

MATH 3423 Statistical Inference

Course Outline – Fall 2024

1. Instructor

Name: Dr. Chi-Wai YU

Contact Details: Rm 3419; phone: 2358-7429; e-mail: macwyu@ust.hk

2. Teaching Assistants

T1A, T1B

Name: HO, Ho Yi Alexis

Contact Details: e-mail: hyhoai@connect.ust.hk

T1C, T1D

Name: CHEN, Yuxuan

Contact Details: e-mail: ychenlo@connect.ust.hk

3. Meeting Time and Venue

Lectures:

Date/Time: Wed (1:30pm – 2:50pm) and Fri (1:30pm – 2:50pm)

Venue: Rm2465

Tutorials:

T1A

Date/Time: Wed (10:30am-11:20am) **Venue:** Rm5508

T1B

Date/Time: Mon (01:30pm-02:20pm) **Venue:** CYTG003

T1C

Date/Time: Wed (09:30am-10:20am) **Venue:** Rm5506

T1D

Date/Time: Tue (01:30pm-02:20pm) **Venue:** CYTG002

4. Course Description

Credit Points: 3 units

Pre-requisite: MATH 2421 or equivalence

Exclusion: NIL

Brief information:

This course covers the material about the basic concepts of statistical inference: point estimation and hypothesis testing. The key topics are the sampling from the normal distributions; order statistics; maximum likelihood estimation; properties of point estimators; unbiased estimation; tests of hypotheses; likelihood-ratio tests.

5. Intended Learning Outcomes

Upon successful completion of this course, students are expected to

No.	ILOs
1	understand the main concept of doing statistical inference.
2	be able to find the maximum likelihood estimator in some statistical problems.
3	understand the new inferential ideas like Fisher information and CR lower bound clearly.
4	be able to find different estimates with some special estimation techniques they learn in class.
5	be able to do some advanced testing of hypotheses such as likelihood-ratio test.

6. Assessment Scheme

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

Assessment

20% by Assignment*

30% (0%, resp) by Midterm

50% (80%, resp) by Final exam

Assessing Course ILOs

1, 2, 3, 4, 5

1, 2, 3, 4, 5

1, 2, 3, 4, 5

*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.
- No make-up midterm exam will be arranged for any reason.
- 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.

The maximum score from the above two different schemes will then be taken to determine the student's final grade.

- Grades will be given by criteria referencing.

7. Student Learning Resources

Lecture Notes: The course notes are available online. They give a concise (to the point) presentation of the course material, usually enough for most students. Some supplementary materials can also be found and downloaded on the course webpage.

Reference books:

- "Statistical Inference" by George Casella and Roger L. Berger
- "Introduction to the Theory of Statistics" by A.M. Mood, F.A. Graybill and D.C. Boes

8. Teaching

Weekly schedule: 3 hrs for lecture and 1 hr for tutorial

9. Course Schedule

Keyword Syllabus:

- Introduction to statistical inference
- Multivariate Normal distribution and central limit theorem
- Relationship between normal and other distributions
- Point estimation: Maximum likelihood estimation
- Fisher information and Cramer-Rao inequality
- Likelihood ratio tests