


A. Lesson Plan and Course Assessment

 UNESA <small>Universitas Negeri Surabaya</small>		Universitas Negeri Surabaya Faculty of Social Science And Law Geography Education Department				Document Code
Lesson Plan						
COURSE	Code	Cluster	Credits	Semester	Compilation Date	
Hidrology	8720202070	Department Of Geography	2	3	2017	
AUTHORIZATION		Lesson Plan Developer	Coordinator		Head of Study Program	
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Learning Outcome (PLO) Program	Plo					
	PLO 2	Able to analyze regional and regional characteristics (regionalization) in the context of resources and disasters based on geographical principles and approaches to support sustainable development				
	PLO 6	Able to make appropriate decisions in the context of solving problems in the field of geography and geography education, based on the results of information and data analysis.				
	PLO 8	Able to formulate, process, analyze data, and present geosphere information both physical and human aspects by using geospatial technology for geography learning and research;				
	PLO 11	Demonstrate an attitude of responsibility for work in their field of expertise independently				
	Course Learning Outcome (CLO)					
	CLO 2	Able to analyze the characteristics of rainwater, evaporation, surface water and groundwater in an area to support sustainable development. (PL O-2)				
	CLO 6	Able to solve the problems of rain, floods and droughts, decreased groundwater levels, and seawater intrusion based on information and data analysis. (PL O-6)				
	CLO 8	Able to process, analyze, and present data on rain, evaporation, river flow or groundwater quality using geospatial technology for research. (PL O-8)				
CLO 11	Able to be responsible for carrying out hydrological cycle analysis independently (PL O-11)					

Course Description	This course discusses the formation of the elements of the water cycle, further discussion to understand students includes the kinds and factors that affect the magnitude of evapotranspiration, analysis and calculations about precipitation, and evapotranspiration in an area. About runoff or surface flows discuss the diversity of the territory, the calculation of river discharge and the factors affecting runoff. Another element, namely infiltration, is only limited to the factors affecting infiltration and the practical importance of infiltration from several aspects. The understanding of groundwater includes the presence of groundwater and various aquifers related to the properties of rock layers, groundwater movements, their relationship with surface water, and seawater intrusion. It is also studied about the role of hydrology in human life and the use of Information technology (IT) in its learning will increase the understanding of the material studied. Achieve learning competencies by using a <i>project base learning</i> approach with the method of inquiry, discussion, question and answer, assignment. The assessment is carried out with performance, and the written test .	
Learning Materials/ Topics	<ol style="list-style-type: none"> 1. The Role of Hydrology in life 2. Water Cycle 3. Elements, classification and calculation of the average precipitation (rain) of the territory 4. Factors affecting Evapotranspiration and calculating evapotranspiration 5. Factors affecting Runoff, the diversity of coverage, and the discharge of runoff 6. Factors affecting infiltration and the practical importance of infiltration 7. The occurrence of groundwater, groundwater movements, axle various aquifers <p>The relationship between groundwater and surface water and seawater intrusion</p>	
References	Primary	<ol style="list-style-type: none"> 1. Asdak, C., 2014, <i>Hydrology and Watershed Management</i>, Yogyakarta, Gadjah Mada University Press. 2. Hadi Susanto, N. 2015, <i>Hydrological Applications</i>, Yogyakarta : Jogja Mediautama 3. Kodoatie, R.J., 2012, <i>Groundwater Spatial Planning</i>, Yogyakarta: Andi Publishers 4. Kodoatie, R. J., 2013, <i>Urban Flood Engineering and Management</i>, Yogyakarta: Andi Publishers 5. Seyhan, E. , 2010, <i>Basics of Hydrology</i>, Yogyakarta: Gadjah Mada University Press 6. Soemarto, C.D., 2007, <i>Hydrology Engineering</i>, Suabaya: National Enterprises
	Supplementary	<ol style="list-style-type: none"> 1. Gabler, R.E., Sack, D., Petersen, J.F., 2012, <i>Physical Geography</i> 10 th Edition, Brooks/Cole, Cengage Learning 2. Petersen, J.F., Sack, D., Gabler, R.E., 2012, <i>Physical Geography</i> 10th Edition, Canada, Brooks/Cole, Cengage Learning 3. Mulyaningsih, S., 2010, <i>Introduction to Environmental Geology</i>, Yogyakarta: A Guide
Lecturer(s)	<ol style="list-style-type: none"> 1. Drs. Agyus Sutedjo, M. Si 2. Drs. Bambang Hariyanto, M.Pd 	
Prerequisites	General Geology	

Week	Learning Objectives	Assessment		Learning Activities and Time Allotment		Learning Sources	Scoring
		Indicators	Criteria/Form/Type	Offline	Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Able to analyze the hydrological cycle and the role of each cyclical element in life.	1.1. Explaining the meaning of Hydrology. 1.2. Analyzing the Hydrological Cycle 1.3. Analyzing the role of each element of Hydrology in Life	Criteria : Performance rubric Form : 1. Non test Assessment of the analysis of the elements of the water cycle in relation to human needs 2. Quiz 1	Direct Instruction [TM : 1 (2x50')] Small Group Discussion Task 1 Make an analysis of each element of the hydrological cycle in relation to human needs. [PT+BM : (1+1) x (2X60')]		Book: - Book 1 - Book 2 - Book 5 - Book 6	8
2	Able to analyze the magnitude of rain elements based on automatic rain data (rain graph on fluviogram)	2.1. Explaining the classification of rain . 2.2. Analyze and calculate the magnitude of rain elements on the rain chart (fluviogram)	Criteria : Performance Rubric Form : 1. Non Test Assessment Analysis of rain elements and their calculations 2. Quiz 2	Direct Instruction [TM : 1 (2x50')] Small Discussion Task 2 Mmake analysis and calculation of rain elements [PT+BM : (1+1) x (2X60')]		Book: - Book 1 - Book 2 - Book 5 - Book 6	8

3	Able to calculate the average rainfall of the region based on rain data at at least 5 rain stations	<p>3.1. Explaining the diversity of rainrooms</p> <p>3.2. Calculating the region's rainy average arithmetically</p> <p>3.3. Calculating the average rain of the region with the Thiessen Polygon</p> <p>3.4. Calculating the Average rainy region with Isohyet</p>	<p>Criteria : Performance Rubric</p> <p>Form : 1. Non Test Assessment of the results of making rain maps 2. Quizzes</p>	<p>Direct Instrruction [TM : 1 (2x50')] Project Based Learning Task 3 Creating a rain map by the method of thiessen and Isohyet polygons [PT+BM : (1+1) x (2X60')]</p>	<p>Book: - Book 1 - Book 2 - Book 5 - Book 6</p>	8
4-5	Able to analyze the factors affecting evapotranspiration that occurs in a certain period of time with empirical formulas.	<p>4.1 Explaining the Meaning of Evapotranspiration</p> <p>4.2. Animating factors affecting evapotranspiration.</p> <p>4.3. Calculating daily evapotranspiration by modification method</p> <p>4.4 Calculating Monthly Evapotranspiration by thornthwaite-matter method</p> <p>4.5. Calculating 10 daily Evapotranspiration by the Turc method</p>	<p>Criteria : Performance Rubric</p> <p>Form : 1. Non Test Assessment of the results of evapotranspiration calculations by the methods of Penmann i, Thorntwaite , and Turc 2. Quiz 4</p>	<p>Direct Instructioni [TM : 2 (2x50')] Small Group dscution Task 4 Calculating Evapotranspiration by using the Penmann, Thornthwaite, and Turc methods in an area. [PT+BM : (2+2) x (2X60')]</p>	<p>Book - Book 1 - Book 2 - Book 6</p>	16
6	Able to analyze runoff factors and calculate the magnitude of runoff in a river	<p>5.1 Explaining the meaning of runoff</p> <p>5.2 Analyzing the factors affecting runoff</p> <p>5.3 Explaining the diversity of runoff</p> <p>5. 4 Calculating river discharge by Manning method</p>	<p>Criteria : Performance Rubric</p> <p>Form : 1. Non Test Assessment of the results of the calculation of sungal discharge</p>	<p>Direct Instruction [TM : 1 (2x50')] Small Discution Task 5 Calculating the discharge of sungal flow based on data [PT+BM : (1+1) x (2X60')]</p>	<p>Book - Book 4 - Book 5 - Book 6</p>	8

			2. Quiz 5				
7	Manpu assesses runoff in an area using empirical formulas	6.1 Assessing runoff by rational formulas 6.2 Assessing runoff by the Melchior method 6.3 Assessing runoff with the Weduwen method	Criteria : Performance Rubric Form : 1. Non Test Assessment of the results of the calculation of runoff by 3 methods. 2. Kuis 6	Direct Instruction [TM : 1 (2x50')] Problem Based Learning Task 6 Analyzing the causes of flooding in an area based on coefficient runoff [PT+BM : (1+1) x (2X60')]		Book: - Book 1 - Book 2 - Book 5 - Book 6	8
9	Mampu analyzes the character of infiltration for practical purposes.	7.1. Explaining the Concept of Infiltration 7.2. Analyzing the factors affecting infiltration 7.3. Analyzing the character of infiltration for practical purposes	Criteria Performance Rubric Form : 1. Non test Assessment of the results of the infiltration character analysis for practical purposes 2. Kuis 7	Direct Instruction [TM : 2 (2x50')] Small Group Discussion Task 7 Analyzing the character of infiltration for practical purposes [PT+BM : (2+2) x (2X60')]		Book: - Book 5 - Book 3 - Book 4 - Book 6	8
10-11	Able to analyze the occurrence of groundwater and groundwater movements in an area.	8.1. Explaining the properties of rocks and the occurrence of groundwater 8.2. Analyzing the direction of movement of groundwater using cartographic methods	Criteria : Performance Rubric Form : 1. Non Test Assessment of the results of making the direction of groundwater flow 2. Quiz 8	Direct Instruction [TM : 2 (2x50')] Small Group Discussion Task 8 Creating the direction of groundwater flow in the groundwater forecast [PT+BM : (2+2) x (2X60')]		Book: - Book 3 - Book 4 - Book 5 - Book 6	12

12-13	Able to determine the types of aquifers in an area	<p>9.1. Explaining the meaning of the aquifer</p> <p>9.2. Determining the types of aquifers based on the character of the rock layers</p>	<p>Criteria : Performance Rubric</p> <p>Form : 1. Non Test Assessment of the results of the depiction of the distribution of various aquifers</p> <p>2. Quiz 9</p>	<p>Direct Instruction [TM : 1 (2x50')]</p> <p>Small Group Discussion Task 9 - Drawing the distribution of various aquifers in the character of the rock layer PT+BM : (2+2) x (2X60')]</p>		<p>Book:</p> <ul style="list-style-type: none"> - Book 3 - Book 5 - Book 6 	12
14-15	Able to analyze the relationship between groundwater and surface water and seawater	<p>10.1. Analyzing the relationship between groundwater and surface water</p> <p>10.2. Calculating the magnitude of seawater intrusion into the ground</p>	<p>Criteria : Rubric Kinerja</p> <p>Form : 1. Non Test Task assessment calculates seawater intrusion into land</p> <p>2. Quiz 10</p>	<p>Direct Instruction. [TM : 1 (2x50')]</p> <p>Small Group Discussion Task 10 Calculating the depth of seawater intrusion into the mainland [PT+BM : (2+2) x (2X60')]</p>		<p>Book:</p> <ul style="list-style-type: none"> - Book 6 - Book 5 - Book 3 	12

B. Calculation of Student Workload

Credit Unit (CU)	ECTS	Meeting Hours	Structured Assignments	Independent Study
2 CU	3.18	1400 minutes	1680 minutes	1680 minutes

APPENDICES

APPENDIX 1 ASSESSMENT RUBRIC

Course Assessment

A. Assessment Rubric

1) Attitudes/Affective Domains

In this domain, the evaluation of student participation in class includes communication skills, discipline and responsibility. The rubrics used are as follows:

Criteria	Score
Communicate effectively, appreciate others' opinions; always attend the class on time; always submit the assignment on time; and always participate in the completion of group assignment	$85 \leq SA \leq 100$
Communicate effectively, appreciate others' opinions; 80% of attendance; submit 90% of the assignment; and often participate in the completion of group assignment.	$70 \leq SA < 85$
Communicate ineffectively, appreciate others' opinions; 75% of attendance; submit the 70% of assignment on time; and participate in the completion of group assignment.	$55 \leq SA < 70$
Communicate ineffectively, do not appreciate others' opinions; rarely attend the class; rarely submit the assignment; and rarely participate in the completion of group assignment	$\leq SA < 55$

2) Knowledge/Cognitive Domain

The students' knowledge is assessed through assignments (individual and group) and tests (mid-term and End-term tests).

a. Assignment Rubric

The criteria of assignment according to Assignment Rubrics:

No	Aspects	Max. Score
1	Finding the financial data: a. Data collected from reputable source, i.e. (Excellent = 3, Good = 2, Fair = 1)	3
2	Calculate data a. Choose the correct formula (Excellent = 3, Good = 2, Fair = 1)	3
	Calculate data b. Correct calculation and result (Excellent = 3, Good = 2, Fair = 1)	3
3	Description of the calculation result Make a description about the calculated result and explain the meaning of the calculation result (Excellent = 3, Good = 2, Fair = 1)	3
4	Conclusion Make a conclusion including a suggestion for a better performance for the company according to the analysis (Excellent = 3, Good = 2, Fair = 1)	3
5	Assignment result paper a. Systematic report (Excellent = 3, Good = 2, Fair = 1)	3
	Assignment result paper b. Language use (Excellent = 3, Good = 2, Fair = 1)	3

b) Tests (mid-term and End-term tests)

The criteria of mid-term and End-term tests in this course are:

1. The ability to give answers correctly according to the key and rubrics;
2. The ability to provide robust argumentation according to theory;
3. The ability to provide systematic explanations; and
4. The ability to apply the essential concepts in a particular situation comprehensively .

B. Universitas Negeri Surabaya Grading System

University students are considered to be competent and pass if at least get 40% of the maximum End-term grade. The Final-term grade (NA) is calculated based on the following weight:

Assessment Components	Percentage
Participation (including attitudes/affective)	20%
Assignment	30%
Mid-term test	20%
Final-term test	30%

Scoring Conversion

Scoring Interval (out of 100)	Point	Grade
$85 \leq NA \leq 100$	4.00	A
$80 \leq NA < 85$	3.75	A-
$75 \leq NA < 80$	3.50	B+
$70 \leq NA < 75$	3.00	B
$65 \leq NA < 70$	2.75	B-
$60 \leq NA < 65$	2.50	C+
$55 \leq NA < 60$	2.00	C
$40 \leq NA < 55$	1.00	D
$0 \leq NA < 40$	0	E