科目ナンバリング	U-LAS11 10002 LE55						
授業科目名<英訳>	Introductory Statistics-E2 Introductory Statistics-E2			担当者所属職名・氏名	医生物学研究所 准教授 VANDENBON, Alexis		
群	自然科学科目群			分野(分類)	データ科学(基礎)	使用言語	英語
旧群	B群	単位数	2単位	週コマ数	1コマ	授業形態	講義（対面授業科目）
開講年度・開講期	2026・後期	曜時限	月4	配当学年	全回生	対象学生	全学向

[授業の概要・目的]

Statistics is arguably the most important science in the world, because every other field of science depends upon it. Nowadays, science is becoming increasingly driven by large amounts of data. The key problem is how to extract knowledge from this data. Statistical analysis is a necessary step in solving this problem. This course will introduce the theory behind basic statistics and practical applications. Especially, we will cover observational studies, experiments, the normal distribution, confidence intervals, hypothesis testing, and linear regression.

[到達目標]

Students will learn about basic concepts in statistics, and learn to apply them on real datasets. Students will develop a feeling for critical thinking when faced with data, be able to make hypotheses, and suggest relevant ways to test them.

[授業計画と内容]

Lectures 1 and 2. Introduction to statistics and data analysis. Statistics in the context of the general process of investigation. Introduction to numerical and categorical data. Simple ways of visual inspection (scatter plots, histograms, etc) and summary statistics.
Lecture 3 and 4. Probability. Formal introduction to probability, probability distributions, independent and dependent variables, and conditional, marginal, joint probability, and random variables.
Lecture 5. Distributions of random variables. Introduction to the normal distribution and its properties.
Lectures 6 and 7. Foundations for inference. We will discuss the principles of parameter inference, and the reliability of parameter estimates, including standard errors and confidence intervals. We will also introduce hypothesis testing and p-values based on these principles.
Lectures 8 and 9. The Central Limit Theorem and inference for numerical data. Practical applications, and the t-test.
Lectures 10 and 11. Inference for categorical data. We examine proportions, their confidence intervals, hypothesis testing, and comparison.
Lecture 12. Introduction to linear regression. We will cover line fitting, residuals, correlation, and least squares regression. The assumptions, interpretation, and weaknesses of linear regression will be introduced.
Lecture 13. Multiple and logistic regression. We expand the principles of simple linear regression to cases with many predictors (multiple regression), and cases where the outcomes are binary categorical (logistic regression).
Lecture 14. Review of course material.
＜Final examination＞
Lecture 15. Feedback

Introductory Statistics-E2(2)へ続く↓↓↓

Introductory Statistics-E2(2)

[履修要件]

At the beginning of the course, you do not need the knowledge of concepts such as standard deviation or statistical distributions, which will be covered in class. A high school level understanding of mathematics is required.

[成績評価の方法・観点]

Grading will be based on a final examination (50%) and small assignments (50%).

[教科書]

Diez, Cetinkaya-Rundel, and Barr 『OpenIntro Statistics (Fourth Edition)』（OpenIntro, Inc.）ISBN:978-1943450077（The course lectures will follow the content of this textbook. Please note that this textbook is also freely (legally) available for download at https://www.openintro.org/book/os/）

[授業外学修（予習・復習）等]

The course will follow a textbook. At the end of each lecture I will specify the sections to read before the next lecture.

[その他（オフィスアワー等）]

No fixed office hours. Students are requested to make appointments directly or by email.

[主要授業科目（学部・学科名）]

理学部