	INSTITUT TEKNOLOGI SEPULUH NOPEMBER **FACULTY OF SCIENCE AND DATA ANALYTICS** **DEPARTMENT OF STATISTICS** **STATISTICS UNDERGRADUATE PROGRAM**		
Course	Course Name	:	**Introduction to Biostatistics and Epidemology**
	Course Code	:	SS234753
	Credit	:	3 SKS
	Semester	:	VII

COURSE DESCRIPTION

Biostatistics and epidemiology are statistics courses applied to the environmental and health fields. The aim of the course is to provide students with the ability to analyze biological, environmental, medical/health and agricultural data (including fisheries, animal husbandry, marine and forestry) using appropriate statistical methods.

PROGRAM LEARNING OUTCOME

PLO-5   Able to apply statistical theory to statistical methods

PLO-7   Able to use modern computing devices to solve statistical problems

PLO-10   Able to apply business, industrial, economic, social, health or environmental statistical methods to real problems

COURSE LEARNING OUTCOME

CLO.1   Able to describe the concept of inferential statistics for the biological, environment, medical/health and agriculture data

CLO.2   Able to use the biological, environment, medical/health and agriculture y data to solve the task

CLO.3   Able to formulate problem-solving in analyzing biological, environment, medical /health and agriculture data with the appropriate interpretation

CLO.4   Able to identify, formulate, and solve the biostatistics and epidemiology problems

CLO.5   Able to use computational technique and modern computer, including selecting the appropriate method that used in solving the case of biological, environment, medical/health and agriculture data

CLO.6   Gain insight about the current issue and upcoming issue relating to the biostatistics

CLO.7   Able to communicate effectively and collaborate with the teams in interdisciplinary and multidisciplinary

CLO.8   Practice responsibilities and professional ethics

CLO.9   Able to motivate themself to think creatively and lifelong learning

MAIN SUBJECT

1. Application of statistical methods in medical/health data in general

2. Descriptive statistics in biostatistics studies

3. Discrete or continuous random variable out of a random event and its probability

4. Parameter estimation, point and interval, and hypothesis testing for real problems

5. Test for parameters using nonparametric methods
6. Test the categorical data
7. Inference statistics on multisample
8. Introduction and overview of goals of epidemiologic research and epidemiologic study designs
9. Measures of disease occurrence and association : a. Different rates, b. Inferences for rates, c. Comparing two rates, d. 2×2 table, e. 2 χ test and Fisher's exact test, f. R×C table, g. Relative risk and odds ratio, h. Inferences for relative risk and odds ratio
10. Control of extraneous factors: a. Confounding and interaction, b. Mantel-Haenszel method, c. Analysis of matched data- McNemar's test, d. Measure of agreement- Kappa statistic
11. Logistic regression: a. Concepts, b. Model and assumption, c. Interpretation of regression coefficients, d. Inferences, e. Likelihood ratio test, f. Goodness-of-fit test, g. Residual plot

PREREQUISITE

Introduction to Statistical Methods, Introduction to Probability Theory, Nonparametric Statistics, Categorical Data Analysis

REFERENCES

1. Rosner, Bernard. 2016. Fundamentals of Biostatistics. 8th edition. Thomson Brooks/Cole.
2. Jewel, NP. 2004. Statistics for Epidemiology. Chapman & Hall/CRC.
3. MacFarland, Thomas W. & Yates, Jan M. 2021. Using R for Biostatistics. Springer.
4. Wassertheil-Smoller, S. 2015. Biostatistics and Epidemiology: A primer for healt and biomedical professionals. Springer.
5. Breslow NE, Day NE (1980). Statistical Methods in Cancer Research, Vol. I, The Analysis of Case- Control Studies. International Agency for Research on Cancer, Lyon.
6. Breslow NE, Day NE (1987). Statistical Methods in Cancer Research, Vol. II, The Design and Analysis of Cohort Studies. International Agency for Research on Cancer, Lyon.
7. Hosmer DW, Lemeshow S (1989). Applied Logistic Regression, John Wiley & Sons.