

**Department of Statistics and Actuarial Science
The University of Hong Kong
STAT2602A Probability and statistics II
Syllabus (2024-2025 1st Semester)**

Lecturer: Dr. Dora Y. Zhang

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Lecture Hours: Mon. 11:30 a.m. – 12:20 p.m. (MB167)

Thur. 10:30 a.m. – 12:20 p.m. (MB201)

Tutor: Ying Li & Zhenghao Li & Sanyou Wu

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Tutorial Hours: TBD

Course Contents

- Overview — random sample, sampling distributions of statistics, moment generating function (Chapters 1 and 2)
- Large-sample theory — laws of large numbers and Central Limit Theorem (Chapter 2)
- Estimation — likelihood, estimator, bias, mean square error, standard error, consistency, Fisher information, Cramer-Rao Lower Bound, efficiency, method of moments, maximum likelihood estimator (Chapter 3)
- Confidence interval — confidence level, confidence limits, equal-tailed interval, construction based on hypothesis test (Chapter 4)
- Hypothesis testing — types of hypotheses, test statistics, p-value, size, power, likelihood ratio test, Neymann-Pearson Lemma, generalized likelihood ratio test (Chapters 5)

Intended Learning Objectives and Outcomes

This course builds on STAT2601, introducing further the concepts and methods of statistics. Emphasis is on the two major areas of statistical analysis: estimation and hypothesis testing. Through the disciplines of statistical modelling, inference and decision making, students will be equipped with both quantitative skills and qualitative perceptions essential for making rigorous statistical analysis of real-life data.

On successful completion of the course, students should be able to

- apprehend the objectives of statistics and its relation to probability theory;
- relate a real-life problem to a formal framework for statistical inference;
- conduct standard parametric statistical inference by means of estimation and hypothesis testing;

- reckon the general applicability of statistics in a broad range of subject areas.

Pre-requisites

For 4-year curriculum UG students: Pass in STAT2601.

Teaching and Assessment

- Teaching is composed of two-hour lectures and a one-hour tutorial class per week.
- Assessment includes a 2-hour examination (60% weighting), a class test and assignments (40% weighting).
- Students MUST attend example classes and hand in assignments by the due dates. Don't ask tutors for hints about assignments.
- Late submission of assignments:
 - Within 24 hours: 50% off the score
 - Beyond 24 hours: zero score.

Plagiarism

Partially or wholly copied assignments will be penalized and/or reported as plagiarism. For details, please read the instructions in the website: <http://www.hku.hk/plagiarism>.

Department's Policy on Absence from Class Test

If for any reason you are or have been unable to attend a mid-term/class test, and if you wish to have a supplementary mid-term/class test, (a) all full-time students (including TPG students) should write to the General Office of the Department of Statistics and Actuarial Science giving reasons for your absence; (b) all part-time students should write to the course instructor giving reasons for your absence, within 7 days of the absence. A special/supplementary test is normally granted to those absent from the original test due to illness and with original medical certificate provided. Students absent due to other reasons are not granted a special/supplementary test unless with very special circumstances and with valid documental proofs provided.

References

- Berry, D.A. & Lindgren, B.W. (1996). *Statistics: Theory and Methods*. Duxbury: Belmont.
- Bickel, P.J. & Doksum, K.A. (2001). *Mathematical Statistics: Basic Ideas and Selected Topics*. Prentice Hall: Upper Saddle River, N.J.
- Hogg, R.V. & Craig, A.T. (1989). *Introduction to Mathematical Statistics*. Macmillan: New York.
- Miller, I. & Miller, M. (2004). *John E. Freund's Mathematical Statistics with Applications*. Pearson Prentice Hall: Upper Saddle River.