

Indian Institute of Technology Kanpur
Department of Statistics and Data Science

SDS432M

Introduction to Sampling Theory

First Course Handout

Semester I (2026–2027)

Prerequisite

MSO209: Probability and Statistics (or an equivalent course).

Instructor

Instructor	Professor Neeraj Misra
Office	Faculty Building, Room 515
Department	Department of Statistics and Data Science
Telephone	Ext. 7087
E-mail	neeraj@iitk.ac.in
Website	https://home.iitk.ac.in/~neeraj

Class Schedule

Lectures

Venue: L-3, Lecture Hall Complex

Days: Tuesday, Wednesday and Thursday

Time: 08:00–08:50

Tutorials

Venue: L-3, Lecture Hall Complex

Day: Wednesday

Time: 14:00–14:50

Compensatory Lectures

Whenever required, compensatory lectures will be held on Tuesdays or Thursdays from 18:10 to 19:30.

Office Hours

Faculty Building, Room 515, by prior appointment.

Course Webpage

<https://hello.iitk.ac.in/studio/mth432msem12627/instructor/home>

<https://home.iitk.ac.in/~neeraj/mth432/mth432.htm>

Reference Books

1. W. G. Cochran, *Sampling Techniques*, Wiley.
2. Parimal Mukhopadhyay, *Theory and Methods of Survey Sampling*, PHI Learning.
3. P. V. Sukhatme, B. V. Sukhatme, S. Sukhatme and C. Asok, *Theory of Sample Surveys with Applications*, IASRI, New Delhi.
4. P. S. R. S. Rao, *Sampling Methodologies and Applications*, Chapman & Hall/CRC.
5. M. N. Murthy, *Sampling Theory and Methods*, Statistical Publishing Society.
6. Z. Govindarajulu, *Elements of Sampling Theory and Methods*, Prentice Hall.

Course Content

Principles of survey sampling; simple random sampling, stratified sampling and unequal probability sampling (with and without replacement); ratio, product and regression estimators; and varying probability sampling schemes.

Course Objectives

A fundamental objective of statistics is to draw reliable inferences about the characteristics of a population using information collected from only a subset of that population, called a *sample*. In many practical situations, conducting a complete census is prohibitively expensive, time-consuming, or operationally infeasible. Consequently, statistical inference relies on carefully selected samples that adequately represent the population. This course introduces the fundamental principles of survey sampling, develops the theory of commonly used probability sampling designs, and studies methods for comparing their statistical efficiency with respect to precision, bias, and cost.

Prerequisites

Students are expected to have a working knowledge of elementary calculus and probability at the level of MSO209: Probability and Statistics (or an equivalent course). Whenever appropriate, prerequisite concepts will be reviewed briefly while introducing new topics.

Course Policies

10.1 I. Evaluation Scheme

The course evaluation will be based on the following components.

Component	Weight
End-semester Examination	70%
Long Quiz	30%

The end-semester examination will be of two hours' duration and will be conducted during 13–20 September 2026 on a date to be announced by the DoAA.

One long quiz of 45 minutes' duration will be held on Wednesday, 19 August 2026.

10.2 II. Academic Performance Evaluation Scheme

Although the Institute follows a policy of relative grading, the following minimum performance levels will normally be expected for the award of the corresponding grades.

Grade	Minimum Marks
A*	85%
A	70%
B ⁺	63%
B	55%
C ⁺	48%
C	40%
D ⁺	35%
D	30%
E	20%

10.3 III. Attendance Policy

Students are expected to attend all lectures, tutorials, quizzes, and examinations regularly. Except under circumstances beyond a student's control, regular attendance is expected throughout the course.

A minimum attendance of 70% is mandatory for securing a passing grade (A*–D) in the course.

Students who attend all scheduled sessions of the course (except for approved medical leave) will be awarded an attendance bonus of 5%.

10.4 IV. Code of Conduct and Academic Integrity

Students are expected to uphold the highest standards of honesty, integrity, and professional conduct throughout the course.

Any form of cheating, plagiarism, impersonation, or use of unfair means during quizzes or examinations will be treated as a serious violation of the Institute's academic code of conduct. In addition to being awarded an F grade in the course, students found guilty of academic misconduct may face disciplinary action in accordance with Institute rules.

Students are also expected to maintain proper decorum during lectures, tutorials, quizzes, and examinations.

10.5 V. Makeup Examination Policy

Ordinarily, no make-up examination will be conducted for the long quiz.

If a student is unable to appear for a quiz due to a genuine medical or other exceptional circumstance, the missed quiz may be considered for proration based on the student's relative performance in the End-Semester Examination.

For a foreseeable non-emergency, the request for proration should be submitted well before the scheduled quiz. In the event of an emergency, the request should be submitted as soon as reasonably possible after the missed assessment.

Medical claims must be supported by a certificate clearly stating that the student was medically unfit to appear for the assessment. Merely producing a certificate indicating that the student consulted a doctor will not be considered sufficient.

The policy governing make-up examinations for the end-semester examination shall be that prescribed by the Institute.

10.6 VI. Lecture Notes, Assignments and Self-study

Students are encouraged to consult the recommended textbooks for a deeper understanding of the material covered in class. Lecture notes will also be made available through the course webpage whenever possible.

Suggested assignment problems will be announced during lectures and posted on the course webpage. Students are strongly encouraged to attempt these problems independently before seeking assistance during tutorial sessions or office hours.

This is a six-credit modular course comprising three lectures and one tutorial every week. In addition to attending the scheduled classes, students should devote approximately seven hours per week to independent study.