Certificate Course

in

Business Analytics

2022-23

(Duration : Six Months)

Scheme and Syllabus

Rourkela Institute of Management Studies
Institutional Area, Gopabandhu Nagar, Chhend,
Rourkela-769015, Odisha

Under

Sambalpur University

Jyoti Vihar, Burla – 768019, Odisha

Scheme of the Course

Slno	Paper Code	Paper Name	Credits	T+L
1	BA101	Business Statistics	4	4
2	BA102	Python and its application	4	2+2
3	BA103	Applied multivariate data analytics	4	3+1
4	BA104	Mathematical Optimization for Business Problem	4	3+1
5	BA105	Database Management System and its Applications	4	3+1
6	BA106	Lab programming with R, SPSS and Excel	4	0+4
7	BA107	Project	8	
		Total Credit	32	

N.B. : T – Theory, L – Lab

Regulation for Certificate Programme in Business Analytics (CPBA)

1. The certificate programme in Business Analytics (CPBA) is a six months full time certificate programme. After successful completion of the programme certificate will be provided to the qualified students.
2. **Duration:**The duration of the programme shall be six months with one semester. There will be two session in a year i.e. July to December and January to June.
3. **Eligibility Criteria**: the candidate should have passed the +2 examination of CHSE, Odisha or its equivalent board / council in any discipline with minimum 40% marks in aggregate. The selection will be based on the marks obtained in +2 examinations.
4. **Number of Papers:** During the course the student has to cover six papers each with 04 credits and 01 project with 08 credits. There will be approximately 10 classes of 01 hour duration for each one credit of a paper.
5. **Attendance:** A candidate shall be required to attend 75% of class during a Semester. Condonation may be granted by the Principal only to the extend of 15% in exceptional cases i.e. Serious Illness &Hospitalization, Accident, Mishap in the family, Deputation by the college for any specific work. The candidates falling short of required attendance percentage will not be allowed for form fill up for the university examination. The candidate will appear the examination in the next batch.

6. **Internal Examination** (50% internal marks) :

   Internal marks will be assigned based on

i.	Assignment / Presentation	- 10 marks
ii.	Attendance	- 10 marks
iii.	Case Discussion	- 10 marks
iv.	Internal Examination - I	- 10 marks
	Internal Examination – II	- 10 marks
	Total	**- 50 marks**

7. **External Examination** (50% external marks) :

The external examination will be conducted by the university; the examination will be conducted tentatively in the month of December and June.

Paper will be set by a panel of examiners to be approved by BOS

8. **Passing Criteria**: Each of the paper will carry 100 marks and the project will carry 200 marks. The marking will be based on numerical score. The candidate remaining absent in either internal examination or university examination in any paper will be considered as absent in that paper inspite of securing marks in any one of the components.

    i. To pass a paper, a candidate should score minimum 50 percent marks in that paper with at least 40 percent marks each in Internal examination and University examination.
    ii. To pass the project, a candidate should score a minimum of 60 percent marks.
    iii. In order to become eligible for awarding certificate the candidate must pass in all individual papers and the projects.

9. **Award of Certificate**: A candidate meeting the passing criteria will be eligible for certificate. The following award may be given to qualifying candidates.
    i. 50% - 65% - Pass
    ii. 65% - 80% - 1st Class
    iii. Above 80% - 1st Class with Distinction.

10. **Back Examination**: Candidate failed in any papers in an examination can re-appear for the next examination for the next batch in those papers where he / she have scored less than 50% marks.
11. **Improvement Examination**: Candidate passed in all the papers and project and got pass award may appear for improvement examination in the next examination with the next batch students. A maximum of 03 papers can be selected for improvement and only one chance will be provided.

12. **Project Evaluation:** The project will be assigned by the faculty members of the institute after 03 months of the class commencement. Project will be evaluated through panel of examiners whose name will be approved by BOS. There will be 200 marks for the project where 100 marks to be given by internal faculty and balance 100 marks will be given by external examiner. Absence in project evaluation shall be treated as fail in that paper.

13. **Question paper setting**: The question paper should be set in such a manner that the question paper should cover all the units.

Certificate Programme in Business Analytics

Course Structure

Sl. No.	Paper Name	Credits
1	Business Statistics	4
2	Python and its application	4
3	Multivariate data analytics	4
4	Mathematical Optimization for Business Problem	4
5	Database Management System and its Applications	4
6	Lab programming with R, SPSS and Excel	4
7	Project	8

Syllabus
Business Statistics

Objective- To facilitates the decision making process by quantifying the element of chance or uncertainties.

Total Credit-4

Hours/Week-4

Module-I	Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio. Presentation: tabular and graphical, including histogram and ogives, consistency and independence of data with special reference to attributes
Module-II	Significance of Statistics in Management domain, Difference between Population and Sample studies, Non-Probability sampling methods, Probability sampling methods, Sampling errors, Non-sampling errors and their remedies, Selection of suitable sample size
Module-III	Measures of central tendency and dispersion: Mean, median , Mode, Harmonic mean, geometric mean, Merits, limitations & Suitability of averages, Absolute & Relative measures of dispersion, range, Quartile deviations, mean Deviation, Standard deviation
Module-IV	Index Numbers: Definition, construction of index numbers and problems thereof for weighted and unweighted Fisher's. Chain index numbers, conversion of fixed based to chain based index numbers and vice-versa. Consumer price index numbers.

Suggested Books

1. Business Statistics : Text and Problems - With Introduction to Business Analytics by N D Vohra - 2nd Edition, Tata Mc Graw Hill Publishers – 2021
2. Statistical Methods by S.P. Gupta - 43rd Edition, Sultan Chand Publishers – 2014
3. Business Statistics by Digambar Patri, D.N. Patri - 3rd Edition, Kalyani Publishers –2014
4. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata

Syllabus
Python Programming

Objective- To facilitates the decision making process by quantifying the element of chance or uncertainties.

Total Credit-4

Hours/Week-4

Module-I	Introduction To Python : Features, Application, Installation and Working with Python, Understanding Python variables Python basic Operators Understanding python blocks Data Types: Data types and Operators , string, list, tuple, set, dict and different methods and operators
Module-II	Program Flow Control : Branching-Conditional blocks using if, else and elif Simple for loops in python, For loop using ranges, string, list and dictionaries Use of while loops in python, Loop manipulation using pass, continue, break,exit and else Programming using Python conditional and loops block
Module-III	Python Functions, Modules And Packages : - Organizing python codes using functions Organizing python projects into modules , Importing own module as well as external modules, Understanding Packages, String, List And Dictionary Manipulations : Building blocks of python programs Understanding string inbuilt methods List manipulation using inbuilt methods Dictionary manipulation, Programming using string, list and dictionary in build functions
Module-IV	Python Plotting:- Matplotlib, plotting a chart and showing it, Format strings in plotting, Different types of chart, Setting labels and title, Adding gridlines, Subplot Data Set Operation : Python File operations, CSV handling , pandas series and frames, Seaborn

Suggested Books

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python For Data Analysis by William McKinney
3. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012

Syllabus
Multivariate data analytics

Objective- To find patterns and correlations between several variables simultaneously

Total Credit-4

Hours/Week-4

Module-I	Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation, principle of least squares and fitting of polynomials and exponential curves.
Module-II	Correlation Analysis Simple Correlation, Scatter Diagram calculation of correlation coefficient, probable error, Rank correlation and its applications.
Module-III	Regression Analysis –linear regression, model for prediction, multiple regression and method of least square
Module-IV	Time series: Time series and its components with illustrations, additive, multiplicative and mixed models. Determination of trend by least squares and moving average methods. Growth curves and their fitting with reference to Modified exponential, Gompertz and Logistic curves. Determination of seasonal indices by Ratio to moving average, ratio to trend and link relative methods

Suggested Books

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia
3. Anderson, T.W. (2003): An Introduction to Multivariate Statistical Analysis, 3rdEdn., John Wiley

Syllabus

Mathematical Optimization for Business Problem

Objective- To facilitates the decision making process by optimizing the Business Problems the element of chance or uncertainties.

Total Credit-4

Hours/Week-4

Module-I	Linear Optimization – Building Linear optimization model, solving linear optimization problem graphically, simplex algorithm, application of linear optimization, sensitivity analysis
Module-II	Integer linear programming and decision analysis – Types of integer, linear programming models, Graphical solution to the all integer problems, applications involving 0-1 variable, Product design and market share optimization, Decision Analysis – making decision with uncertain information, Average pay off strategy, aggressive strategy, conservative strategy, opportunity loss strategy, Decision strategy to maximize objective, Decision tree analysis.
Module-III	Assignment, Transportation models, Aggregate planning models, worker scheduling models, logistic models and sensitivity analysis, aggregate planning models, fixed cost models.
Module-IV	Simulation and AHP

Suggested Books

1. Albnight and Winston, Management science modeling with spreadsheets, (engage learning, Indian Edition, 3rd Indian reprint 2011)Statistical Methods by S.P. Gupta - 43rd Edition, Sultan Chand Publishers – 2014.
2. Albnight and Winston, Business Analytics, Data Analysis & Decision Making, Cenage 5th Edition 2015

Syllabus

Database Management System & Its Applications

Objective-. To know the basics of DBMS and its applications in Business Analytics

Total Credit-4

Hours/Week-4

Module-I	Introduction to DBMS: Data, database, database management system, advantages of DBMS over file system, structure of DBMS, Three level of data abstraction,instance, schema, data independence, data model
Module-II	ER Model: Entity, attributes, relationship, mapping, cardinaties, participation constraints, Simple ER diagram,
Module-III	Relational Model & SQL: Structure of relational database, relational algebra, relational calculus, codd's rule, QBE,Basic of sql, queries in SQL, insert, update, delete statement in sql
Module-IV	Relational Database Design: functional dependency, multivalued dependency, anomalies, different normal forms(1NF, 2NF, 3NF, BCNF), Join

Suggested Books

1. Database System Concepts, by Silberschatz, Sudarshan, and Korth

Syllabus

Lab- R, SPSS and Ms Excel

Objective- To know the basics of implementation of Data analysis using the tools of R, SPSS & Excel

Total Credit- 8

Hours/Week- 4

Module-I	Introduction- & Data Input: Overview of R Programming, Downloading and installing, Help of Function, Viewing documentation, Data Types, Subsetting, Writing data, Reading from csv files Data Visualization-Creating bar chart and dot plot, Creating histogram and box plot, Plotting with base graphics, Plotting and coloring in R
Module-II	Basic Statistic-Computing Basic Statistics, Comparing means of two samples, Testing a proportion, Data Munging Basics, Data manipulation in R-List Management, Data Transformation, Merging Data Frames, Outlier Detection, Combining multiple vector
Module-III	Introduction to spreadsheets, reading data, manipulating data. Basic spreadsheet operations and functions, Introduction to some more useful functions such as the IF, nested IF, Introduction to the Data filtering capabilities of Excel, the construction of Pivot Tables to organize data and introduction to charts in Excel, Constructing various Line, Bar and Pie charts.. Understanding and constructing Histograms and Scatter plots.
Module-IV	An Overview of SPSS, Listing cases, replacing missing values, computing new variables,recording variables, exploring data, selecting cases, sorting cases, merging files, Creating and editing graphs and charts, Descriptive Statistics: measures of central tendency, variability,deviation from normality, size and stability. Bivariate Correlation

Suggested Books

1. R for Everyone: Advanced Analytics and Graphics by Lander Pearson Education