SCHOOL OF DATA SCIENCE AND FORECASTING

PROGRAM CODE: DS9Z 2018-19

PROGRAM TITLE: DOCTOR OF PHILOSOPHY (Ph.D.)

- DATA SCIENCE

PROGRAM OUTCOMES:

- Developing research aptitude.
- Following the steps of research methodology. Learning the ways to data collection and analysis.
- Writing of scientific reports, research papers and dissertation.

PROGRAM SPECIFIC OUTCOMES:

- Problem understanding and developing the solution methods.
- Data collection and analysis.
- Use Data Visualization techniques.
- Employ cutting edge tools and technologies of Data Science.
- Demonstrate knowledge of mathematical and statistical skills.

COURSE WORK STRUCTURE:

Course Code	Course Title	Credits (L-T-P)
DS9Z-901	Research Methodology	4 (2-1-2)
DS9Z-902	Review of Published Research	3 (0-0-6)
DS9Z-903	Computer Applications	3 (1-0-4)
DS9Z-904	Forecasting Methods	3 (2-0-2)
DS9Z-905	Comprehensive Viva-Voce	3

DETAILED SYLLABUS:

DS9Z-901:ResearchMethodology: 4(2-1-2)

Course contents:

- Introduction to research, Need, Importance and Characteristics of research, Types of research – An overview, Quantitative and qualitative research, Review ofliterature
- Identification, Definition and Statement of Problem, Variables, Role of variables in research, Research Questions andObjectives
- Hypotheses, Hypotheses Testing, Population and Sample, Probability Sampling

Techniques, Non - Probability SamplingTechniques

- Research Design – An Overview, Philosophical and Historical, Survey, CaseStudies
- Experimental Designs, ResearchTools
- Process of Research Tools Designing, Questionnaire Designing, Test Designing, Scale Designing, ScalingTechniques
- Process of Standardising Research Tools, Data AnalysisOverview
- Frequency Distribution, Statistical Tools: Measures of Central Tendency, Measure of Variability, Comparing Means: Independent Sample t-test, Paired Sample t-test, One Way ANOVA, Factorial Design ANOVA, ANCOVA, Correlation, Regression, Factor Analysis and Non-parametric StatisticalTechniques.
- Report Writing, IPR and Plagiarism, Statistical Software and Research PaperWriting

Text Books:

1. Kerlinger, F.N: Foundations of Behavioral Research, Surjeet Publication, New Delhi,1983.
2. Sterling, T. and Pollack, S: Introduction to Statistical Data Processing,Prentice Hall, 1968.
3. Campbell,W:FormsandstyleinThesisWriting,3rded.,Boston.,Houghton, Mifflim, 1969.
4. McNemar, Orinn: Psychological Statistics, John Wiely and Sons,1960.
5. Molstad, John A.: Selective Review of Research Studies Showing Media Effectiveness: A Primer for Media Director. AV communication review vol.22,1974.

Course Outcomes:

- To be able to understand the basic concept of research and data collection.
- To be able to formulate research questions and develop a sufficiently coherent research design.
- To be able apply advanced knowledge in statistics to experimental and applied research. Development of hypothesis and testing.
- To be able to critically evaluate the methodological designs and select appropriate analytical strategies for their research projects.
- To understand the interpretation and appropriate reporting requirements for research and thesis writing.
- To be able to use statistical packages required quantitative analysis (e.g., R, SPSS and Excel).

DS9Z-902: Review ofPublishedResearch: 3(0-0-6)

- Introduction to LiteratureReview
- ProblemIdentification
- Process of LiteratureReview

- Searching for related literature to researchproblem
- Methods of organizing theliterature
- Synthesize theresults
- Finalize thereview

Course Outcomes:

At the end of the course the student will learn to

- do literature survey for research.
- synthesize the results and writing the review.

DS9Z-903:ComputerApplications: 3(2-0-2)

Objective:
To make effective use of the computer in research.

Unit I: Basic Knowledge of Computer

System software, Application software, introduction to operating system, single user, multi-user, multi-tasking single tasking, application of computer for research, MS-windows, Linux.

Data Communication and Networks: Data communication concepts, local area network, wide area network, internet, intranet, extranet, website. E-mail, search engines-enterprise E-communication and E-collaboration

Unit II: Use of Internet in Research

Introduction to internet, INFLIBNET, sights (DOAJ), searching on the internet, Using graphics on internet, E-mail. The use of multimedia on the internet, Security on the internet, Exploring e-mail facilities. Internet and the society, study of search engines, Use of EBSCO HOST online database of Academic Libraries. Use of E-Journals, Use of E-library, searching the keyword search engines.

Unit III: Use of Softwares in Research

Introduction to Data analysis software-SPSS: Definition, objectives and features, data analysis using SPSS: Data entry creating variables, switching to data labels, data analysis: Frequencies, recording into different variables, cross tabulations and layers. MATLAB.

Unit V: Research Related Tools and Utilities:

MS-Office and its application, File handing in window, various versions of MSOffice, Research publishing tool- MS-word, Adobe acrobat, Graphics tool- MSexcel. MS-Power Point: Creating presentations and adding effects. Subject/Field specific tools on www.freeware.com

Text Books:

Shelly, G., Cashman,T,. &Vermaat, M. (2008). Microsoft Office 2007. Boston: Cengage Learning.

Softwares: MS Office, SPSS, MATLAB.

Course Outcomes:

At the end of the course the students will be able to-

- Apply computer resources for use in academics.
- Construct academic documents using Microsoft Word.
- Create spreadsheets with formulas and graphs using Microsoft Excel.
- Develop presentations containing animation and graphics using Microsoft PowerPoint.
- Conduct data analysis with SPSS, MATLAB.

DS9Z- 904:Forecasting Methods **3(2-1-0)**

COURSE OBJECTIVE

This subject is designed in such a way to provide the basic concepts of forecasting models based on quantitative analysis.

COURSE DESCRIPTION:

Unit I: Introduction: Fo**re**casting perspective, an overview of forecasting methods, basic steps in forecasting. Basic forecasting tools: time series and cross-sectional data, graphical and numerical summaries, forecasting accuracy, prediction intervals, transformations and adjustments.

Unit II: Time series: Decomposition, principles of decomposition, moving averages, classical decomposition, census bureau methods, forecasting and decomposition.

Unit III: Exponential smoothing: averaging methods, Singleexponential smoothing methods, ARRSES, Double exponential soothing method, comparison of methods, general aspects of smoothing methods.

Unit IV: Regression: Simple regression, forecasting with simple regression, non-linear relationships. Multiple regressions. Box-Jenkins methods: examining correlations in time series data, examining stationary, ARIMA models, forecasting with ARIMA models.

Text Book(s):

1. Spyros Makridakis :Forecasting Method's and application Wiley
2. N.P. Nagpal :Forecasting Techniques ,RBSA

3. Stephen A. Delurgio: Forecasting Principals and Application, McGraw Hill

Course Outcomes:

- Discuss the key factors which affect the success of forecasting procedures.
- Use Basic Statistical Techniques and statistical Graphics to forecast values.
- Find different sets of Smoothed or Average values to be used when forecasting.
- Understand the key concepts needed to use the Linear Regression model when forecasting.
- Model and Forecast the Seasonal component of a set of values.
- Model the different types of cyclical behaviour observed in different sets of values.
- Understand and use the Box-Jenkins or ARMA Procedure.