



UNIVERSITAS SEBELAS MARET
FACULTY OF TEACHER TRAINING AND EDUCATION
BACHELOR OF BIOLOGY EDUCATION STUDY PROGRAM

Building D 3rd Floor FTTE UNS Jl Ir. Sutami No. 36 A Ketingan Surakarta 57126 Indonesia

E-mail: biologi@fkip.uns.ac.id; Website: <https://biologi.fkip.uns.ac.id/en/>

Introduction to Sciences and Mathematic

Undergraduate Programme in Biology Education

Module Handbook

Module Name	Introduction to Sciences and Mathematics (Pengantar Sains dan Matematika)																			
Module level	Undergraduate Programme																			
Course Code	02013242005																			
Abbreviation, if applicable	-																			
Courses included in the module, if applicable	-																			
Semester/Term	2 nd																			
Module coordinator (s)	Anif Jamaluddin, S.Si., M.Si. Ph.D.																			
Lecturer (s)	Anif Jamaluddin, S.Si., M.Si. Ph.D. Arum Nur Wulandari, S.Pd., M.Pd.																			
Language	Bahasa Indonesia (Indonesian Language)																			
Classification within the curriculum	Compulsory/ Elective																			
Teaching format/class hours per week during the semester	Direct instruction/face to face/blended learning: 22.67 h/week: lecture, discussion, workshop Structured Activity: 34 h/week (Through the analysis of journal articles and learning measurement, students learn how to use mathematics in problem solving in biology.) Self-study Activity: 34h/Week (Students learn introduction to science and mathematic from various sources)																			
Workload	<table><tr><td>Type</td><td>CSU</td><td>Face to Face</td><td>Structured Activities</td><td>Self-study</td></tr><tr><td>T</td><td>2</td><td>22.67h (0.75 ECTS)</td><td>34h (1.12 ECTS)</td><td>34h (1.12 ECTS)</td></tr><tr><td>Total</td><td>2</td><td colspan="3">90.67h (3 ECTS)</td></tr></table>					Type	CSU	Face to Face	Structured Activities	Self-study	T	2	22.67h (0.75 ECTS)	34h (1.12 ECTS)	34h (1.12 ECTS)	Total	2	90.67h (3 ECTS)		
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Total	2	90.67h (3 ECTS)																		
Credit Points	2 CSU (3 ECTS)																			
Requirements	-																			
Learning goals/competencies	PLO 1 They are able to demonstrate their fundamental knowledge in science and mathematics and relates																			



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	to problems in biology PLO 7 They are able to solve problems and present the idea argumentatively. CLO 1 Apply mathematical principles and concepts in understanding biological phenomena (e.g. Fibonacci rules for understanding order in living things) and solving biological problems CLO 2 Apply descriptive statistical principles and probabilities related to biology and its learning in problem-solving activities CLO 3 Explaining the scope of science and interdisciplinary science CLO 4 Apply interdisciplinary principles of science in problem solving <table><tr><th>CLO/ PLO</th><th>P L O 1</th><th>P L O 2</th><th>P L O 3</th><th>P L O 4</th><th>P L O 5</th><th>P L O 6</th><th>P L O 7</th><th>P L O 8</th><th>P L O 9</th><th>P L O 10</th></tr><tr><td>CLO1</td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CLO2</td><td>*</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CLO3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td></tr><tr><td>CLO4</td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td></tr></table>	CLO/ PLO	P L O 1	P L O 2	P L O 3	P L O 4	P L O 5	P L O 6	P L O 7	P L O 8	P L O 9	P L O 10	CLO1	*										CLO2	*										CLO3							*				CLO4							*			
CLO/ PLO	P L O 1	P L O 2	P L O 3	P L O 4	P L O 5	P L O 6	P L O 7	P L O 8	P L O 9	P L O 10																																														
CLO1	*																																																							
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Content	1. Types of diabetes, its causes and physiological mechanisms, reviewing and analyzing literature (research journals) about experimental animals in diabetes research, communicating the results of analysis in written (paper) and oral form (group presentation) 2. Types of experimental animals for diabetes research in vivo, explaining induction techniques of diabetes induction techniques in experimental animals, calculating /determining inductance/diabetagen doses, understanding the experimental animal markers, ethical clearance and its preparation. 3. Hormone analysis techniques and protein expression both in plasma, serum or organs of diabetic animals 4. organ structures (pancreas, ren, liver) which are heavily influenced by diabetes conditions and are able to perform problem-solving analysis related to diabetes and experimental animals.																																																							



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Attribute Soft skill	1. Able to think conceptually, analytically, and logically 2. Have good communication skills 3. Able to solve problem and present the idea argumentatively												
Study/exam achievements	Students are required to attend the face-to-face lecture minimum 75% to be able to take the Mid and Final exam. It is considered to complete the course and pass if students obtain at least 60% of maximum final score. The final score (FS) is calculated based on the following ratio: <table><tr><th>Aspect</th><th>(%)</th></tr><tr><td>Task/quiz/presentation</td><td>30</td></tr><tr><td>Participation</td><td>10</td></tr><tr><td>Mid-Term Test</td><td>30</td></tr><tr><td>Final Exam</td><td>30</td></tr><tr><td>Final Score</td><td>100</td></tr></table>	Aspect	(%)	Task/quiz/presentation	30	Participation	10	Mid-Term Test	30	Final Exam	30	Final Score	100
Aspect	(%)												
Task/quiz/presentation	30												
Participation	10												
Mid-Term Test	30												
Final Exam	30												
Final Score	100												
Form of Media	Powerpoint slide, article, specimen												
Literature (primary references)	1. Sismondo, Sergio. (2007). <i>An Introduction to Science and Technology Studies</i>. United States: John Wiley and Sons. 2. Blomberg, Clas. (2007). <i>Physics of Life: The Physicst's Road to Biology</i>. Amsterdam: Elsevier 3. Cuyper, M.D and Bulte, Jeff W.M. (2002). <i>Physics and Chemistry Basis of Biotechnology</i>. Dordrecht: Kluwer Academic Publishers 4. Douglas & Runger. (2003). <i>Applied Statistics and Probability for Engineers</i>. United States: John Wiley & Sons 5. Sudjana. (2005). <i>Metoda Statistika</i>. Tarsito 6. Pramesti, Getut. (2014). <i>Kupas Tuntas Data Penelitian dengan SPSS 22</i>. Jakarta: Elex media kumputindo 7. Anwar, Ali. (2009). <i>Statistika untuk Penelitian dan Aplikasinya dengan SPSS dan Excel</i>. Kediri: IAIT Press 8. Suwarjeni, V. Wiratna. (2008). <i>Belajar SPSS untuk Penelitian Mahasiswa dan Umum</i>. Yogyakarta: Ardana Media 9. Arianto, Agus. (2004). <i>Statistik Konsep Dasar, Aplikasi,</i>												



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	<i>dan Pengembangannya</i>. Jakarta: Kencana Prenadamedia Group 10. Sugiyono. (2013). <i>Metode Penelitian Kuantitatif, Kualitatif dan R & D</i>. Bandung: Alfabeta
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RUBRIC ASSESSMENT

Basic Assessment	Assessment techniques	Indicators, Criteria (taxonomy)	Valuation Weight
Task	Written Test	1. Know the concept of science 2. Understand history and science development 3. Knowing interaction science in society	10%
Case method, team based project	Participation, performances	1. Knowing the concept basic physics includes mechanic thermodynamic and electricity 2. Understand modern physics 3. Conducting analysis application of physics in the field biology	10%
Case method, team based project	Participation, performances	1. Knowing interdisciplinary science 2. Understand and learn development of science across field 3. Conduct studies and present across disciplines of design from reputable journals	10%
Team based project, Task	Performances	Students are able to Mastering the concept of science	10%
Case method	Participation	Liveliness in the discussion and the quality of ideas	20%



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Case method	Participation	Liveliness in the discussion and the quality of ideas	5%
Case method	Participation	Liveliness in the discussion and the quality of ideas	5%
Team Based Project	Performances	Breaking up the problem In biology with Applying the concept parametric/nonparametric statistics	5%
Final Exam	Written Test	Accuracy, clarity, and traceability of written test answers	25%

MID TEST INTRODUCTION TO SCIENCE AND MATHEMATIC

Tuesday, April 13 2021

Instruction:

1. Write the answer in the paper and write your name and ID Number
2. Copy this text below:

I declare that the following work is the result of my own thoughts and not from the results of cheating, because I believe in my own abilities.

3. Use clear stationery because the answer sheet will later be scanned
4. Make sure all questions are answered, thoroughly before collecting
5. Compile photos in 1 pdf file, making sure all answers are completed
6. Name file : **Full Name _ Class A/B/C_ID Number**

Questions:

1. A massive spread of the disease caused by food, especially salmonella enteritidis content. An expert wanted to create descriptive statistics by taking a sample of 9 from an ice cream maker and the salmonella enteritidis content was calculated (in MPN/g). Data:

0.59; 0.14; 0.31; 0.69; 0.23; 0.78; 0.51; 0.39; 0.41

Calculate the average, Q1, and average deviations from the data! **[Score 10]**

2. A cross of a rat species produces a new sapling presented in the following table!

Color	Size		
	Small	Medium	Big
White	11	5	7
Gray	5	9	10



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Black	8	6	9
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From the results of the cross was taken 1 sample. What are the odds if:

- a. Picked up gray and medium mice
 - b. Picked up black or small mice
 - c. Picked up black mice if it is known that the size is small **[score 10]**
3. The 13 brands of cigarettes that were randomly selected and their nicotine levels measured in mg were as follows:

7.3	8.6	10.4	9.5	16.5	12.2
11.5	8.1	11.5	9.3	9.2	8.5
10.5					

With a significance level of 5%, test the hypothesis whether the average nicotine level in cigarettes exceeds 9, if it is known that the nicotine levels of cigarettes are distributed normally! **[score 20]**

4. In a biological experiment 3 concentrations of chemicals were used to stimulate the growth of a particular type of plant over a period of time. The following growth data, in centimeters, is recorded from living plants. Is there a noticeable difference in average growth caused by these three chemical concentrations? Use the significant level of 0.05. **[score 20]**

Concentration		
1	2	3
6.5	5.5	6
7	8	6.5
6	6.5	5
5.5	6	6
8	7	7
	4.5	5.5

5. In the article Technometrics (Narula & JF Jellington in Montgomery 2003: 381) investigates the effect of taxes on the sale price of homes. With spss obtained the following output:



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Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.569 ^a	.323	.248	2.4125

a. Predictors: (Constant), pajak

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.043	1	25.043	4.303	.068 ^a
	Residual	52.383	9	5.820		
	Total	77.425	10			

a. Predictors: (Constant), pajak

b. Dependent Variable: harga

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	18.519	5.457		3.394	.008			
	pajak	2.144	1.034	.569	2.074	.068	.569	.569	.569

a. Dependent Variable: harga

With the output as above do a complete regression analysis!

Use $\alpha=5\%$ [score 20]

6. Students of the P. Biology study program want to assess the performance of the chairman of the association as long as the chairman of the association is still serving as the chairman of the association in the study program. Samples were taken as many as 20 students to assess before and after the election of the chairman of the association. The data used is in the form of a nominal scale, namely: like it or not. Here are the results of a survey of 20 students. Investigate with $\alpha = 5\%$, whether there is a difference in judgment before and after the election of the chairman set? [score 20]

Assessor name	Before election	After election
Aini	Like	Not like
Udin	Like	Not like
Zuhra	Like	Not like
Rudi	Not like	Like
Susi	Like	Like
Vera	Like	Like
Roby	Not like	Not like
Ihsan	Like	Like
Rival	Like	Like
Fitria	Like	Like



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Hengky	Like	Not like
Husnul	Not like	Not like
Idami	Not like	Like
Putra	Like	Like
Randy	Like	Like
Rahmi	Not like	Not like
Melani	Like	Not like
Amelia	Not like	Not like
Ocy	Not like	Like
Fauzy	Like	Like