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| Course Title: | Statistical Inference-I |
| Course Code: | STAT-402 |
| Semester: | VII |
| Credit Hours: | 3 Credit Hours |
| Pre-requisites: | N / A |

Learning Outcomes

By the end of this course, students will be able to:

1. Have vast knowledge about point estimation and properties of a good estimator.
2. Tackle the problems related to Cramer-Rao inequality and Minimum variance bound estimators.
3. Get an insight on Bayes estimation with examples.

Course Outline

Unit 1

1.1 Point Estimation and Properties of an Estimator

Point estimation and problems of estimation. Properties of a good estimator: Unbiasedness, Consistency, Efficiency and Sufficiency. Mean-squared error. Consistency and Best asymptotically normal estimator. Minimal sufficient statistics. Joint sufficiency. Exponential family. Sufficiency and Completeness. Cramer-Rao inequality.

1.2 Minimum Variance Bound estimators

Rao-Blackwell and Lehmann-Sheffe theorems. Uniformly Minimum Variance Unbiased estimators. Joint completeness. Location invariant and scale-invariant estimators. Pitman estimators for location and scale.

Unit 2

2.1 Bayes Estimation

Bayes estimators. Prior and Posterior distributions. Posterior Bayes estimators. Loss function and Risk function. Bayes estimator, Minimax Methods of estimation.

- **Teaching-learning Strategies:**

Class Lecture method, which includes seminars, discussions, assignments and projects. (Audio-visual tools are used where necessary)

- **Assignments-Types and Number with calendar:**

According to the choice of respective teacher.

- **Assessment and Examinations:**

According to the University's Semester Rules.

| Sr. No. | Elements | Weightage | Details |
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| 1 | Midterm Assessment | 35% | It takes place at the mid-point of the semester. |
| 2 | Formative Assessment | 25% | It is continuous assessment. It includes: Classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc. |
| 3 | Final Assessment | 40% | It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course |

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| | | | the teacher may assess their students based on term paper, research proposal development, field work and report writing etc. |
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Text Books

1. Casella, G., & Berger, R.L. (2008). *Statistical Inference*. Cengage Learning, New York, USA.
2. Hogg, R.V., & Tanis E.A. (2009). *Probability and Statistical Inference* (7th ed.). Macmillan Publishing Company, New York.

Suggested Readings

1. Hoel, P.G. (1984). *Introductions to Mathematical Statistics* (5th ed.). John Wiley and Sons, New York.
2. Hogg, R.M., McKean, J., & Craig, A.T. (2013). *Introduction to Mathematical Statistics*. Prentice Hall, New Jersey, USA.
3. Lehman, E.L. (2003). *Theory of Point Estimation* (2nd ed.). John Wiley, New York.
4. Mood, A.M., Graybill, F.A., & Boes, D.C. (2007). *Introduction to the Theory of Statistics*. McGraw Hill, New York, USA.
5. Rao, C.R. (2001). *Linear Statistical Inference and its Applications* (2nd ed.). Wiley.