	Universitas Negeri Surabaya **Faculty of Postgraduate School,** **Vocational Education Doctoral Study Program**	**Document Code**

SEMESTER LEARNING PLAN

Courses		**CODE**	**Course Family**	**Credit Weight**			**SEMESTER**	**Compilation Date**
Multivariate Statistics		8300102004		**T=2**	**P=0**	**ECTS=5.04**	1	September 15, 2023
AUTHORIZATION		**SP Developer**		**Course Cluster Coordinator**		**Study Program Coordinator**		
		Prof. Dr. Ekohariadi, M.Pd. dan Dr. Nurmi Frida Dorintan Bertua Pakpahan, M.Pd.		Prof. Dr. Ekohariadi, M.Pd.		Dr. Ratna Suhartini, M.Si.		

Learning model	**Case Studies**																		
Program Learning Outcomes (PLO)	**PLO study program which is charged to the course**																		
	PLO-9	Respect the nationality of culture, views, religion and beliefs, as well as the opinions or findings of other people																	
	Program Objectives (PO)																		
	PO - 1	Mastering theoretical concepts, principles and techniques of multivariate analysis.																	
	PO - 2	Able to use various kinds of multivariate analysis technique software to solve research problems in the field of vocational education.																	
	PO - 3	Examining the results of vocational research using multivariate analysis techniques.																	
	PO - 4	Produce articles on the use of various multivariate analysis techniques.																	
	PLO-PO Matrix																		

P.O	PLO-9
PO-1	
PO-2	
PO-3	
PO-4	

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																

Short Course Description	This course studies analytical methods or statistical tests related to problems with more than one variable (multivariate). Topics studied include two-variable and multivariable regression analysis, variance analysis, MANOVA, path analysis, confirmatory factor analysis, structural equation modeling.

References	**Main :**
	1. Daniels, L., & Minot, N. (2020). An introduction to statistics and data analysis using Stata. London: Sage Pub. 2. Dattalo, P. (2013). Analysis of multiple dependent variables. New York: Oxford University Press. 3. Fraenkel, J.R. & Norman, E.W. (2012). How to design and evaluate research in education (8th Ed.). New York: McGraw-Hill.
	Supporters:

1. Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2019). Multivariate data analysis (8th eds.) . London: Pearson Education Limited.
2. McClelland, M.M, & Acock, A.C. (2013). Relations between preschool attention span-persistence and age 25 educational outcomes. Early Childhood Research Quarterly 28, 314-324.
3. Panneerselvam, R. (2014). Research methodology. New Delhi: PHI Learning Private Limited.
4. Randolph, K.A., & Myers, L.L. (2013). Basic statistics in multivariate analysis. New York: Oxford University Press.
5. Spencer, N.H. (2014). Essentials of multivariate data analysis. New York: CRC Press.
6. Stevens, J.P. (2016). Applied multivariate statistics for the social sciences. New York: Routledges

Supporting lecturer	Prof. Dr. Ekohariadi, M.Pd. Dr. Nurmi Frida Dorintan Bertua Pakpahan, M.Pd. Prof.Dr. Tri Wrahatnolo, M.Pd., M.T.						

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	Students are able to analyze data descriptively	1.Distinguish between categorical and quantitative data. 2.Calculate mean, median and mode. 3.Calculate standard deviation	**Form of Assessment** : Participatory Activities	Lectures, discussions, presentations 2 x 50'		**Material:** Data types, techniques for summarizing quantitative and categorical data. **References:** *Fraenkel, JR & Norman, EW (2012). How to design and evaluate research in education (8th Ed.). New York: McGraw-Hill.*	4%
2	Understanding bivariate correlation	1.Determine the correlation coefficient 2.Explain the concept of linear correlation	**Criteria:** 1.Test: Score 0-100 2.Non test: Score 4 (86 - 100): Very Good; Score 3 (76 - 85): Good; Score 2 (61 - 75): Fair; Score 1 (50 - 60): Poor **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Lecture, discussion, practice 2 x 50'	Lecture, discussion, practice 2 x 50'	**Material:** Correlation coefficient and correlation concept, **References:** *Randolph, KA, & Myers, LL (2013). Basic statistics in multivariate analysis. New York: Oxford University Press.*	5%
3	Understanding linear regression	1.Determining multiple regression coefficients 2.Determine the coefficient of determination	**Criteria:** 1.Full marks are obtained if you complete all assignments correctly and on time. 2.Test: Score 0-100 3.Non test: Score 4 (86 - 100): Very Good; Score 3 (76 - 85): Good; Score 2 (61 - 75): Fair; Score 1 (50 - 60): Poor **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Lecture, discussion, practice 2 X 50	Zoom-meet, lecture, discussion, practice 2 X 50	**Material:** Multiple regression **References:** *Stevens, JP (2016). Applied multivariate statistics for the social sciences. New York: Routledges*	5%

4	Determining logistic regression coefficients	1. Full marks are obtained if you complete all assignments correctly and on time. 2. Test: Score 0-100 3. Non test: Score 4 (86 - 100): Very Good; Score 3 (76 - 85): Good; Score 2 (61 - 75): Fair; Score 1 (50 - 60): Poor	**Criteria:** 5 **Form of Assessment** : Participatory Activities	Lectures, discussions, practices 2 X 50"	Zoom-meet, lecture, discussion, practice 2 X 50"	**Material:** Logistic regression, odds coefficient **References:** *Stevens, JP (2016). Applied multivariate statistics for the social sciences. New York: Routledges*	0%
5			**Criteria:** 1. Full marks are obtained if you complete all assignments correctly and on time. 2. Test: Score 0-100 3. Non test: Score 4 (86 - 100): Very Good; Score 3 (76 - 85): Good; Score 2 (61 - 75): Fair; Score 1 (50 - 60): Poor **Form of Assessment** : Participatory Activities, Practice/Performance	Lectures, discussions, practices 2 X 50"	Zoom-meet, lecture, discussion, practice 2 X 50"	**Material:** Path model using linear regression **References:** *Hair, JF, Black, WC, Babin, BJ, & Anderson, RE (2019). Multivariate data analysis (8th eds.). London: Pearson Education Limited.*	5%
6			**Criteria:** 1. Full marks are obtained if you complete all assignments correctly and on time. 2. Test: Score 0-100 3. Non test: Score 4 (86 - 100): Very Good; Score 3 (76 - 85): Good; Score 2 (61 - 75): Fair; Score 1 (50 - 60): Poor **Form of Assessment** : Participatory Activities, Practice/Performance	Lectures, discussions, practices 2 X 50"	Zoom-meet, lecture, discussion, practice 2 X 50"	**Material:** Path model using structural equation modeling (SEM) techniques **References:** *Hair, JF, Black, WC, Babin, BJ, & Anderson, RE (2019). Multivariate data analysis (8th eds.). London: Pearson Education Limited.*	5%
7			**Criteria:** 1. Full marks are obtained if you complete all assignments correctly and on time. 2. Test: Score 0-100 3. Non test: Score 4 (86 - 100): Very Good; Score 3 (76 - 85): Good; Score 2 (61 - 75): Fair; Score 1 (50 - 60): Poor **Form of Assessment** : Participatory Activities, Practice/Performance	Lecture, discussion, practice 2 x 50'	Zoom-meet, lecture, discussion, practice 2 x 50'	**Material:** Multiple logistic regression coefficients **References:** *Daniels, L., & Minot, N. (2020). An introduction to statistics and data analysis using Stata. London: Sage Pub.*	5%

8	Midterm Exam (UTS)	Complete UTS properly and correctly	**Criteria:** 1. Full marks are obtained if you complete all test items correctly and on time. 2. Test: Score 0-100 **Form of Assessment** : Participatory Activities, Tests	UTS 2 X 50"	UTS 2 X 50"	**Material:** 1st meeting to 7th meeting **References:** *Randolph, KA, & Myers, LL (2013). Basic statistics in multivariate analysis. New York: Oxford University Press.*	15%
9			**Criteria:** Full marks are obtained if you complete all assignments correctly and on time. **Form of Assessment** : Participatory Activities	Lectures, discussions, practices 2 X 50"	Zoom-meet, lecture, discussion, practice 2 X 50"		5%
10			**Criteria:** Full marks are obtained if you complete all assignments correctly and on time. **Form of Assessment** : Participatory Activities	Lectures, discussions, practices 2 X 50"	Zoom-meet, lecture, discussion, practice 2 X 50"		5%
11			**Criteria:** Full marks are obtained if you complete all assignments correctly and on time. **Form of Assessment** : Participatory Activities	Lectures, discussions, practices 2 X 50"	Zoom-meet, lecture, discussion, practice 2 X 50"		5%
12		Can understand structural models	**Criteria:** 1. Full marks are obtained if you complete all assignments correctly and on time. 2. Test: Score 0-100 3. Non test: Score 4 (86 - 100): Very Good; Score 3 (76 - 85): Good; Score 2 (61 - 75): Fair; Score 1 (50 - 60): Poor **Form of Assessment** : Participatory Activities, Practice/Performance	Lectures, discussions, practices 2 X 50"	Zoom-meet, lecture, discussion, practice 2 X 50"	**Material:** Structural models and structural model analysis **References:** *Hair, JF, Black, WC, Babin, BJ, & Anderson, RE (2019). Multivariate data analysis (8th eds.). London: Pearson Education Limited.*	5%
13		Can understand by carrying out exploratory analysis	**Criteria:** 1. Full marks are obtained if you complete all assignments correctly and on time. 2. Test: Score 0-100 3. Non test: Score 4 (86 - 100): Very Good; Score 3 (76 - 85): Good; Score 2 (61 - 75): Fair; Score 1 (50 - 60): Poor **Form of Assessment** : Participatory Activities, Practice/Performance	Lectures, discussions, practices 2 X 50"	Zoom-meet, lecture, discussion, practice 2 X 50"	**Material:** Exploratory factor analysis and factor loading **References:** *Hair, JF, Black, WC, Babin, BJ, & Anderson, RE (2019). Multivariate data analysis (8th eds.). London: Pearson Education Limited.*	5%

No			Criteria			Material/References	
14	Understand multidimensional scaling techniques	Can create scales using multidimensional scaling techniques	**Criteria:** 1. Full marks are obtained if you complete all assignments correctly and on time. 2. Test: Score 0-100 3. Non test: Score 4 (86 - 100): Very Good; Score 3 (76 - 85): Good; Score 2 (61 - 75): Fair; Score 1 (50 - 60): Poor **Form of Assessment** : Participatory Activities	Lectures, discussions, practices 2 X 50"	Zoom-meet, lecture, discussion, practice 2 X 50"	**Material:** Scaling using multidimensional scaling techniques **References:** *Panneerselvam, R. (2014). Research methodology. New Delhi: PHI Learning Private Limited.* **Material:** Scaling using multidimensional scaling techniques **References:** *Spencer, NH (2014). Essentials of multivariate data analysis. New York: CRC Press.*	5%
15		1. Full marks are obtained if you complete all assignments correctly and on time. 2. Test: Score 0-100 3. Non test: Score 4 (86 - 100): Very Good; Score 3 (76 - 85): Good; Score 2 (61 - 75): Fair; Score 1 (50 - 60): Poor	**Criteria:** 1. Full marks are obtained if you complete all assignments correctly and on time. 2. Test: Score 0-100 3. Non test: Score 4 (86 - 100): Very Good; Score 3 (76 - 85): Good; Score 2 (61 - 75): Fair; Score 1 (50 - 60): Poor **Form of Assessment** : Participatory Activities, Practice/Performance	Lectures, discussions, practices 2 X 50"	Zoom-meet, lecture, discussion, practice 2 X 50"	**Material:** explains the results of operating the SEM application in the education sector. **References:** *Hair, JF, Black, WC, Babin, BJ, & Anderson, RE (2019). Multivariate data analysis (8th eds.). London: Pearson Education Limited.*	5%
16	Final Semester Examination (UAS)	Complete the UAS properly and correctly	**Criteria:** 1. Full marks are obtained if you complete all test items correctly and on time. 2. Test: Score 0-100 **Form of Assessment** : Participatory Activities, Tests	UAS 2 X 50"	UAS 2 X 50"	**Material:** 8th meeting to 15th meeting **References:** *Stevens, JP (2016). Applied multivariate statistics for the social sciences. New York: Routledges*	20%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	60.67%
2.	Project Results Assessment / Product Assessment	4.17%
3.	Practice / Performance	16.67%
4.	Test	17.5%
		99.01%

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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.