Minutes of the Meeting

Intermediate Statistics for Economics

Date: 17th March, 2023

Course Title	Intermediate statistics for Economics - DSC-6
Course Code	ECON006
Course Abbreviation:	STAT 2
Credits	4
Duration (per week)	4 hours (3 Lectures+ 1 Tutorial)
Date of Meeting	17th March 2023
Venue	Delhi School of Economics
Chair	Prof. Pami Dua, Dr. Reetika Garg and Dr. Anish Gupta

Attended By:

Kanika Pathania	Sri Venkateswara College
Anu Singh Deswal	Jesus and Mary College
Rakesh Kumar	Dyal Singh College
Deepika Kandpal	PGDAV Morning
Gaganpreet Kaur	SGTB Khalsa College
Neha	ARSD
Ajay Kumar	Kamala Nehru college
Roshan Kumar Singh	Kamala Nehru college
Shubhi Singh	Lady Shri Ram College for Women
Shruti Garg	Sri Guru Gobind Singh college of Commerce
Dr. Paramjeet Kaur	Sri Guru Gobind Singh college of Commerce
Dr. Srishty Kasana	Daulat Ram College
Dr. Deepika Goel	Aryabhatta College

Learning Objectives
The Learning Objectives of this course are as follows:
• This course focuses on techniques for statistical inference. The main objective of the course is to help students understand how to draw inference from samples regarding the underlying populations using point estimation, interval estimation and hypothesis testing.

Learning outcomes
The Learning Outcomes of this course are as follows:
• An important learning outcome of the course will be the capacity to use and analyse statistics in everyday life. The course will improve students' ability to analyse data, make decisions, form predictions, and conduct research.

A meeting of teachers of this course was held to discuss the following:

- The detailed reading list for the UGCF course to be implemented in the academic session 2022-23.
- The pattern of the semester-end exam.
- How to give a good intuition of the concepts to the students by using some practical concepts.
- How to assess students for the continuous assessment

Since this paper is taught in its present form for the first time, under UGCF, a sub-committee was constituted to review the suggested readings. The committee consisted of the following teachers:

1. Deepika Goel, Aryabhatta College
2. Paramjeet Kaur, Sri Guru Gobind Singh College of Commerce
3. Priyanka Bhatia, SRCC College
4. Poonam Kalra, St. Stephen's College

The issues discussed in the meeting are as follows:

1. Teachers suggested that from the suggested readings in the syllabus, J Devore and Hogg, Tanis and Zimmerman (HT&Z) could be used as core textbooks. John Rice can be used for some topics.
2. Students should be aware of the following topics; however, no questions should be asked in the examinations:
    a) Simulation experiments
    b) β and sample size determination
    c) Power curves
3. Jan Kmenta can be used for properties of an estimator, particularly 'sufficiency' of an estimator.
4. In order to achieve uniformity in evaluation of final answer scripts, it was decided to include the following note in final question paper:
    a) All questions within each section are to be answered in a contiguous manner on the answer sheet. Start each question on a new page, and all sub-parts of a question should follow one after the other.

b) All intermediate calculations should be rounded off to 3 decimal places. The values provided in statistical tables should not be rounded off. All final calculations should be rounded off to two decimal places.

5. It was agreed that the question paper will include internal choice in each section with limited number of sub-parts.
6. The following distribution of topics, indicative weightage, and the amount of choice within each section, was agreed upon:
    a. Section 1: Unit 1: (weightage 20 marks), Two questions of 10 marks each. Internal choice in these units should be given as 2 out of 3 questions
    b. Section 2: Unit 2: (weightage 30 marks), Three questions out of Four for 10 marks each.
    c. Section 3: Unit 3 and Unit 4: (weightage 40 marks), Four questions out of Five for 10 marks each.
7. There would be no compulsory question in any of the sections.
8. End semester exam would be of 90 marks. The internal assessment would comprise of 12 marks Class test, 12 marks Class test/assignment. Lecture attendance will carry 06 marks. Problem solving during tutorials/ interpretation of results pertaining to a set of data should be the preferred medium for continuous assessment of 35 marks out of 40 (Five marks for attendance in tutorials).

The details of the Course Content, Topic-wise Reading list, recommended textbooks are given below:

Content (Unit-wise):

UNIT - 1: Sampling distribution of a Statistic (12 Hours)

Concept of Statistic and parameter, Sampling distributions, Central Limit Theorem.

UNIT - 2: Estimation (12 Hours)

Estimator and methods of estimation, Point Estimation: method of moments and method of maximum likelihood; Interval Estimation, Properties of an estimator: Consistency, Unbiasedness, Efficiency and Sufficiency, confidence level and sample size, intervals based on Z-distribution, t-distribution and chi-squared distribution, F-distribution.

UNIT – 3: Inference (9 Hours)

Meaning of a statistical hypothesis, errors in hypothesis testing: Type 1 and Type 2 errors, power of a test.

UNIT - 4: Hypothesis Testing (12 Hours)

Testing of a population Mean, proportions - small and large sample tests, P-value; Testing for variance; Testing hypothesis for two samples, testing for equality of means; testing for ratio of variances.

Unit No.	TOPIC	READINGS FROM CORE TEXTS
1.	**Sampling distribution of a Statistic**	***Devore: Ch 5.3 (excluding simulation experiments), 5.4, 5.5*** ***Hogg, Tanis and Zimmerman: Ch 5.6*** ***Anderson et. al: Ch 7.8***
2.	**Estimation**	***Devore: Ch 6 (except pages 249-250), Ch 7, Confidence intervals are also covered in Ch 9 for which relevant sections are provided in Unit IV)*** ***Hogg, Tanis and Zimmerman: Ch 6.4 (examples from gamma, Weibull distribution are excluded), 7.1-7.4*** ***Larsen and Marx: Ch 5.4*** ***Jan Kmenta: Ch 6.1 (pp 156-159, 162)***
3.	**Inference**	***Devore: Ch 8.1*** ***John Rice: Ch 9.4*** ***Larsen and Marx: Ch 6.1-6.4(pp 350-369 excluding power curves, 370-374)***
4.	**Hypothesis Testing**	***Devore: Ch 8.2 – 8.5 (excluding β and sample size determination in each case), Ch 9 (excluding β and choice of sample size in 9.1 and excluding Ch 9.3)*** ***Hogg, Tanis and Zimmerman: Ch 8.1 – 8.4***

Essential Readings:

1. Devore, J. (2012). Probability and Statistics for Engineers, 8th ed. Cengage Learn-ing.
2. Hogg, R., Tanis, E., Zimmerman, D. (2021) Probability and Statistical inference, 10th Edition, Pearson.
3. Larsen, R., Marx, M. (2011). An introduction to mathematical statistics and its applications. Prentice Hall.
4. Miller, I., Miller, M. (2017). J. Freund's Mathematical Statistics with Applications, 8th ed. Pearson.
5. Anderson, D. R, Sweeny, D. J, et. al (2019), Statistics for Business and Economics, 13th edition, Cengage Learning.

6. Jan Kmenta (1997), Elements of Econometrics, 2nd ed. Macmillan publishing; New York and Collier Macmillan; London.

Recommended Readings for Teachers:

1. John A. Rice (2007). Mathematical Statistics and Data Analysis, 3rd ed. Thomson Brooks/Cole.
2. Demetri Kantarelis, D. and Malcolm O. Asadoorian, M. O. (2009). Essentials of Inferential Statistics, 5th edition, University Press of America.