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

SEMESTER LEARNING PLAN

Courses		**CODE**	**Course Family**	**Credit Weight**			**SEMESTER**	**Compilation Date**
Statistical Methods		4420103082	Compulsory Study Program Subjects	**T=3**	**P=0**	**ECTS=4.77**	1	July 28, 2023
AUTHORIZATION		**SP Developer**		**Course Cluster Coordinator**			**Study Program Coordinator**	
		Danang Ariyanto, S.Si., M.Si		A'yunin Sofro, M.Si., Ph.D			Prof. Dr. Raden Sulaiman, M.Si.	

Learning model	**Case Studies**

Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix
	<table><tr><td>P.O</td></tr></table>
	PO Matrix at the end of each learning stage (Sub-PO)
	<table><tr><td rowspan="2">P.O</td><td colspan="16">Week</td></tr><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr></table>

Short Course Description	Examining the concepts of basic knowledge of statistics, population, samples, measures of data concentration, measures of location and dispersion, presentation of data in table form, presentation of data in diagram form, hypothesis testing, Z test, T test, anova, correlation and regression and the chi square test through individual and group task-based learning

References	**Main :**	
	1. Weiss, N. A.. 2017. Elementary Statistics (9 th Edition) . Boston: Pearson 2. Freedman, D.. 2007. Statistics (4th Edition). New York: Norton & Company.	
	Supporters:	
	1. Sofro, A., A. Oktaviani dan D.A. Maulana, 2019. Buku Ajar - Metode Statistika. Unesa Press	

Supporting lecturer	Prof. Drs. I Ketut Budayasa, Ph.D. Affiati Oktaviarina, S.Si., M.Sc. A'yunin Sofro, M.Si., Ph.D. Danang Ariyanto, S.Si., M.Si. Dimas Avian Maulana, S.Si., M.Si.

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 can define the meaning of statistics, population and sample	1. Define basic knowledge of statistics, population and samples 2. Apply basic knowledge of statistics, populations and samples in everyday life. 3. Explain sampling techniques and the types of data obtained 4. Apply knowledge of sampling techniques and types of data in daily life	**Criteria:** Assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Learning approach with lectures and discussions 3 X 50		**Material:** Basic Knowledge of Statistics, Sampling Techniques and Data Types **References:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson* **Material:** Basic Knowledge of Statistics, Sampling Techniques and Data Types **References:** *Sofro, A., DA Maulana and A. Oktaviani, 2021. Textbook - Statistical Methods. Unesa Press*	5%
2	Students can define the meaning of data concentration and distribution measures	1. Explain the knowledge of measures of centralization and distribution of data 2. Apply knowledge of data concentration and distribution measures in everyday life.	**Criteria:** Assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Learning approach with lectures and discussions 3 X 50		**Material:** Measures of concentration and distribution **Reference:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson* **Material:** Measures of concentration and distribution **References:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press*	5%
3	Students can study and apply ways of presenting data	1. Defines data presentation 2. Applying data presentation methods in everyday life. 3. Implement data presentation through computer programs	**Criteria:** Assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Learning approach with lectures and discussions 3 X 50		**Material:** Data presentation **Bibliography:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson* **Material:** Data presentation **References:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press*	5%

| 4 | Students can define and apply sample space, probability and probability distribution | 1. Explain the sample space, probability and probability distribution of Binomials
2. Applying sample space, probability and probability distribution from Binomial in everyday life
3. Explain the normal distribution and the area under the normal curve
4. Applying the normal distribution in daily life
5. Proving the relationship between the sampling distribution of the sample mean and the normal distribution
6. Applying the sampling distribution of the sample mean in everyday life | **Criteria:**
Assessment rubric

Forms of Assessment :
Participatory Activities, Project Results Assessment / Product Assessment | Learning approach with lectures and discussions
3 X 50 | • Online Lectures (Zoom, Google Meeting, etc.)
• Synchronous and Asynchronous Discussions (WAG, Google Classroom, etc.)
• E-Learning: Virtual Learning Unesa (Vinesa)
3 X 50 | **Material:** Probability distribution and sampling distribution
Reference: *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson*

Material: Probability distribution and sampling distribution
References: *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press* | 5% |

| 5 | Students can define and apply sample space, probability and probability distribution | 1. Explain the sample space, probability and probability distribution of Binomials
2. Applying sample space, probability and probability distribution from Binomial in everyday life
3. Explain the normal distribution and the area under the normal curve
4. Applying the normal distribution in daily life
5. Proving the relationship between the sampling distribution of the sample mean and the normal distribution
6. Applying the sampling distribution of the sample mean in everyday life | **Criteria:** Assessment rubric

Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment | Learning approach with lectures and discussions 3 X 50 | • Online Lectures (Zoom, Google Meeting, etc.)
• Synchronous and Asynchronous Discussions (WAG, Google Classroom, etc.)
• E-Learning: Virtual Learning Unesa (Vinesa) 3 X 50 | **Material:** Probability distribution and sampling distribution **Reference:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson*

Material: Probability distribution and sampling distribution **References:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press* | 5% |
| 6 | Students can define and apply parameter estimation, confidence intervals and margin of error | 1. Defines parameter estimates, confidence intervals and margins of error for the mean of a population
2. Applying parameter estimates, confidence intervals and margin of error for the mean of a population in everyday life | **Criteria:** Assessment rubric

Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment | Learning approach with lectures and discussions 3 X 50 | • Online Lectures (Zoom, Google Meeting, etc.)
• Synchronous and Asynchronous Discussions (WAG, Google Classroom, etc.)
• E-Learning: Virtual Learning Unesa (Vinesa) 3 X 50 | **Material:** parameter estimates, confidence intervals and margin of error for the mean of a population. **Reference:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson*

Material: parameter estimation, confidence interval and margin of error for the mean of a population **Reference:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press* | 5% |

7	Students can define and explain statistical hypothesis testing	1. Explain hypothesis testing 2. Applying hypothesis testing in inferential statistical procedures 3. Explain the Z test for the mean of a population 4. Applying the Z test for the mean of a population in daily life	**Criteria:** Assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Learning approach with lectures and discussions 3 X 50	• Online Lectures (Zoom, Google Meeting, etc.) • Synchronous and Asynchronous Discussions (WAG, Google Classroom, etc.) • E-Learning: Virtual Learning Unesa (Vinesa) 3 X 50	**Material:** Hypothesis testing and implementation for the Z test on the mean of one population. **Reference:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson* **Material:** Hypothesis testing and implementation for the Z test on the mean of a population. **Reference:** *Freedman, D.. 2007. Statistics (4th Edition). New York: Norton & Company.* **Material:** Hypothesis testing and implementation for the Z test on the mean of one population. **Reference:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press*	5%
8	U.S.S	U.S.S		UTS 3 X 50			0%
9	Students can explain and apply the Z test for the mean of two populations	1. Explain the Z test for the mean of two populations 2. Applying the Z test to the mean of two daily life populations	**Criteria:** Assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Learning approach with lectures and discussions 3 X 50	• Online Lectures (Zoom, Google Meeting, etc.) • Synchronous and Asynchronous Discussions (WAG, Google Classroom, etc.) • E-Learning: Virtual Learning Unesa (Vinesa) 3 X 50	**Material:** Z Test **Bibliography:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson* **Material:** Z Test **References:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press*	5%

| 10 | Students can define and apply one population and two population t tests and implement them in computer programs | 1.Explain the T test for the mean of a population 2.Applying the T test to the mean of a population in daily life 3.Explain the T test for the means of two independent populations 4.Applying the T test to the mean of a population in daily life 5.Explain the T test for the mean of two related populations 6.Applying the T test for the mean of two populations that are related to each other in everyday life | **Criteria:** Assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment | Learning approach with lectures and discussions 3 X 50 | • Online Lectures (Zoom, Google Meeting, etc.) • Synchronous and Asynchronous Discussions (WAG, Google Classroom, etc.) • E-Learning: Virtual Learning Unesa (Vinesa) 3 X 50 | **Material:** One population and two population T test **References:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson* **Material:** One population and two population T test **References:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press* | 10% |
| 11 | Students can define and apply one population and two population t tests and implement them in computer programs | 1.Explain the T test for the mean of a population 2.Applying the T test to the mean of a population in daily life 3.Explain the T test for the means of two independent populations 4.Applying the T test to the mean of a population in daily life 5.Explain the T test for the mean of two related populations 6.Applying the T test for the mean of two populations that are related to each other in everyday life | **Criteria:** Assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment | Learning approach with lectures and discussions 3 X 50 | • Online Lectures (Zoom, Google Meeting, etc.) • Synchronous and Asynchronous Discussions (WAG, Google Classroom, etc.) • E-Learning: Virtual Learning Unesa (Vinesa) 3 X 50 | **Material:** One population and two population T test **References:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson* **Material:** One population and two population T test **References:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press* | 10% |

12	Students can define and apply Analysis of variance (ANOVA) and implement it in a computer program	1. Explain knowledge about ANOVA 2. Apply ANOVA knowledge to dependent data in everyday life. 3. Implement ANOVA in a computer program	**Criteria:** Assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Learning approach with lectures and discussions 3 X 50	Online Lectures (Zoom, Google Meeting, etc.) • Synchronous and Asynchronous Discussions (WAG, Google Classroom, etc.) • E-Learning: Virtual Learning Unesa (Vinesa) 3 X 50	**Material:** one-way ANOVA **Reference:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson* **Material:** One-way ANOVA **Reference:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press*	10%
13	Students can define, apply Correlation Analysis and implement it in computer programs	1. Explains knowledge about correlation in general 2. Explain knowledge about scatter plot data 3. Explains knowledge about calculating correlation coefficients 4. Explaining knowledge about correlation coefficients in populations and hypothesis testing 5. Apply correlation knowledge to dependent data in everyday life.	**Criteria:** Assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Learning approach with lectures and discussions 3 X 50	Online Lectures (Zoom, Google Meeting, etc.) • Synchronous and Asynchronous Discussions (WAG, Google Classroom, etc.) • E-Learning: Virtual Learning Unesa (Vinesa) 3 X 50	**Material:** Correlation Analysis **Literature:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson* **Material:** Correlation Analysis **Literature:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press*	10%

14	Students can understand the meaning of linear regression	1. Explain knowledge about determining independent and dependent variables 2. Explain the parameter estimation method in regression 3. Explain knowledge of hypothesis testing for regression constants 4. Explain knowledge of hypothesis testing for regression coefficients 5. Apply knowledge of linear regression in everyday life.	**Criteria:** Assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Learning approach with lectures and discussions 3 X 50	Online Lectures (Zoom, Google Meeting, etc.) • Synchronous and Asynchronous Discussions (WAG, Google Classroom, etc.) • E-Learning: Virtual Learning Unesa (Vinesa) 3 X 50	**Material:** Regression Analysis **Literature:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson* **Material:** Regression Analysis **Bibliography:** *Freedman, D.. 2007. Statistics (4th Edition). New York: Norton & Company.* **Material:** Regression Analysis **References:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press*	10%
15	Students can define, apply the Chi Square Test and implement it in a computer program	1. Defining the Chi square Test 2. Applying Chi square in everyday life 3. Implementing the Chi Square Test in a computer program	**Criteria:** Assessment rubric **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Learning approach with lectures and discussions 3 X 50	Online Lectures (Zoom, Google Meeting, etc.) • Synchronous and Asynchronous Discussions (WAG, Google Classroom, etc.) • E-Learning: Virtual Learning Unesa (Vinesa) 3 X 50	**Material:** Chi Square Test **Reference:** *Weiss, NA. 2017. Elementary Statistics (9th Edition). Boston: Pearson* **Material:** Chi Square Test **References:** *Freedman, D.. 2007. Statistics (4th Edition). New York: Norton & Company.* **Material:** Chi Square Test **References:** *Sofro, A., A. Oktaviani and DA Maulana, 2019. Textbook - Statistical Methods. Unesa Press*	10%
16	Final exams						0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	50%
2.	Project Results Assessment / Product Assessment	50%
		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.