|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CS/IT 251** | **Probability &Statistics with R Lab** | **L** | **P** | **C** |
|  |  | **0** | **3** | **1.5** |

**Course Objectives:**

The student who successfully completes this course will have:

1. The knowledge to use R for statistical programming, computation, modelling and graphics.

2. The skill to write functions and use R in an efficient way.

3. The ability to fit some basic types of statistical models using R.

4. The idea to expand the knowledge of R on their own.

**Course Outcomes**

On completion of this course, students will be able to:

1. Write the programs in R to solve the statistical problems.
2. Apply various built in functions in R to solve the computational and modelling problems.
3. Interpret the statistical data by various functions of graphical representation.
4. Understand- reading, writing, working and manipulating the data in various data frames.

**CO-PO Mapping**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | 3 |  |  |  |  |  |  |  |  |  | 3 |
| **CO2** | 2 | 2 |  |  |  |  |  |  |  |  |  | 2 |
| **CO3** | 3 | 3 |  |  |  |  |  |  |  |  |  | 2 |
| **CO4** | 3 | 2 |  |  |  |  |  |  |  |  |  | 3 |

**CO-PSO Mapping**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **PSO1** | **POS2** | **PSO3** |
| **CO1** | 3 | 3 | 1 |
| **CO2** | 2 | 2 | 3 |
| **CO3** | 3 | 3 | 2 |
| **CO4** | 3 | 2 | 2 |

**Lab – Course Content**

Introduction to R

Functions

Control flow and Loops

Working with Vectors and Matrices

Reading in Data

Writing Data

Working with Data

Manipulating Data

Simulation

Linear model

Data Frame

Graphics in R

**Pre – Requisites**

CS/IT-151– C Programming.

**Lab – Course Plan&Delivery:**

|  |  |
| --- | --- |
| **LIST OF EXPERIMENTS** | **PERIODS** |
| 1. Graphical representation of data  a) Bar plot b)Frequency polygon | **3** |
| 2. Graphical representation of data  a) Histogram b)Pie chart c) Scatter plot | **3** |
| 3. Measures of central tendency  a) Mean b)Median c)Mode | **3** |
| 4. Measures of central tendency  a)Geometric Mean e)Harmonic Mean | **3** |
| 5. Measures of dispersion  a)Range b)Quartile deviation | **3** |
| 6. Measures of dispersion  a)Mean deviation b)Standard deviation | **3** |
| 7. Goodness of fit  a) Binomial b)Poisson | **3** |
| 8. Goodness of fit  a)Normal b)Contingency table | **3** |
| 9. Parametric tests  a) t-test for one-mean b) t-test for two means | **3** |
| 10.Parametric tests  a) paired t-test b) F-test | **3** |
| 11. Non-parametric tests  a) Wilcoxon-Signed rank test (one sample) b) Wilcoxon-Signed rank test (paired samples) c) Mann-Whitney test (two samples) | **3** |
| 12. Non-parametric tests  a) Kolmogorov-Smirnov test (one sample) b)Kolmogorov-Smirnov test(two samples) | **3** |
| 13. Time series  a) Trend line b)Non-linear trend line | **3** |
| 14. Time series  a)Moving averages b)ARIMA | **3** |

**Evaluation Methods:**

Internal Lab Exam : 40 Marks

Final Lab Exam : 60 Marks

**Topics Covered Beyond The Curriculum:**

Statistical concepts regarding testing of hypothesis

Differences between C and R Programming

**Semester End Observations for Future Guidance:**

Case studies to be explained are revised.

Identified new problems to be assigned for the next academic year students.

**Learning Resources:**

**Text Books:**

1*.*Hands-on Programming with R*,* Garrett Grolemund, O′Reilly.

2*.*R for Everyone: Advanced Analytics and Graphics*,* Jared P. Lander, Addison-Wesley