Course number	U-LAS11 10010 LE55		
Course title (and course title in English)	Mathematical Statistics-E2 Mathematical Statistics-E2	Instructor's name, job title, and department of affiliation	Research Institute for Mathematical Sciences Associate Professor,Croydon, David Alexander

Group	Natural Sciences	Field(Classification)	Data Science(Foundations)

Language of instruction	English	Old group	Group B	Number of credits	2

Number of weekly time blocks	1	Class style	Lecture (Face-to-face course)	Year/semesters	2025・First semester

Days and periods	Thu.2	Target year	Mainly 2nd year students	Eligible students	For science students

[Overview and purpose of the course]

This course will develop the theory of statistical inference, which has applications across the natural and social sciences, and beyond. It will focus on the key topics of parameter estimation and hypothesis testing. As well as presenting the theoretical justification for various techniques covered, it will also be a goal to show how these can be applied in examples. The topics covered in this course will be further developed in Mathematical Statistics 2, which is held in the second semester.

[Course objectives]

- To understand the basic concepts of, and mathematical justification for, point estimation and hypothesis testing
- To be able to apply key techniques of statistical inference in applications

[Course schedule and contents)]

The following indicates possible topics that will be covered and approximate schedule, though the precise details may vary depending on the student's proficiency level and background.

(1) Review of probability theory [3 weeks]
Distribution and expectation, multivariate distributions, conditional distributions, notions of convergence, common families of distributions, random samples
(2) Point estimates [5 weeks]
Estimators, sampling distribution, parametrized statistical models, maximum likelihood estimates, sampling distributions, confidence intervals, point estimation for linear models
(3) Hypothesis testing [4 weeks]
Likelihood ratio tests, methods of evaluating tests, goodness of fit tests
(4) Applications [2 weeks]
Extended example applications of the main techniques covered earlier in the course

[Course requirements]

None

Continue to Mathematical Statistics-E2(2)↓↓↓

Mathematical Statistics-E2(2)

[Evaluation methods and policy]

There will be 3 exercise sheets throughout the course, for which students will be expected to return work and present some of their answers in class. This will account for 30% of the final mark. The remaining 70% will be based on a final exam.

[Textbooks]

There will be no set textbook for the course, as the lectures will contain all the material needed for the homework and exam. However, students might find the following useful as additional reading:
Statistical Inference, Casella and Berger, Duxbury, 2002

[Study outside of class (preparation and review)]

Details will depend on the number of students enrolling on the course, and will be discussed in the first class.

[Other information (office hours, etc.)]

[Essential courses]