	Universitas Negeri Surabaya Faculty of Social Sciences and Law Geography Education Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Mineralogy and Petrography	8720202108	Physical Geography	T=2	P=0	ECTS=3.18	2	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Drs. Agus Sutedjo, M.Si.	Drs. Bambang Hariyanto, M.Pd.	Dr. Nugroho Hari Purnomo, S.P., M.Si.

Learning model	**Case Studies**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-5	Able to make appropriate decisions to solve educational problems and transformative geography learning by utilizing various learning resources based on science and technology and the arts
	PLO-7	Able to make appropriate decisions to resolve regional problems in a spatial context based on an integrated geographic approach
	Program Objectives (PO)	
	PO - 1	Able to process, analyze, present rock data using geospatial technology to support sustainable development, able to solve problems related to rocks based on information and data analysis, and be responsible for their field of expertise.
	PLO-PO Matrix	

P.O	PLO-5	PLO-7
PO-1		

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																

Short Course Description	This course is a course that discusses rocks, the main aim of which is to make it easier for students to determine various types of rocks megascopically, including igneous rocks, clastic and non-clastic sediments, metamorphic and pyroclastic. Determining the type of rock is preceded by a discussion of crystals and the characteristics of minerals as rock-forming materials. The next discussion is the process of formation and location of rock formation as well as the various structures, textures and colors of each type of rock which constitute the character of the rock. Understanding the character of rocks is basic knowledge that must be mastered, then by identifying the rock you will be able to know its type. The use of information technology in this activity will make it easier to understand various types of rocks. Achievement of learning competencies by using a project based learning approach with inquiry, discussion, question and answer, assignment methods. Assessment is carried out by performance and written tests	
References	**Main :**	

1. 1. Klein, C., , Philpotts, A.,2013, Earth Materials. Introduction to Mineralogy and Petrology, New York,Cambridge University Press.
2. 2. Pearl, R.M., 1960, How To Know The Minerals And Rocks, New York, McGraw-Hill Book Company.
3. 3. Petersen, J.F., Sack, D., Gabler, R.E., 2012, Physical Geography 10th Edition, Canada, Brooks/Cole, Cengage Learning
4. 4. Sutedjo, A., Hariyanto, B., 2017, Buku Ajar. Ilmu Batuan, Surabaya, FISH Unesa

Supporters:

1. 1. Sutedjo, A., 2019, Modul 3. Dinamika Litosfer dan Pengaruhnya Terhadap Kehidupan Manusia. Kegiatan Belajar 1 : Litosfer, Surabaya, FISH Unesa.

Supporting lecturer	Drs. Agus Sutedjo, M.Si. Drs. Bambang Hariyanto, M.Pd.

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	Able to analyze crystals and minerals based on their properties	1. Explain the meaning of crystals, minerals and rocks. 2. Analyze the shape of crystals	**Criteria:** Assessments are carried out at UTS **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Tests	lecture, question and answer, assignment 2 X 50		**Material:** 1. Definition of crystals, minerals and rocks 2. Forms of crystals **Library:** *2. Pearl, RM, 1960, How To Know The Minerals And Rocks, New York, McGraw-Hill Book Company.*	6%
2	Able to analyze crystals and minerals based on their properties	1. Explain the formation of minerals 2. Explain the properties of minerals	**Criteria:** Assessments are carried out at UTS **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Tests	Lectures, questions and answers. Assignment 2 X 50		**Material:** 1. Mineral Formation 2. Mineral Properties **References:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	8%
3	Able to analyze crystals and minerals based on their properties	1. Identify rock-forming minerals. 2. Explain the Rock Cycle	**Criteria:** Assessments are carried out at UTS **Form of Assessment** : Participatory Activities, Tests	lecture and question and answer 2 X 50		**Material:** 1. Rock-forming minerals 2. Rock Cycle **Bibliography:** *2. Pearl, RM, 1960, How To Know The Minerals And Rocks, New York, McGraw-Hill Book Company.*	6%
4	Able to analyze the properties of igneous rocks and determine the type or name of the rock and its distribution	1. Explain the meaning of Igneous rocks. 2. Explain the process of forming igneous rocks. 3. Explain the structure of igneous rocks	**Criteria:** Assessments are carried out at UTS **Form of Assessment** : Participatory Activities, Tests	Lectures and questions and answers 2 X 50		**Material:** 1. Definition of Igneous rocks. 2. Igneous Rock Formation Process 3. Igneous Rock Structure **Reference:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	6%

5	Able to analyze the properties of igneous rocks and determine the type or name of the rock and its distribution	1. Explain the texture of igneous rocks. 2. Explain the mineral composition of igneous rocks	**Criteria:** Assessments are carried out at UTS **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Tests	Lectures, questions and answers, and 2 X 50 Assignments		**Material:** 1. Texture of Igneous Rocks 2. Mineral Composition of Igneous Rocks **References:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	6%
6	Able to analyze the properties of igneous rocks and determine the type or name of the rock and its distribution	. Explain the types/types of Igneous Rocks 2. Explain the Distribution of Igneous Rocks	**Criteria:** Assessments are carried out at UTS **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	lectures, questions and answers and 2 X 50 Assignments		**Material:** 1. Types/types of Igneous Rocks 2. Distribution of Igneous Rocks **References:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	8%
7	Able to analyze the properties of pyroclastic rocks and determine the type of rock and its distribution in a certain geomorphological area		**Criteria:** Assessments are carried out at UTS **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Lectures, questions and answers and 2 X 50 Assignments		**Material:** 1. Understanding pyroclastic rocks 2. Process of forming pyroclastic rocks 3. Structure and texture of pyroclastic rocks. 4. Types of Pyroclastic Rocks 5. Distribution of Rocks **Library:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	8%
8	Able to understand the scope of mineralogy and the concept of minerals Students are able to understand crystallography and crystals Students are able to understand the physical properties of minerals Students are able to understand the chemical properties of minerals Students are able to understand the formation and existence of minerals Students are able to understand the types of minerals based on their physical and chemical properties	- Explain the scope of mineralogy - Explain the meaning of minerals - Explain the structure of minerals - Explain the scope of crystalgraphy. - Explain the various crystal axes - Explain the crystal system - Differentiate between symbolization by Weiss and Miller - Explain the character and shape of crystals - Explain the physical properties of minerals - Describe the physical properties of minerals based on observations	**Criteria:** 1.- Each test in essay form consists of 4 questions, with the following score weights. 2.Question number 1 is given a weighting of 0 - 20% 3.Question number 2 is given a weighting of 0 - 20% 4.Question number 3 is given a weighting of 0 - 25% 5.Question number 4 is given a weighting of 0 - 35% 6.- The total number of marks is 100.	- 2 X 50 Sub Summative Exam			0%

		of minerals. - Explain and practice the steps to determine the hardness of minerals - Calculate the specific gravity of minerals - Explain transparency and magnetism of minerals - Explain Fluorescence and Phosference Events - Explain chemical qualitative analysis of minerals. - Explains the quantitative analysis of primary minerals and secondary minerals - Explains the steps for researching mineral chemistry using the wet method and the dry method. - Explain the formation of minerals - Explain the existence of minerals - Explain the difference between primary minerals and secondary minerals - Explain with examples of mineraloids. - Explain the difference between metamict minerals and amorphous minerals - Explain with examples the classification of minerals according to their properties and mineral composition. - Provide examples of minerals that are useful for industry and the lives of Indonesian people.					
9	Able to analyze the properties of clastic sedimentary rocks and determine the type of rock and the location of its distribution	1. Explain the meaning of clastic sedimentary rocks. 2. explain the process of forming clastic sedimentary rocks	**Criteria:** Assessment is carried out at UAS **Form of Assessment** : Participatory Activities, Tests	lecture, question and answer 4 X 50		**Material:** 1. Understanding Clastic Sedimentary Rocks 2. Process of Forming Clastic Sedimentary Rocks **References:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	6%

10	Able to analyze the properties of clastic sedimentary rocks and determine the type of rock and the location of its distribution	1. explain the structure of clastic sedimentary rocks. 2. explain the texture of clastic sedimentary rocks.	**Criteria:** Assessment is carried out at UAS **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Tests	Lectures, questions and answers, assignments 2 X 50		**Material:** 1. Structure of Clastic Sedimentary Rocks 2. Texture of Clastic Sedimentary Rocks. **References:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	8%
11	Able to analyze the properties of clastic sedimentary rocks and determine the type of rock and the location of its distribution	1. Explain the types of clastic sedimentary rocks. 2. Explain the distribution of clastic sedimentary rocks.	**Criteria:** Assessment is carried out at UAS **Form of Assessment** : Participatory Activities, Tests	lecture and question and answer 2 X 50		**Material:** 1. Types of Clastic Sedimentary Rocks 2. Distribution of clastic sedimentary rocks. **References:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	6%
12	Able to analyze the properties of non-clastic sedimentary rocks and determine the type of rock and the location of its distribution	1. Explain the meaning of non-clastic sedimentary rocks. 2. Explain the process of forming non-clastic clastic sedimentary rocks. 3. Explain the structure of non-clastic sedimentary rocks.	**Criteria:** Assessment is carried out at UAS **Form of Assessment** : Participatory Activities, Tests	lecture and question and answer 2 X 50		**Material:** 1. Definition of Non-Clastic Sedimentary Rocks 2. Process of Formation of Non-Clastic Clastic Sedimentary Rocks 3. Structure of Non-Clastic Sedimentary Rocks **Reference:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	7%
13	Able to analyze the properties of non-clastic sedimentary rocks and determine the type of rock and the location of its distribution	1. Explain the texture of non-clastic sedimentary rocks. 2. Explain the types of non-clastic sedimentary rocks. 3. Explain the distribution of non-clastic sedimentary rocks	**Criteria:** Assessment is carried out at UAS **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Tests	lecture, question and answer and assignment 2 X 50		**Material:** 1. Texture of Non-Clastic Sedimentary Rocks. 2. Types of Non-Clastic Sedimentary Rocks. 3. Distribution of Non-Clastic Sedimentary Rocks **References:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	9%

14	Able to analyze the properties of metamorphic rocks and determine their types in order to support sustainable development	1. Explain the meaning of metamorphic rocks 2 Explain the process of forming metamorphic rocks 3. Explain the structure of metamorphic rocks	**Criteria:** Assessment is carried out at UAS **Form of Assessment** : Participatory Activities, Tests	lecture and question and answer 2 X 50		**Material:** 1. Definition of metamorphic rocks 2 Process of formation of metamorphic rocks 3 Structure of metamorphic rocks **References:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	7%
15	Able to analyze the properties of metamorphic rocks and determine their types in order to support sustainable development	1. Explain the texture of metamorphic rocks 2. Explain the types of metamorphic rocks 3. Explain the distribution of metamorphic rocks	**Criteria:** Assessment is carried out at UAS **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Tests	Lectures, questions and answers and assignments 2 X 50		**Material:** 1. Texture of metamorphic rocks 2. Types of metamorphic rocks 3. Distribution of metamorphic rocks **References:** *4. Sutedjo, A., Hariyanto, B., 2017, Textbook. Rock Science, Surabaya, FISH Unesa*	9%
16	Correctly identify and determine the names of each of the 5 rock types, igneous, metamorphic, sedimentary and pyroclastic	-	**Criteria:** 1.Essay writing test: 2.- Each test in essay form consists of 4 questions, with the following score weights. 3.Question number 1 is given a weightage of 0 13 20% 4.Question number 2 is given a weightage of 0 13 20% 5.Question number 3 is given a weightage of 0 - 25% 6.Question number 4 is given a weightage of 0 13 35% 7.- The total number of marks is 100.	Summative Exam (US) 2 X 50			0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	42.34%
2.	Project Results Assessment / Product Assessment	23.34%
3.	Test	34.34%
		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.