

9. Module IX: Scientific Thinking

9.1. Module Objectives

On completion of this module, the students will:

- Understand basic methods for experiment design, data analysis, and presenting data in summary form in microbiological research;
- Able to assess a situation involving state the nature of the biological question and the null and alternative hypotheses proposed, decide on the correct statistical procedure to test the null hypothesis and assumptions of the test used, calculate the statistic, assess its statistical significance, and interpret the data in light of calculated result

9.2. Module Data

Person in charge	Dr. RamadHani Eka Putra
Total Credits	3
Course	BM225 Statistic for Microbiogy
Modul Examination	Written Test

9.2.1. Sub-module I: Statistic for Microbiology

Lecturer	Dr. Ramadhani Eka Putra
Semester	4
Type of submodule / course	Lecture with exercises
Credits	3
Workload:	3 hours lectures, 3 hours structured activities, 3 hours individual study, 16 weeks per semester, and total 144 hours a semester
Workload details	Textbook reading assignment, case studies, and group discussion
Classification within the curriculum:	General Studies / Compulsory Course/ Elective Course
Type of assessment/examination	Written Test : Midterm exam, Final exam, Quizess, Assignments
Language	Bahasa Indonesia
Course Target / Outcome	The students will have the ability to : <ul style="list-style-type: none">• Define and describe the basic methods statistic in microbiological research• Apply statistical methods to interpret data of microbiology research

Teaching methods	Interactive Teaching
Contents (SAP)	
1	Introduction
2	Basic Statistic
3	Data Distribution
4	Esperimental Design
5	Writing test I (Case Study)
6	Testing difference between two groups I
7	Testing difference between two groups II
8	Chi-square contingency tables
9	Writing test II (Case Study)
10	Hypothesis test (single factor)
11	Writing test III (Case Study)
12	Hypothesis test (two factors) I
13	Hypothesis test (two factors) II
14	Hypothesis test (multi factorial) I
15	Hypothesis test (multi factorial) II
16	Final Test
Literature / Sources	<ul style="list-style-type: none"> • Black, J. 2007. Microbiology: Principles and Applications, 7th ed. John Wiley. • Madigan, M. T., J. M. Martinko & J. Parker, 2006. Brock Biology of Microorganisms, 11th ed. Pearson Prentice Hall International, Inc., New Jersey • Pelczar, M. J. E. C. S. Chan & N. R. Krieg, 1993, Microbiology concept and application, McGraw Hill, Inc., Toronto