Keio University Syllabus and Timetable

INTRODUCTION TO PROBABILITY AND STATISTICS FOR LIBERAL ARTS

Lecturer(s)	BANA, GERGELY I.
Credit(s)	2
Academic Year/Semester	2024 Fall
Day/Period	Fri.2
Campus	Mita
Classroom	436
Class Format	Face-to-face classes (conducted mainly in-person)
Registration Number	25540
Faculty/Graduate School	INTERNATIONAL　CENTER
Year Level	2, 3, 4
Grade Type	S, A, B, C, D
K-Number　▼ Detail	CIN-CO-90413-212-83

Course Contents/Objectives/Teaching Method/Intended Learning Outcome

The aim of this course is to teach liberal arts students to understand the basic notions of probability theory and statistics, and to be able to comprehend the meaning of an elementary statistical analysis. While some mathematics is unavoidable to handle probabilities and statistics, our target is not to be able to carry out computations, rather to be able to comprehend simple analyses concerning randomness, subjective and objective probabilities, parameter estimation, confidence. After a short introduction of elementary probability theory, the most important discrete and continuous distributions, the law of large numbers and the central limit theorem, we discuss the basics of statistics, parameter estimation, confidence, and Bayesian statistics.

Active Learning Methods ⓘ Description

Discussions, Debates
Group work
Problem-based learning

Preparatory Study

Review of previous lectures - 1-2 hours
3 homework assignments
1 final take-home assignment

Course Plan

Lesson 1
Randomness, frequencies, subjective and objective probability

Lesson 2

Some combinatorics and counting combinations, permutations

Lesson 3

Discrete random variables, expected value, variance

Lesson 4

Conditional probability, Bayes' theorem, base rate fallacy

Lesson 5

Joint distributions, covariance, correlation, independence

Lesson 6

Bernoulli, binomial, geometric and Poisson distributions

Lesson 7

Briefly about continuous random variables, uniform, normal and exponential distributions

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Lesson 8

Law of large numbers and the Central Limit Theorem

Lesson 9

What Statistics is and how it is different from Probability

Lesson 10

Frequentist parameter estimation, confidence intervals

Lesson 11

Hypothesis testing

Lesson 12

Bayesian inference with known priors

Lesson 13

Bayesian inference with unknown priors

Lesson 14

Discussing actual statistical analyses on topics concerning Japan

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Other

Review and Conclusion

Method of Evaluation

3 homework assignments - 60%
1 take-home final exam - 30%
Class attendance - 10%

Reference Books

Canning: Statistics for the Humanities
Freedman, Pisani, & Purves: Statistics
Devore: Probability and Statistics for Engineering and the Sciences

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