Revised SYLLABUS OF PRE – Ph.D. COURSE (2019-20)
IN
STATISTICS

Department of Statistics, H.N.B.Garhwal Central University, Srinagar (Garhwal)

Distribution of different courses and credits in the semester:

Core Course

Course Code	Title of the Paper	Credit
PPS I—(i)	Statistical Method and Data Analysis	1
PPS I—(ii)	Research & Publication Ethics (RPE)	2
PPS II	Research Methodology and Project Work	4

Electives Course

Course Code	Title of the Paper	Credit
Elective/Optional Papers	Any two papers out of the paper Nos. PPS III to PPS VI	2 X 4 = 8
PPS III	Statistical Computing	4
PPS IV	Operational Research Modeling and Linear Programming	4
PPS V	Finite Population and Design of Experiment	4
PPS VI	Demography	4

Core Cours

Course No. PPS I -(i)   **Title: Statistical Methods and Data Analysis**

Credit: 1

Test for mean and variance in the normal distribution: One - population and two - population cases, regression Analysis. Analysis of variance one way and two way classification (equal no. of observations per cell). Large sample tests through normal approximation. Non parametric test.

Books Recommended:

1. Freund J.E. (2001): Mathematical Statistics, Prentice Hall of India.
2. Goon A.M., Gupta M.K., Das Gupta. B. (1991): Fundamentals of Statistics, Vol. 1, World Press, Calcutta.
3. Anderson, T.W. (1983): An Introduction to Multivariate Statistical Analysis, 2nd Ed., Wiley.
4. Mood A.M., Graybill, F.A. and Boes D.C. (1974): Introduction to the theory of Statistics, McGraw Hill.
5. Das and Giri: Design and analysis of experiment.
6. Siegel. S.: Non parametric statistics for behavioral science (TMH).

Core Course PPS I (ii)   **Title: Research & Publication Ethics (RPE)**
Credit: 2
Module I:
RPE 02: Scientific Conduct:
1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: falsification, fabrication and Plagiarism (FFP)
4. Redundant Publications: Duplicate and overlapping Publications, salami slicing
5. Selective reporting and misrepresentation of data

Module II:
RPE 03: Publication Ethics:
1. Publication ethics: definition, introduction and importance
2. Best Practices/standard setting initiatives and guidelines: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types.
5. Violation of publication ethics, authorship and contributorship.
6. Identification of publication misconduct, complaints and appeals.

Course No. PPS II   **Title: Research methodology and project work**

Credit: 4

Concept and definition, variables and hypotheses, theory and facts, formulation of research problems, development of research methodology and research methods-collection of data, statistical techniques used, evaluation and accuracy of results, developments of knowledge-approaches, rationalistic mode, scientific mode. Identification of problem, formulation of hypotheses, imagination in the formulation of scientific law, recognition of a problem area and identifying the relative questions.

Steps in research process-
   A. Conceptual phase-formulation of the research problem, literature review, developing the hypothesis.
   B. Empirical phase-preparing the research design, determination of sample size, collection of data.
   C. Analytic phase- analysis of data, hypothesis testing, generalization and interpretation, writing up, conclusions.

Types of variables-independent, dependent and control variables.

Measurement - concept and level of measurement, scaling technique, validity and reliability of a measurement.

Types of data and methods of collection of data, pre-testing, pilot survey, longitudinal survey, prospective and retrospective surveys, sampling and non sampling errors, sampling unit and sampling frame, population and sample, scrutinizing of data, estimation of coverage and errors in data collection, revisits.

Books Recommended:

   1. Kothari, C.R. (1985): Research Methodology: Methods and Techniques, Wiley Eastern**.**
   2. Dominowski, R.L. (1980): Research Methods, Prentice Hall Inc., New Jersey.
   3. Mishra, R.P. (1980): Research Methodology, Handbook Concept Publishing Company, New Delhi.
   4. IIPS (1996): Research Methodology, IIPS, Mumbai.
   5. Jain, M.K. (2005): Research Methodology and Statistical Techniques, Shree Publishers & distributors.
   6. Singh, Y.K. (2006): Fundamental of Research Methodology and Statistics, New Age International Publishers.

Electives Course

Course No. PPS III   **Title: Statistical computing**

Credit: 4

Computer and its structures, Computer oriented procedure.

Programming in C and C++, Difference between C and C++.

Windows: Use of windows, its operations and applications. MS word: operations of MS word and applications.

MS excel: Use of MS excel, its operations, solution of statistical problems using MS excel.

MATLAB/MINITAB: Use of MATLAB/MINITAB, computation of statistical problem using MATLAB/MINITAB.

Numerical analysis and statistical applications.

A statistical package SPSS

WEB/INTERNET/EMAIL: Concept of WEB, INTERNET and EMAIL and its application.

Books Recommended:

1. B. Ryan and B.L. Joiner (2001): Minitab handbook, 4th edition, Duxbury.
2. R.A. Thisted(1988): Elements of statistical computing, Chapman and hall.
3. E. Balagurusqamy: Programming in C
4. B.W. Kernighan and D.M.Ritchie (1988): The programming language, Second edition. Prentice hall

Course No. PPS IV   **Title: Operational Research Modeling and
                                                    Linear Programming**

Credit: 4

Definition and scope of Operational Research. Different types of models. Replacement models and sequencing theory, inventory problems and their analytical structure. Simple deterministic and

stochastic models of inventory control. Basic characteristics of queuing system, different performance measures. Steady state solution of Markovian queuing models: M/M/1, WW1 with limited waiting space; MWC, M/M/C with limited waiting space.

Linear programming, simplex method, duality in linear programming. Transportation and assignment problems. 2-persons zero sum games. Equivalence of rectangular game and linear programming.

Books Recommended:

1. Kanti, S., Gupta, P.K. and Singh, M.M. (1995): Operational Research, Sultan Chand & Sons, New Delhi.
2. Taha, H.A. (1982): Operational Research: An introduction, Macmillan, New York.
3. Wagner, H.M. (1994): Principles of Operations Research, Prentice Hall of India, New Delhi.
4. Hillier, F.S. and Leiberman, G.J. (1962): Introduction to Operational Research, Holden-day, San Francisco.
5. Satty, T.L: Mathematical Methods of Operations Research (Mc.Graw Hill).

Course No. PPS V   **Title: Finite Population and Design of Experiment**

Credit: 4

Sampling techniques and estimation: Simple random sampling with and without replacement. Stratified sampling, allocation problem, systematic sampling. Two stage sampling, related estimation problems in the above cases.

Basic principles of experimental design. Randomization structure and analysis of completely randomized, randomized blocks and latin squares designs. Factorial experiments. Analysis of 2^n factorial experiment in randomized blocks.

Books Recommended:

1. Das and Giri: Design and analysis of experiment.
2. Cochran, W.G. and Cox, G.M. (1959): Experimental Designs, Asia Publishing House, Singapore.
3. Analysis and Design of Experiments, Dover Publications Inc. New York.
4. Goon A.M., Gupta, M.K. and Das Gupta, B.: Outline of Statistics Vol.-2.
5. Giri (1986): Analysis of variance, South Asian Publishers.

Course No. PPS VI   **Title: Demography**

Credit: 4

Coverage and content errors in demographic data, Chandrasekhran-Deming formula to check completeness of registration data, adjustment of age data-use of Whipple, Myer and UN indices. Population transition theory.

Measure of fertility; stochastic models for reproduction, distributions of time to first birth, inter-live birth intervals and of number of births (for both homogeneous and non homogeneous groups of women), estimation of parameters; estimation of parity progression from open birth interval data.

Measures of Mortality; construction of abridged life tables, infant mortality rate and its adjustments, model life table.

Stable and quasi-stable populations, intrinsic growth rate. Models of population growth and their filling to population data.

Internal migration and its measurement, migration models, concept of international migration.

Methods for population projection, component method of population projection, Nuptiality and its measurements.

Books Recommended:

1. Bartholomew, D.J. (1982): Stochastic models for social processes, John Wiley.
2. Benjamin, B. (1969): Demography analysis, George, Allen and Unwin
3. Chiang, C.L. (1968): Introduction to stochastic processes in Biostatistics, John Wiley
4. Keyfitz, N. (1977): Applied mathematical demography, Springer Verlag.
5. Spiegelman, M. (1969): Introduction to demographic analysis, Harvard university press.
6. Srivastava, O.S.: Demography and Population Studies.
7. Cox, P.R. (1970): Demography, Cambridge University Press.

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