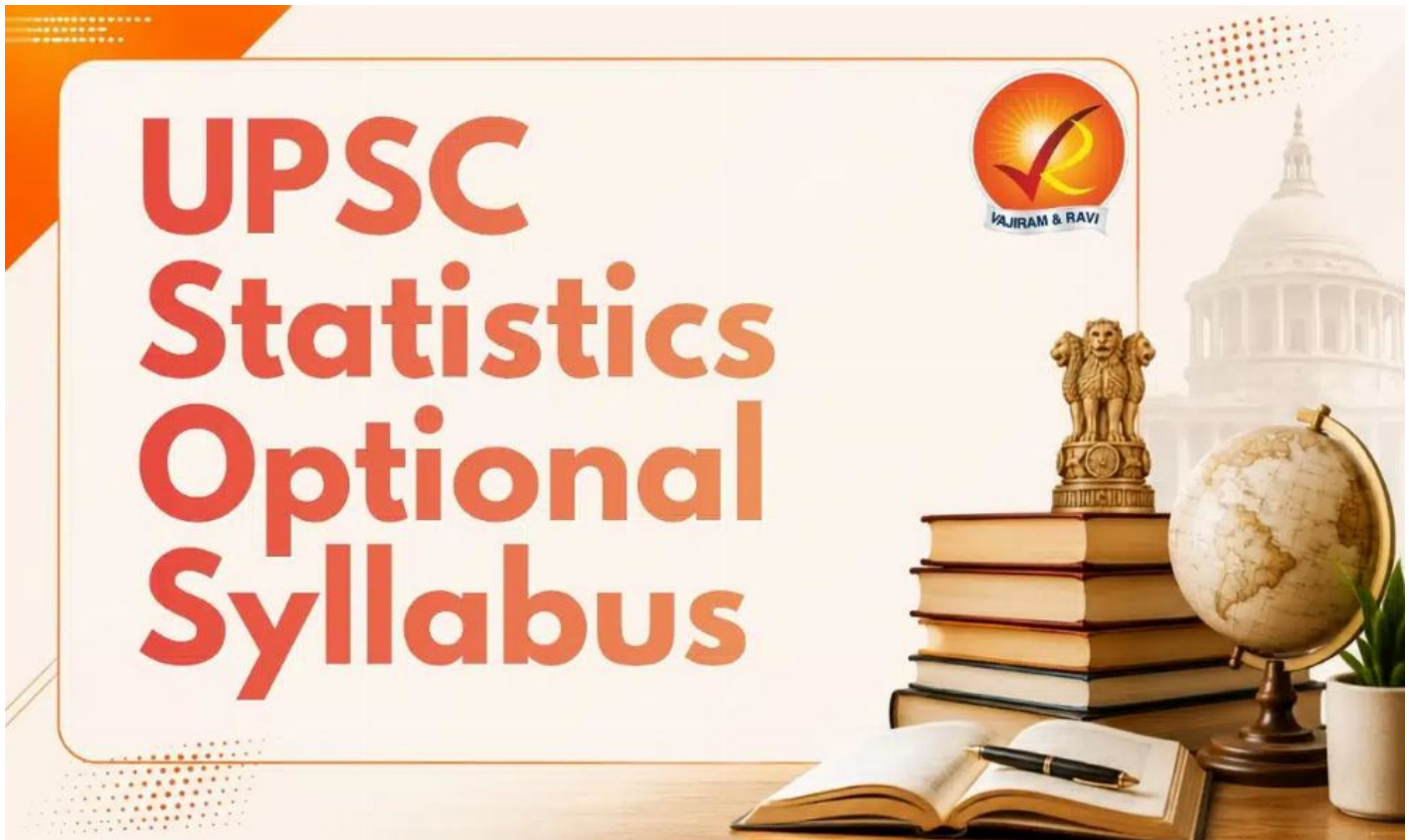


UPSC Statistics Optional Syllabus 2026 for CSE Mains

Paper 1 & 2

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Among the 48 optional subjects in the UPSC Exam, Statistics Optional is one of the least preferred due to its technical and specialized nature. Many candidates avoid it because of its mathematical concepts and challenging syllabus. However, for those with a solid understanding of probability, sampling, and data analysis, Statistics Optional can be a scoring subject with limited competition. This article covers the detailed UPSC Statistics Syllabus, link to download PDF, and other essential details.

UPSC Statistics Syllabus

Statistics is a subject that includes collection, organization, analysis, interpretation, and presentation. Candidates with a strong interest in mathematical subjects and a preference for technical concepts may find Statistics Optional a suitable choice. The UPSC Statistics Syllabus is often aligned with topics covered in related graduation. Like other optional subjects, it consists of two papers, Paper 1 and Paper 2, each carrying 250 marks. With a clear understanding of the core concepts, candidates can score well in this subject.

UPSC Statistics Syllabus for Paper 1

The UPSC Statistics Syllabus for Paper 1 includes the topics which are theoretical and fundamental concepts of statistics. For a detailed subject description, refer to the table below.

UPSC Statistics Syllabus for Paper 1	
Topic	Subtopics
Probability	• Sample space and events , probability measure and probability space, random variable as a measurable function. • Distribution function of a random variable, discrete and continuous-type random variable, probability mass function, probability density function, vector-valued random variable, marginal and conditional distributions, stochastic independence of events and of random variables, expectation and moments of a random variable, conditional expectation, convergence of a sequence of random variable in distribution, in probability, in path mean and almost everywhere, their criteria and inter-relations, Chebyshev's inequality and Khintchine's weak law of large numbers, strong law of large numbers, and Kolmogoroffs theorems, probability generating function, moment generating function, characteristic function, inversion theorem, Lindenberg and Levy forms of central limit theorem, standard discrete and continuous probability distributions.
Statistical Inference	• Consistency, unbiasedness, efficiency , sufficiency, completeness, ancillary statistics, factorization theorem, exponential family of distribution and its properties, uniformly minimum variance unbiased (UMVU) estimation, Rao Blackwell and Lehmann-Scheffe theorem s, Cramer-Rao inequality for single Parameter. • Estimation by methods of moments, maximum likelihood, least squares, minimum chi-square and modified minimum chi-square, properties of maximum likelihood and other estimators, asymptotic efficiency, prior and posterior distributions, loss function, risk function, and minimax estimator. Bayes estimators. • Non-randomised and randomised tests, critical function, MP tests, Neyman-Pearson lemma, UMP tests, monotone likelihood ratio: similar and unbiased tests, UMPU tests for single parameter likelihood ratio test and its asymptotic distribution. Confidence bounds and its relation with tests. • Kolmogorov's test for goodness of fit and its consistency, sign test, and its optimality. Wilcoxon signed ranks test and its consistency, Kolmogorov-Smirnov two sample test, run test, Wilcoxon-Mann-Whitney test and median test, their consistency, and asymptotic normality. • Wald's SPRT and its properties, O_c, and ASN functions for tests regarding parameters for Bernoulli, Poisson, normal, and exponential distributions. Wald's fundamental identity.

Linear Inference and Multivariate Analysis	Linear statistical models , theory of least squares and analysis of variance, Gauss-Markoff theorem, normal equations, least squares estimates, and their precision, test of significance, and interval estimates based on least squares theory in one way, two-way, and three-way classified data, regression analysis, linear regression, curvilinear regression, and orthogonal polynomials, multiple regression, multiple and partial correlations, estimation of variance and covariance components, multivariate normal distribution, Mahalanobis's D² and Hotelling's T² statistics and their applications and properties, discriminant analysis, canonical correlations, and principal component analysis.
Sampling Theory and Design of Experiments	- An outline of fixed-population and super-population approaches , distinctive features of finite population sampling, probability sampling designs, simple random sampling with and without replacement, stratified random sampling, systematic sampling and its efficacy, cluster sampling, two-stage and multi-stage sampling , ratio and regression methods of estimation involving one or more auxiliary variables, two-phase sampling, probability proportional to size sampling with and without replacement, the Hansen-Hurwitz and the Horvitz Thompson estimators, non-negative variance estimation with reference to the Horvitz-Thompson estimator, non-sampling errors. - Fixed effects model (two-way classification) random and mixed effects models (two-way classification with equal observation per cell), CRD, RBD, LSD and their analyses, incomplete block designs, concepts of orthogonality and balance, BIBD, missing plot technique, factorial experiments and 2⁴ and 3², confounding in factorial experiments, split-plot and simple lattice designs, transformation of data Duncan's multiple range test.

UPSC Statistics Syllabus for Paper 2

The UPSC Statistics Syllabus for Paper 2 includes the topics like official statistics, demography, and psychometry. For a detailed subject description, refer to the table below.

UPSC Statistics Syllabus for Paper 2	
Topic	Subtopics
Industrial Statistics	- Process and product control , general theory of control charts, different types of control charts for variables and attributes, $\bar{X}$, R, s, p, np and charts, cumulative sum charts. Single, double, multiple, and sequential sampling plans for attributes, OC, ASN, AOQ, and ATI curves, concepts of producers and consumer's risks, AQL, LTPD, and AOQL, Sampling plans for variables, Use of Dodge-Romin tables. - Concept of reliability , failure rate, and reliability functions, reliability of series and parallel systems and other simple configurations, renewal density, and renewal function, Failure models : exponential, Weibull, normal, lognormal. Problems in life testing censored and truncated experiments for exponential models.

Optimization Techniques	• Different types of models in Operations Research , their construction, and general methods of solution, simulation and Monte-Carlo methods formulation of Linear Programming (LP) problem, simple LP model and its graphical solution, the simplex procedure, the two-phase method, and the M-technique with artificial variables, the duality theory of LP and its economic interpretation, sensitivity analysis, transportation and assignment problems, rectangular games, two-person zero sum games, methods of solution (graphical and algebraic). • Replacement of failing or deteriorating items, group and individual replacement policies, the concept of scientific inventory management and analytical structure of inventory problems, simple models with deterministic and stochastic demand with and without lead time, storage models with particular reference to dam type. • Homogeneous discrete-time Markov chains , transition probability matrix, classification of states, and ergodic theorems, homogeneous continuous-time Markov chains, Poisson process, elements of queuing theory, M/M/1, M/M/K, G/M/1 and M/G/1 queues. • Solution of statistical problems on computers using well-known statistical software packages like SPSS.
Quantitative Economics and Official Statistics	• Determination of trend, seasonal, and cyclical components, Box-Jenkins method, tests for stationary series, ARIMA models, and determination of orders of autoregressive and moving average components, forecasting. Commonly used index numbers - Laspeyres, Paasche's, and Fisher's ideal index numbers, chain-base index number, uses and limitations of index numbers, the index number of wholesale prices, consumer prices, agricultural production, and industrial production, test for index numbers -proportionality, time-reversal, factor-reversal and circular. • General linear model, ordinary least square and generalized least squares methods of estimation, the problem of multicollinearity, consequences, and solutions of multicollinearity, autocorrelation, and its consequences, heteroscedasticity of disturbances and its testing, test for independence of disturbances concept of structure and model for simultaneous equations, the problem of identification-rank and order conditions of identifiability, two-stage least square method of estimation. • Present official statistical system in India relating to population, agriculture, industrial production, trade and prices, methods of collection of official statistics, their reliability and limitations, principal publications containing such statistics, various official agencies responsible for data collection, and their main functions.

Demography and Psychometry	• Demographic data from census, registration, NSS, and other surveys , and their limitations. and uses, definition, construction and uses of vital rates and ratios, measures of fertility, reproduction rates, morbidity rate, standardized death rate, complete and abridged life tables, construction of life tables from vital statistics and census returns, uses of life tables, logistic and other population growth curves, fitting a logistic curve, population projection, stable population, quasi-stable population, techniques in estimation of demographic parameters, standard classification by cause of death, health surveys and use of hospital statistics. • Methods of standardisation of scales and tests, Z-scores, standard scores, T-scores, percentile scores, intelligence quotient and its measurement and uses, validity and reliability of test scores and its determination, use of factor analysis and path analysis in psychometry.
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UPSC Statistics Optional Syllabus PDF

The UPSC Statistics Optional Syllabus consists of two papers — Paper 1 and Paper 2, each carrying a weightage of 250 marks. Both papers cover around 4 major subjects. Below is a direct link for UPSC Statistics Optional Syllabus PDF for candidates who are opting for Statistics as their optional subject.

UPSC Statistics Optional Syllabus 2026 Preparation Strategy

Preparing for the Statistics Optional in the UPSC Mains requires a focused and well-planned strategy. Candidates who are opting as optional subject can refer the below discussed UPSC Statistics Optional Syllabus Preparation Strategy:

1. Carefully go through the syllabus for Paper 1 and Paper 2 to identify the key topics.
2. Refer to standard textbooks and reliable study materials for an in-depth understanding.
3. Prepare concise notes, especially for important formulas and concepts for quick revision.
4. Solve previous years' question papers and participate in mock test series to refine your problem-solving skills.
5. Focus on problem-solving, particularly in subjects like Structural Analysis, Fluid Mechanics, and Transportation Engineering.
6. Analyze your performance after each test and revise challenging topics.
7. Allocate dedicated time for consistent revision and problem-solving to strengthen your understanding.
8. Consider joining a Statistics Optional coaching or seeking mentorship for expert feedback and guidance.
9. Allocate dedicated time for regular revision to strengthen your command to the subject.

UPSC Statistics Optional Books

To effectively cover the Statistics Optional Syllabus for the UPSC Mains, candidates should refer to the standard reference books which helps in building conceptual clarity. Below we have shared the list of UPSC Statistics Optional Books that an appearing candidate who is opting for the Statistics as the optional subject:

UPSC Statistics Optional Books	
Book Name	Author
An Introduction to Probability Theory & Mathematical Statistics	V K Rohtagi
Introductory Probability and Statistical Applications	Paul Meyer
An Outline of Statistical Theory (2 Vol.)	A M Goon, M K Gupta, and B. Dass Gupta
Fundamentals of Applied Statistics	S C Gupta and V K Kapoor
Fundamentals of Mathematical Statistics	A C Gupta and V K Kapoor
Fundamentals of Statistics (2 Vol.)	A M Goon, M K Gupta, and B Dass Gupta
Sampling Techniques	William G. Cochran
Sampling Theory of Surveys with Applications	B. V Sukhatme & B V Sukhatme

Other Related UPSC Optional Syllabus		
UPSC Commerce Optional Syllabus	UPSC Geography Optional Syllabus	UPSC Geology Optional Syllabus
UPSC History Optional Syllabus	UPSC Law Optional Syllabus	UPSC Maths Optional Syllabus
UPSC Medical Science Optional Syllabus	UPSC Philosophy Optional Syllabus	UPSC Physics Optional Syllabus
UPSC PSIR Optional Syllabus	UPSC Psychology Optional Syllabus	UPSC Sociology Optional Syllabus
UPSC Zoology Optional Syllabus	UPSC Economics Optional Syllabus	UPSC Agriculture Optional Syllabus

Other Related UPSC Optional Syllabus		
UPSC Anthropology Optional Syllabus	UPSC Botany Optional Syllabus	UPSC Chemistry Optional Syllabus
UPSC Civil Engineering Optional Syllabus	UPSC Management Optional Syllabus	UPSC Mechanical Engineering Optional Syllabus
UPSC Public Administration Optional Syllabus	UPSC Statistics Optional Syllabus	UPSC Electrical Engineering Optional Syllabus
UPSC Animal Husbandry & Veterinary Science Optional Syllabus		

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