## MATHEMATICAL STATISTICS

| Semester | Subject | Category | Lecture |  | Theory |  | Practical | Credits |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| IV | $\begin{gathered} \hline 21 \mathrm{CPM} \\ \text { A4B } \end{gathered}$ | Core - <br> Paper XIV | Hrs/week | Hrs/Sem | Hrs/week | Hrs/Sem | 0 | 5 |
|  |  |  | 6 | 90 | 6 | 90 |  |  |

COURSE OBJECTIVES:
The students will be able to

- Understand sampling theory, significance tests, estimation, testing of hypothesis, ANOVA and sequential analysis with rigorous mathematical treatment.
- Acquire knowledge on statistics and apply it to various physical problems
- Develop a thorough grasp of statistical methodology and apply statistical skills to solve real-life problems
COURSE OUTCOMES:
On the successful completion of the course, the students will be able to

| CO <br> Number | CO Statement | Knowledge <br> Level <br> (K1-K4) |
| :---: | :--- | :---: |
| $\mathbf{C O 1}$ | Understand the exact sampling distributions and solve statistical <br> problems which are used in the fields of scientific experimentation. | K2 |
| $\mathbf{C O 2}$ | Apply parametric test for small samples, test the independence of <br> attributes and test for randomness. | K3 |
| $\mathbf{C O 3}$ | Discuss various characteristics of estimators and illustrate different <br> methods of estimation | K 3 |
| $\mathbf{C O 4}$ | Analyze the results for various experiments using one and two <br> factors of classification | K 4 |
| $\mathbf{C O 5}$ | Construct the sequential probability in the ratio test, determine the <br> constants of A and B, test the hypothesis concerning P on 0-1 <br> distribution, m in Normal distribution and obtain OC function. | K 3 |

Knowledge Level: K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze.
MAPPING WITH PROGRAM OUTCOMES

| C0S | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C01 | S | S | M | M | S | S |
| CO2 | S | S | M | M | M | S |
| CO3 | S | S | M | M | S | S |
| CO4 | S | M | S | S | M | S |
| C05 | S | S | S | M | M | S |

S- Strong; M - Medium; L - Low

Notion of a sample and a statistic - Distribution functions of $\bar{X}, \mathrm{~s}^{2}$ and $\left[\bar{X}, \mathrm{~s}^{2}\right]-\chi^{2}$ distribution student t - distribution - Fisher's Z - distribution - Snedecor 's F - distribution - Distribution of sample mean from non - normal populations.
Chapter 9: Sections 9.1 to 9.8
UNIT - II: SIGNIFICANCE TEST:
18 Hours
Concept of a Statistical test - parameteric tests for small samples and large samples $-\chi^{2}$ test the Wald - Wolfovitz and Wilcoxon - Mann - Whitney tests - independence tests by contingency tables.

Chapter 12: Sections 12.1 to 12.7
UNIT - III: ESTIMATION:
18 Hours
Preliminary notion - Consistency estimation - Unbiased estimates - Sufficiency - Efficiency Asymptotically most efficient estimates - methods of finding estimates.

Chapter 13: Sections 13.1 to 13.8
UNIT -IV: ANALYSIS OF VARIANCE:
18 Hours
One way classification and two way classification-Hypothesis testing : Poser functions - OC function - Most powerful test - Uniformly most powerful test - unbiased test .
Chapter 15: Sections 15.1 and 15.2 (omit section 15.3)
Chapter 16: Sections 16.1 to 16 .5. (Omit section 16.6 and 16.7)

UNIT - V: SEQUENTIAL ANALYSIS:
18 Hours
SPRT -Auxiliary theorem - Wald's fundamental identity -OC function and SPRT.E(n) and determination of A and B.Testing of hypothesis concerning p on 0-1 distribution and min Normal distribution.

Chapter 17: Sections 17.1 to 17.9 (omit section 17.10)

## DISTRIBUTION OF MARKS: THEORY 90\% AND PROBLEMS $\mathbf{1 0 \%}$

TEXT BOOK

| S.NO | AUTHORS | TITLE | PUBLISHERS | YEAR OF <br> PUBLICATION |
| :--- | :--- | :--- | :--- | :---: |
| 1. | MarekFisz | Probability Theory and <br> Mathematical Statistics | John Wiley and sons, <br> New York | 1963 |

REFERENCE BOOKS

| S.NO | AUTHORS | TITLE | PUBLISHERS | YEAR OF <br> PUBLICATION |
| :--- | :--- | :--- | :--- | :---: |
| 1. | E.J Dudewicz and <br> S.N.Mishra | Modern <br> Mathematical <br> Statistics | John Wiley and <br> sons, New York | 1963 |
| 2. | V.K.Rohatgi | An introduction to <br> Probability theory <br> and Mathematical <br> Statistics(3 ${ }^{\text {rd }}$ edition) | Wiley Eastern <br> ,New Delhi | 1988 |
| 3. | G.G.Rousatt | A first course in <br> Mathematical <br> Statistics | Addision Wesley <br> publishing <br> company | 1973 |
| 4. | B.L.Vanderwareden | Mathematical <br> statistics | G. Allen \&Unwin <br> Ltd, London | 1968 |

## WEB RESOURCES

1. www.researchgate.net/publication/272237355_probability_and_mathematical_statistics.pdf
2. http://www.math.louisville.edu/~pksaho01/teaching/Math662TB-09S.pdf

## TEACHING METHODOLOGY

1. Class room teaching
2. Giving Assignments for all units
3. Discussions
4. Home test
5. PPT presentation

## SYLLABUS DESIGNER

Dr.T.Ranjani, Assistant Professor of Mathematics.

