours			77 hours	

Text Book(s)	
1	Object Oriented Programming with C++ by Balagurusamy, E. (Tata McGraw Hill)
2	Programming with C++ by D. Ravichandran (Tata McGraw Hill)
Reference Books	
1	The C++ Programming Language by Bjarne Stroustrup, Addison-Wesley.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses
2	https://www.learncpp.com/
3	https://www.programiz.com/cpp-programming
4	https://www.geeksforgeeks.org/c-plus-plus/
Course Designed By: Dr.J.Krishnan	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	M	M	-	-	-
CO2	S	S	S	M	S	M	M	-	-	-
CO3	S	S	S	S	S	M	M	-	-	-
CO4	S	S	M	S	S	M	S	-	-	-
CO5	S	S	S	S	S	S	M	-	-	-

*S-Strong; M-Medium; L-Low



Semester IV	Allied II – Practical (C and C++ Programming)	Int: 30	Ext: 45
List of Program:			
1. Program to form a frequency distribution for the given data $X_1, X_2, X_3 \dots X_n$, given the number of class intervals K and the width of the class intervals W. 2. Program to find the Arithmetic Mean, Geometric Mean and Harmonic Mean for the given frequency distribution. 3. Program to find Mean, Variance, Standard Deviation and Coefficient of Variation. 4. Program to find the three quartiles Q_1, Q_2 and Q_3 the Coefficient of Skewness. 5. Program to find the first four moments about origin A and to find $\beta_1, \beta_2, \gamma_1$ and γ_2. 6. Program to find simple correlation coefficient and regression coefficients for the given bivariate data. 7. Program to fit a straight line of the form $y = ax + b$ using the principle of least squares to the given bivariate data. 8. Program to fit a Binomial Distribution. 9. Program to fit a Poisson Distribution. 10. Program to arrange a one-dimensional array of numbers in ascending and descending order. 11. Program to evaluate a matrix polynomial of the type $aX^2 + bX + cI$ where X is a matrix of order 3×3 and I is an identity matrix and a, b and c are constants. 12. Program to solve the given system of simultaneous equations involving three variables. 13. Program to open a file, store data in it, and read and display the data from the file.			

Examination Pattern:

- ✓ Two questions are to be answered with internal choice.
- ✓ One question from **C Programming**.
- ✓ One question from **C++ Programming**.