The Hong Kong University of Science and Technology

UG Course Syllabus

Statistical Inference

MATH 3426

3 credits

Pre-requisites: MATH 2411

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Course Description

This course covers basic and standard sampling design and estimation methods. Implementation with R/Excel will also be discussed for survey data analysis. Topics include simple random sampling, stratified random sampling, systematical sampling, cluster sampling, etc.

Intended Learning Outcomes (ILOs)

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

No.	ILOs
1.	Recognize and use appropriately important technical terms and definitions in sampling.
2.	Understand the estimators in different sampling schemes and apply them in concise form.
3.	Apply sampling techniques in familiar situations.
4.	Analyze survey data using different statistical models with R/ Excel.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
Homework assignments	25%	Week 4, 7, 10, 13
Final examination	75%	In the exam period

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Homework assignments	ILO1, ILO2, ILO3, ILO4	This task assesses students' ability to explain and apply statistical concepts in sampling (ILO 1), evaluate their implications (ILO 2) and (ILO 3) and catch up with the lecture materials to handle statistical problems in different sampling schemes (ILO 4).]
Final examination	ILO1, ILO2, ILO3, ILO4	Final examination is designed to access students' foundational understanding of the concepts for statistical sampling (ILO 1), evaluate their ability to construct different sampling approaches for different situations (ILO 4), and their implications (ILO 2) for the application of large sample cases (ILO 3).

Grading Rubrics

Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

a. Examination duration: 3 hrs for Final Examination
b. Percentage of assignments and examination.

Assessment	Assessing Course ILOs
25% by homework (3-4 sets)	1, 2, 3, 4
75% by the final exam	1, 2, 3, 4

*All assignments will receive feedback within 10 working days

Related to the policy on GenAI for teaching and learning, there is No restrictions on use of generative AI for an assessment task.

- For Assignment, no late submission will be accepted.
- If a student misses the final exam, s/he must fill in a form to apply for a make-up final exam with evidence officially.

c. Grades will be given by criteria referencing.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates mastery of all theories and results for statistical sampling covered in the course and can adapt and apply the sampling approaches to new problems and situations. The student can appropriately apply these concepts to real-world problems, interpret the results accurately, and exhibits strong proficiency in using R for analysis.
B	Good Performance	Shows a solid understanding of the theoretical results in sampling discussed in the course. The student can effectively apply these methods to real-world problems and interpret the results with minor errors. Demonstrates good competency in using R for performing analyses.
C	Satisfactory Performance	Possesses adequate knowledge of the core sampling concepts covered in the course. The student can address familiar problems and perform basic analyses using R, though with some inconsistencies. Shows basic ability to interpret results.
D	Marginal Pass	Has a threshold understanding of the fundamental sampling concepts taught in the course. The student can perform simple analyses using R but may struggle with more complex applications. Interpretation of results may be limited and occasionally inaccurate.
F	Fail	Does not have sufficient understanding of even the basics components of the sampling theory covered in the course. The student is unable to effectively apply methods to real-world problems, nor using R for analyses, and fails to interpret results correctly.

Course AI Policy

Students are permitted to consult any person—including the instructor, teaching assistants (TAs), and classmates—for ideas and hints while completing homework assignments. The use of ChatGPT and other generative AI tools is also allowed. However, students are required to write up the solutions independently and are responsible for ensuring that their submissions are correct and comply with University rules and laws, including those regarding plagiarism.

Students are particularly cautioned about the potential inaccuracies and fallacies that may arise from AI-generated answers. Additionally, our final examination will be closed book, meaning that AI tools and resources will not be available during exams. This policy is in place to prevent overreliance on such tools and to ensure that assessments accurately reflect each student's individual understanding and capabilities.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include [specific details, e.g., strengths, areas for improvement]. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Required Texts and Materials

There is no textbook. The lecture notes give a concise (to the point) presentation of the course material, usually enough for most students.

Reference Book:

"Elementary Survey Sampling" (Duxbury Press) by Richard L. Scheaffer, William Mendenhall, R. Lyman Ott, Kenneth G. Gerow.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.