UNESA	**Universitas Negeri Surabaya** **Faculty of Mathematics and Natural Sciences** **Biology Undergraduate Study Program**	**Document Code**

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Biostatistics and Biocomputers	4620103036	Compulsory Study Program Subjects	**T=3**	**P=0**	**ECTS=4.77**	3	April 27, 2023

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Prof.Dr.Ir. Dyah Hariani, M.Si	Prof.Dr.Ir. Dyah Hariani, M.Si	Dr. H. Sunu Kuntjoro, S.Si., M.Si.

Learning model	**Project Based Learning**

Program Learning Outcomes (PLO)

PLO study program which is charged to the course	
PLO-6	Able to apply logical, critical, systematic and innovative thinking in the context of developing or implementing science and/or technology according to their field of expertise.
PLO-7	Able to work independently and collaboratively, as well as responsibly, in completing various tasks in class, in the laboratory and in the field.
PLO-10	Able to design and conduct experiments in the field of biology, manage, analyze, interpret, document and store research data, to manage biological natural resources
Program Objectives (PO)	
PO - 1	Able to demonstrate knowledge related to biostatistics and biocomputers
PO - 2	Able to demonstrate and apply MS Excel and SPSS software in the field of biology
PO - 3	Able to design research experiments and analyze collected data
PO - 4	Able to apply transferable skills to develop environmental commitment in an effort to realize the character of "Faith, Smart, Independent, Honest, Caring and Tough"
PO - 5	Able to show a responsible attitude and be able to work independently and collaborate in completing biostatistics and biocomputer tasks

PLO-PO Matrix

P.O	PLO-6	PLO-7	PLO-10
PO-1			
PO-2			
PO-3			
PO-4			
PO-5			

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PO-1																
PO-2																
PO-3																
PO-4																
PO-5																

Short Course Description	This course examines the basics of biostatistics in practice and computer-based research, including: data form, data organization, central tendency and data distribution including average, standard deviation, variation; normal distribution; hypothesis testing, analysis of variance, experimental design of one factor (RAL, RAK and Other Squares) and two or more factors (Split Plot design and Strip Plot Design), correlation-regression analysis, covariance analysis, and nonparametric statistics. Lectures are delivered using a student-centered approach in practicum activities and assignments; while the practicum is carried out using a computer program. These two learning activities are carried out to facilitate students to work honestly and independently.

References	**Main :**	
	1. 1. Steel JH dan Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp 2. 2. Montgomery, D.C. 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc 3. 3. Kadir. 2017. Statistika Terapan: Konsep, Contoh dan Analisis Data dengan Program SPSS/Lisrel dalam Penelitian. Depok: Edisi Ketiga. Rajawali Pers 4. 4. Hariani D, Ambarwati R, Purnama ER, 2019. Buku Ajar Mahasiswa: Biostatistika dan Biokomputer. Surabaya: Unesa Press 5. 5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education,Inc. 6. 6. Kusriningrum-RS, 2008. Perancangan Percobaan. Surabaya: Airlangga University Press.	
	Supporters:	
	1. Artikel-artikel yang relevan	
Supporting lecturer	Prof. Dr. Ir. Dyah Hariani, M.Si. Erlix Rakhmad Purnama, S.Si., M.Si. Putut Rakhmad Purnama, S.Si, M.Si. Fitriari Izzatunnisa Muhaimin, B.Sc., M.Sc.	

Week-	**Final abilities of each learning stage (Sub-PO)**	**Evaluation**		**Help Learning, Learning methods, Student Assignments, [Estimated time]**		**Learning materials [References]**	**Assessment Weight (%)**
		Indicator	**Criteria & Form**	**Offline (*offline*)**	**Online (*online*)**		
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
1	Understand the meaning of statistics and its benefits. Understand the concept of data and measurement scales	a. Explain the meaning of statistics b. Explain the benefits of statistics c. Explain the meaning of data and types of data d. Give examples of each type of data e. Distinguish between data measurement scales	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method: Student centered Method: Discussion (2x50') Paktek (1x150') Students work on assignments, discussion 3 X 50	•Visiting the website for online lectures •Flipped Learning, asynchronous learning in Sidia •Study of teaching materials •Chat related to identifying types of measurement scales and related to types of statistical tests (2 x 50 minutes) Practice: • Working on LKM •Providing feedback regarding identification of scale types measuring data using statistical tests in research in the field of biology (1 x 150 minutes)	**Material:** Introduction to Biostatistics and Biocomputers **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** Introduction to Biostatistics and Biocomputers **References:** *2. Montgomery, DC 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc* **Material:** Introduction to Biostatistics and Biocomputers **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** Introduction to Biostatistics and Biocomputers **References:**	5%

						4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press **Material:** Introduction to Biostatistics and Biocomputers **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** Introduction to Biostatistics and Biocomputers **References:** *6. Kusriningrum-RS, 2008. Experiment Design. Surabaya: Airlangga University Press.* **Material:** Introduction to Biostatistics and biocomputers References **:**	
2	Understand the use of computers for statistics	a. Explain computer programs that can be used to process data. Operate Excel and SPSS	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method: Student centered Method: Learning: Discussion (2x50') Paktek (1x150') Students install programs to operate MS Office, Excel and SPSS and apply them Students work on assignments and discussions 3 X 50	Visiting the website for online lectures •Flipped Learning, asynchronous learning at Sidia: • Studying teaching materials • Actively discussing in forums • Students install programs to operate MS Office, Excel and SPSS and apply them • Students do assignments, discussions	**Material:** data processing programs **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** data processing programs **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press*	5%

3	1. Understand the concept of data presentation 2. Applying the Ms. program Office to present data	Distinguish between the use of diagrams, graphs and tables for presenting data. Present data using diagrams and graphs using the MS program. Office. Presents data in the form of a frequency distribution table	**Criteria:** ASSIGNMENT with a weight of 30%. UTS with a weight of 20%. Students' activities and responses during learning activities as participation, with a weight of 20%. UAS with a weight of 30%. **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method: Student centered Method: Case Study based learning •Type of data presentation in the form of graphs, tables using MS office programs, such as Excel •Describe the results of data presentation •Discussion (2x50') Practice (1x150') •Students work on assignments and discussions 3 X 50	Visiting the website for online lectures •Flipped Learning, asynchronous learning at Sidia: • Studying teaching materials • Actively discussing in forums (2 x 50 minutes) Practice: • Working on LKM • Students holding discussions	**Material:** presenting data **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** presenting data **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** presenting data **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** Presentation of data **Library:**	5%

4	1. Understand the concept of data concentration measures and data distribution measures 2. Using Ms.Office to calculate the size of the distribution and centering of data	a. Explain data centralization measures. Presenting data using data centering measures. Explain the dimensions of data distribution. Presenting data using data distribution measures. Calculating the mean and standard deviation using Excel and the SPSS program	**Criteria:** ASSIGNMENT with a weight of 30%. UTS with a weight of 20%. Students' activities and responses during learning activities as participation, with a weight of 20%. UAS with a weight of 30%. **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method: Student centered Method: Case Study based learning •Calculating central tendencies, means, normal distribution using MS office programs, such as Excel or SPSS programs •Describing the results of data presentation •Discussion (2x50') Practice (1x150') •Students doing assignments, and discussions 3 X 50	•Visiting the website for online lectures •Flipped Learning, asynchronous learning at Sidia: • Studying teaching materials • Actively discussing in forums (2 x 50 minutes) Practice: • Working on LKM • Students holding discussions	**Material:** the concept of centralized data measures and data distribution measures. **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** concept of centralized data size and data distribution size **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** the concept of centralized data measures and data distribution measures. **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.*	5%

5	Understand and apply the concept of normality test and difference test (t test)	a. Explain the purpose and procedure of normality testing. b. Testing the normality of data. c. Explain the purpose and procedure of the td test. Apply the t test to test the difference between two groups of data. Using Excel and SPSS for normality test and difference test (t test)	**Criteria:** ASSIGNMENT with a weight of 30%. UTS with a weight of 20%. Students' activities and responses during learning activities as participation, with a weight of 20%. UAS with a weight of 30%. **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method: Student centered Method: Case Study based learning •Testing the normality of data using an MS office program, such as Excel or the SPSS program and drawing conclusions •Testing normal data using the SPSS t test •Making conclusions •Discussion (2x50') Paktek (1x150') •Students do assignments and discussions 3 X 50	•Visiting the website for t-test online lectures •Flipped Learning, asynchronous learning in Sidia: • Studying teaching materials • Actively discussing in forums (2 x 50 minutes) Practice: 1x150' • Doing T-Test LKM using SPSS • Students hold discussions	**Material:** Normality test and t test **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** Normality test and t test **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** Normality test and t test **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** Normality test and t test **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** Concepts about normality tests and difference tests (t tests) **References:**	5%
6	1. Understand and apply the concept of simple regression 2. Using Excel and SPSS to test simple regression tests	a. Explain the purpose and procedure of simple regression testing b. Analyzing data using simple regressionc. Using Excel and SPSS to test simple regression tests	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method: Student centered Method: Case Study based learning •Simple regression testing using SPSS •Making conclusions •Discussion (2x50') Practice (1x150') •Students do	Visiting the website for online lectures on simple regression testing •Flipped Learning, asynchronous learning in Sidia: • Studying teaching materials • Actively discussing in forums (2 x 50 minutes) Practice: 1x150' • Working on simple regression testing LKM using SPSS • Students holding discussions	**Material:** Simple Regression **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** Simple Regression **Bibliography:**	5%

				assignments and discussions 3 X 50		*2. Montgomery, DC 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc* **Material:** Simple Regression **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** Simple Regression **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** Simple Regression **References:** *5. Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** Simple Regression **References:** *6. Kusriningrum-RS, 2008. Experimental Design. Surabaya: Airlangga University Press.*	
7	1. Understand and apply the concept of multiple regression 2. Using Excel and SPSS for multiple regression tests	a. Explain the purpose and procedure of multiple regression testing. Analyzing data using multiple regressionc. Using Excel and SPSS to test multiple regression tests	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method: Student centered Method: Case Study based learning •Multiple regression testing using SPSS •Making conclusions •Discussion (2x50') Practice (1x150') •Students do assignments	Visiting the website for online lectures on multiple regression testing •Flipped Learning, asynchronous learning at Sidia: • Studying teaching materials • Actively discussing in forums (2 x 50 minutes) Practice: 1x150' • Working on multiple regression testing LKM using SPSS • Students holding discussions	**Material:** Mutiple regression **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** Mutiple regression	5%

				and discussions 3 X 50		**References:** *2. Montgomery, DC 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc* **Material:** Multiple regression **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** Mutiple regression **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** Mutiple regression **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** Mutiple regression **References:** *6. Kusriningrum-RS, 2008. Experimental Design. Surabaya: Airlangga University Press.* **Material:** Objectives and procedures for multiple regression testingb. Analyzing data using multiple regressionc. Using Excel and SPSS to test multiple regression tests **Library:**	
							10%

8		1.UTS weight 20% 2.Students' activities and responses during learning activities as participation, weight 20%	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** : Participatory Activities, Tests	Learning Method: Student centered Method: Case Study based learning •Multiple regression testing using SPSS •Making conclusions •Discussion (2x50') Practice (1x150') •Students do assignments and discussions 2 X 50	Visiting the website for online lectures on multiple regression testing •Flipped Learning, asynchronous learning at Sidia: • Studying teaching materials • Actively discussing in forums (2 x 50 minutes) Practice: 1x150' • Working on multiple regression testing LKM using SPSS • Students have 2 x discussions 50	**Material:** Mutiple regression **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** Mutiple regression **References:** *2. Montgomery, DC 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc* **Material:** Multiple regression **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** Mutiple regression **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** Mutiple regression **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** Mutiple regression **References:** *6. Kusriningrum-RS, 2008. Experimental Design. Surabaya: Airlangga University Press.*	

						Material: Objectives and procedures for multiple regression testingb. Analyzing data using multiple regressionc. Using Excel and SPSS to test multiple regression tests **Library:**	
9	1. Understand and apply the concept of covariance analysis 2. Use Excel and SPSS to test covariance analysis	a. Explain the purpose and procedure of covariance analysis b. Analyze data using covariance analysis c. Using Excel and SPSS for covariance analysis tests	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method: Student centered Method: Case Study based learning •Testing correlation and analysis using SPSS •Making conclusions •Discussion (2x50') Practice (1x150') •Students do assignments and discussions 3 X 50	Visiting the website for online lectures on correlation and anacova tests •Flipped Learning, asynchronous learning in Sidia • Studying teaching materials • Actively discussing in forums (2 x 50 minutes) Practice: 1x150' • Working on correlation and anacova test worksheets using SPSS • Students hold discussions	**Material:** correlation and co-variance analysis **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** correlation and co-variance analysis **References:** *2. Montgomery, DC 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc* **Material:** correlation and co-variance analysis **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** correlation and co-variance analysis **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:**	5%

						correlation and co-variance analysis **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** correlation and co-variance analysis **References:** *6. Kusriningrum-RS, 2008. Experimental Design. Surabaya: Airlangga University Press*	
10	Understand and apply concepts about experimental design and 1-factor analysis of variance (CRD). Understand and apply the concept of the BNT test. Use the SPSS program to analyze data	1.Designing a 1 factor RAL experimental design Analyzing the variance of experimental data. Analyzing data with the BNT test Using the SPSS program to analyze the data 2.TASK with a weight of 30%	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method: Student centered Method: Case Study based learning •Experimental testing of 1 factor RAL variance analysis using SPSS •Making conclusions •Discussion (2x50') Practice (1x150') •Students work on assignments and 3 X 50 discussions	Visiting the website for online lectures for the 1 factor RAL analysis of variance test •Flipped Learning, asynchronous learning in Sidia: • Studying teaching materials • Actively discussing in the forum (2 x 50 minutes) Practice: 1x150' • Working on the LKM for the 1 factor RAL analysis of variance test using SPSS • Students conduct discussions	**Material:** 1-factor analysis of variance (RAL) **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** 1-factor analysis of variance (RAL) **References:** *2. Montgomery, DC 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc* **Material:** 1-factor analysis of variance (RAL) **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** 1-factor analysis of variance (RAL) **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student*	5%

						Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press **Material:** 1-factor analysis of variance (RAL) **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** 1-factor analysis of variance (RAL) **References:** *6. Kusriningrum-RS, 2008. Experimental Design. Surabaya: Airlangga University Press.*	
11	Understand and apply concepts about experimental design and 1 factor analysis of variance (RCBD, Latin square). Using the SPSS program to analyze data	a. Designing a 1 factor experimental design; RCBD, Latin square b. Analyzing data variants from experimental results c. Using the SPSS program to analyze data	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method: Student centered Method: Case Study based learning •Experimental testing of 1 factor RAK and Latin Square variance analysis using SPSS •Making conclusions •Discussion (2x50') Practice (1x150') •Students work on assignments and 3 X 50 discussions	Visiting the website for online lectures for 1-factor variance analysis test RAK and Latin Square •Flipped Learning, asynchronous learning in Sidia: • Studying teaching materials • Actively discussing in the forum (2 x 50 minutes) Practice: 1x150' • Doing LKM for 1-factor variance analysis test RAK and Latin Square using SPSS • Students conduct 2 X 50 discussions	**Material:** 1-factor analysis of variance (RCBD, Latin square) **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** 1-factor analysis of variance (RCBD, Latin square) **References:** *2. Montgomery, DC 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc* **Material:** 1-factor analysis of variance (RCBD, Latin square) **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press*	5%

						Material: 1-factor analysis of variance (RCBD, Latin square) **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** 1-factor analysis of variance (RCBD, Latin square) **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** 1-factor analysis of variance (RCBD, Latin square) **References:** *6. Kusriningrum-RS, 2008. Experimental Design. Surabaya: Airlangga University Press.*	
12	Understand and apply concepts about experimental design and 1-factor variance analysis (split plot and strip plot). Using the SPSS program to analyze data	a. Designing a 2 factor experimental design: split plot and strip plot b. Analyzing data variants resulting from a 2-factor experiment c. Using the SPSS program to analyze data	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method: Student centered Method: Case Study based learning •Experimental testing of 2 factor variance analysis split plot and strip plot design using SPSS •Making conclusions •Discussion (2x50') Practice (1x150') •Students work on assignments and 3 x discussions 50	Visiting the website for online lectures for 2-factor split plot and strip plot design variance analysis tests •Flipped Learning, asynchronous learning in Sidia: • Studying teaching materials • Actively discussing in forums (2 x 50 minutes) Practice: 1x150' • Doing LKM for variance analysis tests 2 factor split plot and strip plot design using SPSS • Students conduct discussions	**Material:** 2-factor analysis of variance (split plot and strip plot) **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** 2-factor analysis of variance (split plot and strip plot) **References:** *2. Montgomery, DC 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc* **Material:** 2-factor analysis of variance (split plot and strip plot) **References:** *3. Kadir. 2017. Applied*	5%

						Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press **Material:** 2-factor analysis of variance (split plot and strip plot) **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** 2-factor analysis of variance (split plot and strip plot) **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** 2-factor analysis of variance (split plot and strip plot) **References:** *6. Kusriningrum-RS, 2008. Experimental Design. Surabaya: Airlangga University Press.*	

13	1. Understand the concept of nonparametric statistical tests 2. Understand and apply the concept of the Wilcoxon signed rank test 3. Understand and apply the concept of the Spearman correlation test 4. Use the SPSS program to analyze data	a. Explain various types of non-parametric statistics b. Explain the requirements of the Wilcoxon signed rank test c. Analyze the data using the Wilcoxon d signed rank test. Explain the requirements for the Spearman correlation test e. Analyzing data using sperm correlation f. Using the SPSS program to analyze data	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method : Student centered Method: Case Study based learning •Experimental testing analysis of non-parametric statistical tests Wilcoxon signed rank and Spearman correlation test using SPSS Making conclusions •Discussion (2x50') Practice (1x150') •Students work on assignments and discussions 3 X 50	Visiting the web for online lectures non-parametric statistical test Wilcoxon signed rank and Spearman correlation test using SPSS •Flipped Learning, asynchronous learning in Sidia: • Studying teaching materials • Actively discussing in forums (2 x 50 minutes) Practice: 1x150' • Working on LKM Wilcoxon signed rank test and test using SPSS • Students conduct discussions	**Material:** the Wilcoxon signed ranking test the Spermman correlation **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** the Wilcoxon signed ranking test the Spermman correlation **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** the Wilcoxon signed ranking test the Sperm correlation **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** the Wilcoxon signed ranking test the Spermman correlation **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.*	5%
14	Understand and apply the concept of the Chi-Square test. Use the SPSS program to analyze data	Differentiating the use of the Chi-Square test: goodness of fit and contingency tables Analyzing data using the Chi-Square test: goodness of fit and contingency tables Using the SPSS program to analyze data	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** :	Learning Method : Student centered Method: Case Study based learning •Experimental testing analysis of non-parametric statistical	Visiting the website for online lectures on non-parametric statistical tests Chi-Square tests using SPSS •Flipped Learning, asynchronous learning in Sidia: • Studying teaching materials • Actively discussing in forums (2 x 50 minutes)	**Material:** the Chi-Square test **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp*	5%

			Participatory Activities, Practical Assessment	tests Wilcoxon signed rank and Spearman correlation test using SPSS Making conclusions •Discussion (2x50') Practice (1x150') •Students work on assignments and discussions Method Learning: Student centered Method: Case Study based learning •Experimental testing analysis of non-parametric statistical tests Chi-Square test using SPSS •Making conclusions •Discussion (2x50') Practice (1x150') •Students work on assignments and 3 x discussions 50	Practice: 1x150' • Working on the Chi analysis test worksheet -Square using SPSS • Students conduct discussions	**Material:** the Chi-Square test **References:** *2. Montgomery, DC 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc* **Material:** the Chi-Square test **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** the Chi-Square test **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** the Chi-Square test **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** the Chi-Square test **References:** *6. Kusriningrum-RS, 2008. Experimental Design. Surabaya: Airlangga University Press.*	

15	Understand and apply the concept of the Cruscal Wallis test and Friedman test. Using the SPSS program to analyze data	a. Differentiate the use of the Kruskal Wallis test and the Friedman test b. Analyzing data using the Kruskal Wallis test and Friedman test c. Using the SPSS program to analyze data	**Criteria:** 1.TASK with a weight of 30% 2.UTS weight 20% 3.Students' activities and responses during learning activities as participation, weight 20% 4.UAS weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Learning Method : Student centered Method: Case Study based learning •Experimental testing, analysis of non-parametric statistical tests, Kruskal Wallis test and Friedman test using SPSS •Making conclusions •Discussion (2x50') Practice (1x150') •Students do assignments and discussions 3 X 50	Visiting the website for online lectures on non-parametric statistical tests, Kruskal Wallis test and Friedman test using SPSS •Flipped Learning, asynchronous learning in Sidia: • Studying teaching materials • Actively discussing in forums (2 x 50 minutes) Practice: 1x150' • Working on LKM Kruskal Wallis test and Friedmen test using SPSS • Students conduct discussions	**Material:** the Kruskcal Wallis test and the Friedman test **References:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** the Kruskcal Wallis test and the Friedman test **References:** *2. Montgomery, DC 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc* **Material:** the Kruskcal Wallis test and the Friedman test **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** the Kruskcal Wallis test and the Friedman test **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** the Kruskcal Wallis test and the Friedman test **References:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.*	5%
16		UAS weight 30%	**Criteria:** 1.TASK with a weight of 30%	2X50	2X50	**Material:** All material from Weeks 9-15	20%

				2. UTS weight 20% 3. Students' activities and responses during learning activities as participation, weight 20% 4. UAS weight 30% 5. **Form of Assessment** : Participatory Activities, Tests			**Bibliography:** *1. Steel JH and Torrie DA, 1996. Principle and Procedure Statistics: A Biometrical Approach. New York: McGraw Hill Book Comp* **Material:** All material from Weeks 9-15 **Bibliography:** *2. Montgomery, DC 2001. Design and Analysis of Experiments. 5th Edition. New York: John Wiley & Sons, Inc* **Material:** All material from Weeks 9-15 **References:** *3. Kadir. 2017. Applied Statistics: Concepts, Examples and Data Analysis with the SPSS/Lisrel Program in Research. Depok: Third Edition. Rajawali Press* **Material:** All material from Weeks 9-15 **References:** *4. Hariani D, Ambarwati R, Purnama ER, 2019. Student Textbook: Biostatistics and Biocomputers. Surabaya: Unesa Press* **Material:** All material from Weeks 9-15 **Bibliography:** *5.Weiss, NA. 2017. Elementary Statistics. USA: 10th Edition. Pearson Education, Inc.* **Material:** All material from Weeks 9-15 **References:** *6. Kusriningrum-RS, 2008. Experimental Design. Surabaya: Airlangga University Press.* **Material:** UAS **Literature:**	

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	50%
2.	Practical Assessment	35%
3.	Test	15%
		100%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.