

## Syllabus of Ph.D. Course Work in Statistics

### Unit I: Linear Models

Estimability of linear parametric functions, BLUES, method of generalized least squares, multiple regression, Analysis of multiple regression models, selecting the best regression equation-Ridge regression.

### Unit II: Probability and Probability Distributions

Probability Distributions, Review of univariate discrete and continuous distributions, Bivariate normal and multinomial distributions, convolution and compound distribution, truncated and mixture distributions, sampling distributions  $\chi^2$ , t, F, non-central  $\chi^2$ , non-central t, non-central F distribution their properties and applications, extreme value distributions and their properties.

### Unit III: Statistical Inference

Sufficiency, completeness, MVU estimators, exponential class of densities and its properties, classes of distribution admitting complete sufficient statistics, test function, N-P lemma for test functions, uniformly most powerful tests for one sided alternative for one parameter exponential class of densities, confidence intervals, relations with testing of hypothesis. ML method estimation, Fisher's scoring method, likelihood ratio test, SPRT, Non-parametric tests.

### Unit IV: Demography and Operation Research

Concept of rates and ratios, incidence and prevalence rates, prospective and retrospective studies. Population estimation- inter censual and post censual, methods of population projection-mathematical and component models. Mathematical models in biology. Davis and Blake's approach, Bongaart's model. Models of number of births and conception in a given time period. Studies related to birth interval. Mortality (differentials & determinants) life table, models of life table Migration models. Theory of Population stabilization.

Integer Programming, Dyanamic programming, simulation, transportation and assignment problem. Introduction to game theory.

### Unit V: Statistical Computing with R

Some preliminary concepts of R-programming, Simple manipulation with numbers & vectors, arrays and matrices, reading data from files, execution and looping, graphical procedures, codes for generating standard deviation using R, examining distribution of a set of data, statistical models in R-linear, generalized linear and non-linear models.

K. K. K. K.

SK Singh

M. K. K. K.



# DEPARTMENT OF STATISTICS

PATNA UNIVERSITY  
PATNA-800 005, BIHAR (INDIA)

Ref... 21/Stat. P. 4 -

Date. 7/5/19



To  
The Registrar  
Patna University, Patna.

Subject: Submission of Syllabus of Ph. D. course work in Statistics, Patna University.

Sir,

I send herewith the Syllabus of the course as stated in the subject which is duly approved by the departmental council, Department of Statistics, Patna University.

This is for your information and needful action.

With Regards.

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1041 DR / fsh  
3/5/19

Yours' sincerely

SK Singh

Dr. Sree Kant Singh

Head,

Department of Statistics,

Patna University, Patna.

S/O G...  
28/5/19

Sr. Ag...  
9/5/19