

Module designation	Statistics
Module level, if applicable	Undergraduate
Code, if applicable	PBIOUM6105
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Even semester
Person responsible for the module	Dr. Sulisetijono, M.Si
Lecturer	Dr. Sulisetijono, M.Si, Dr. Vivi Novianti, M.Si, Nur'aini Kartikasari, S.Si, M.Sc, Indra Kurniawan Saputra, S.Si, M.Si
Language	<i>Bahasa Indonesia</i>
Relation to curriculum	Undergraduate degree program, compulsory, 2 <sup>nd</sup> semester.
Type of teaching, contact hours	Undergraduate degree program: cooperative learning, 2 x 50 = 100 minutes
Workload	1. Lectures: 2 x 50 = 100 minutes (1.67 hours) per week. 2. Exercises and Assignments: 2 x 60 = 120 minutes (2 hours) per week. 3. Private study: 2 x 60 = 120 minutes (2 hours) per week.
Credit points	2 credit points (~3 ECTS-eq)
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to be eligible for the final examination.
Recommended prerequisites	-
Module objectives/intended learning outcomes	Students are able to: (LO2) Master basic science concepts and scientific procedures to find, analyze problems/natural phenomena in the field of science, which is carried out carefully, critically, and systematically.
Course learning activity	1. Acquiring sensitivity in finding, analyzing and solving biological problems that require solving with statistics through the application of knowledge of descriptive and inferential statistics principles. 2. Finding and looking for alternative statistical tests that are in accordance with problems in the field of biology. 3. Determining procedural steps, analyzing, and solving

	<p>biological problems by applying descriptive and inferential statistical studies both using manual calculations and using data processing programs.</p> <p>4. Determining the steps to obtain statistical data based on problems in the field of biology.</p> <p>5. Making decisions based on accurate statistical tests to solve problems in the field of biology</p>	
Content	<p>This course covers the following main topics:          Definition of Statistics; Scope of Statistical; Data: Type, Collection, Presentation; Type of variables; Descriptive Statistics of Measures of Central Tendency: Mean (mean), Median, Mode, Midrange; Descriptive Statistics of Dispersion Measures: Range, Variance and Standard Deviation; Estimated Confidence Interval Mean, Standard of Error (Standard error) of the Mean; Presentation of Quantitative and Qualitative Data: Tables and Graphs; Basics of Probability; Probability Distribution: Binomial, 2 (chi square), Normal Distribution; Normal Curve Application; Population and Sample; Sampling Distribution; Hypotheses: one-tail and two-tail; Two-Mean Difference Test (hypothesis test): paired and unpaired t-test with the same variance, Test of homogeneity of variance (F-max); Test for Differences of More than Two Means: Analysis of Variance with one independent variable (one way); Analysis of Variance with two independent variables (two way); Conduct a post-hoc test: Fisher's least significant difference test (Fisher's LSD), the Tukey's honestly significant difference test (Tukey's HSD), Duncan's Multiple Range Test (DMRT), Scott-Knott; Principles of Data Transformation; Correlation and Regression: Simple and Multiple; Partial Regression; Principles and Stages of Covariance Analysis; Test for data normality, homogeneity of variance, and data linearity; Non-parametric statistics: 2 test (Chi Square), Wilcoxon test, Kruskal-Wallis test; Use of Computers for Data Presentation and Statistical Testing: Excel and SPSS Programs.</p>	
Learning activity	Week 1	<ul style="list-style-type: none"> <li>● Introduction; handbook modules; Lecture rules</li> <li>● CHAPTER I: Differences in the meaning of statistics and statistics; Scope of statistical</li> <li>● CHAPTER II: Types of statistical data according to their nature; Types of quantitative data; Data sources, Collections; Types of data according to the measurement data scale (NOIR: nominal, ordinal, interval, ratio); Data collection technique.</li> <li>● Reading Assignments</li> </ul>
	Week 2	<ul style="list-style-type: none"> <li>● CHAPTER III: Types of population and sample</li> <li>● CHAPTER IV: Presentation of Quantitative and Qualitative Data: Tables and Graphs</li> </ul>

		<ul style="list-style-type: none"> <li>● Assignment of Exercises</li> </ul>
Week 3		<ul style="list-style-type: none"> <li>● Continued CHAPTER IV: Tables &amp; Distribution Tables; Graphs/Diagrams; Creating categories from ordinal scores</li> <li>● Assignment of Exercises</li> </ul>
Week 4		<ul style="list-style-type: none"> <li>● CHAPTER V: Descriptive statistics: <ul style="list-style-type: none"> <li>○ measure of central tendency</li> <li>○ measure of dispersion</li> </ul> </li> <li>● Assignment of Exercises</li> </ul>
Week 5		<ul style="list-style-type: none"> <li>● CHAPTER VI: Basics of Normal Distribution Probability; Various hypotheses</li> <li>● Assignment of Exercises</li> </ul>
Week 6		<ul style="list-style-type: none"> <li>● CHAPTER VII: Paired and unpaired t-test</li> <li>● Assignment of Exercises</li> </ul>
Week 7		<ul style="list-style-type: none"> <li>● CHAPTER VIII: Analysis of Variance with one independent variable (one way) with replication equal and unequal CHAPTER IX: Conduct a post-hoc test: Fisher's least significant difference test (Fisher's LSD), the Tukey's honestly significant difference test (Tukey's HSD), Duncan's Multiple Range Test (DMRT), Scott-Knott</li> <li>● Assignment of Exercises</li> </ul>
Week 8		MIDTERM EXAMINATION
Week 9		<ul style="list-style-type: none"> <li>● CHAPTER X: Analysis of Variance with two independent variables (two way) and post-hoc test</li> <li>● Assignment of Exercises</li> </ul>
Week 10		<ul style="list-style-type: none"> <li>● CHAPTER XI: Test for normality of data distribution, homogeneity of variance; CHAPTER XII: Data transformation; CHAPTER XIII: Correlation and simple linear regression</li> <li>● Assignment of Exercises</li> </ul>
Week 11		<ul style="list-style-type: none"> <li>● CHAPTER XIII: Correlation and multiple linear regression; Partial correlation; Data linearity test</li> </ul>
Week 12		<ul style="list-style-type: none"> <li>● CHAPTER XIII: Correlation and regression with the same observation X; Correlation and non-linear regression</li> <li>● Assignment of Exercises</li> </ul>
Week 13		<ul style="list-style-type: none"> <li>● CHAPTER XIV: Analysis of Covariance</li> <li>● Assignment of Exercises</li> </ul>
Week 14		<ul style="list-style-type: none"> <li>● CHAPTER XIV: Continuation of Covariance Analysis</li> <li>● CHAPTER XV: Non-parametric Statistics: Test 2 (Chi Square); Sign Test</li> <li>● Assignment of Exercises</li> </ul>

	Week 15	<ul style="list-style-type: none"> <li>• CHAPTER XV: Non-parametric Statistics: The Mann-Whitney Test; Spearman Correlation Test; Kruskal-Wallis test;</li> <li>• Review</li> </ul>
	Week 16	FINAL EXAMINATION
Study and examination requirements and forms of examination	<p>Activities: attendance, presentation-question-and-answer (S1) = 15%</p> <p>Structure task report, assignment (S2) = 25%</p> <p>Midterm examination (S3) = 20%</p> <p>Practice test (S4) = 20 %</p> <p>Final examination (S5) = 20%</p>	
Media employed	LCD, Whiteboard, Sipejar	
Reading List	<ol style="list-style-type: none"> <li>1. Brombin, C., Salmaso, L., Fontanella, L. &amp; Fusilli, L. I. C. 2016. <i>Parametric and Nonparametric Inference for Statistical Dynamic Shape Analysis with Applications</i>. Heidelberg New York Dordrecht London: Springer International Publishing.</li> <li>2. Djarwanto, Ps. 2015. <i>Statistik Nonparametrik</i>. Yogyakarta: BPFE.</li> <li>3. Gomez, K.A. &amp; Gomez, A.A. 2007. <i>Statistical Procedures for Agricultural Research</i>. John Wiley and Sons. NewYork.</li> <li>4. Hanafiah, Ali Kemas. 2018. <i>Rancangan Percobaan Aplikatif</i>. Jakarta: PT. RajaGrafindo Persada.</li> <li>5. Kemendikbud. 2014. <i>Modul Pembelajaran SPSS (Statistical Package for the Social Sciences)</i>. Jakarta: Pusat Data dan Statistik Pendidikan Kementerian Pendidikan dan Kebudayaan Republik Indonesia. <a href="http://sdm.data.kemdikbud.go.id/upload/files/Modul%20Pembelajaran%20SPSS%2019%20-%20Bagian%201.pdf">http://sdm.data.kemdikbud.go.id/upload/files/Modul%20Pembelajaran%20SPSS%2019%20-%20Bagian%201.pdf</a></li> <li>6. Sahid. 2010. <i>Analisis Data Statistiks dengan MS Excel</i>. <a href="http://statistikbisnis.narotama.ac.id/download_berita/Analisis%20Data%20Statistiks%20dengan%20MS%20Excel.PDF">http://statistikbisnis.narotama.ac.id/download_berita/Analisis%20Data%20Statistiks%20dengan%20MS%20Excel.PDF</a></li> <li>7. Santosa, Ratno D. &amp; Kusnadi, M.H. 2012. <i>Analisis Regresi</i>. Yogyakarta: Penerbit Andi Offset.</li> <li>8. Sastrosupadi, Adji. 2018. <i>Rancangan Percobaan Praktis Bidang Pertanian</i>. Edisi Revisi. Yogyakarta: Penerbit Kanisius.</li> <li>9. Sastrosupadi, Adji. 2018. <i>Penggunaan Regresi, Korelasi, Koefisien Lintas, dan Analisis Lintas</i>. Malang: Penerbit Bayumedia Publishing.</li> <li>10. Scheffler, W.C. 1987. <i>Statistika untuk Biologi, Farmasi, Kedokteran, dan Ilmu yang Bertautan</i>. Alih Bahasa oleh Suroso. 1987. Bandung: Penerbit ITB.</li> </ol>	

	<ol style="list-style-type: none"> <li>11. Sokal, R.R. &amp; Rohif, F.J. 1981. <i>Pengantar Biostatistika</i>. Alih Bahasa oleh Basrullah. 1991. Yogyakarta: UGM.</li> <li>12. Steel, R.G.D. &amp; Torrie, J.H. 1991. <i>Prinsip dan Prosedur Statistika: suatu pendekatan biometrik</i>. Alih Bahasa oleh Bambang Sumantri.1991. Jakarta: PT Gramedia.</li> <li>13. Subali, B. 2016. <i>Biometri</i>. Jakarta: Pusat Penerbitan Universitas Terbuka.</li> <li>14. Sugiarto. 2017. <i>Analisis Regresi</i>. Yogyakarta: Penerbit Andi Offset.</li> <li>15. Sulisetijono. 2020. <i>Bahan Ajar Matakuliah: Statistika untuk Biologi dan Ilmu-ilmu yang Bertautan</i>. Malang: FMIPA UM.</li> <li>16. Usman, H. &amp; Akbar, R.P.S. 2020. <i>Pengantar Statistika</i>. Jakarta: Bumi Aksara.</li> </ol>
Date of last amendment made	January, 2022