	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
Programming language	4420102177	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	3	August 25, 2023

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model: Project Based Learning

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

Program Objectives (PO)

PO - 1	Able to apply basic programming principles to solve simple mathematical problems critically and creatively
PO - 2	Able to implement simple programming algorithm procedures in Python
PO - 3	Have a responsible attitude in completing each task, be open to input/criticism, and be able to make decisions.
PO - 4	Able to answer problems given, prepare answers/reports on problems given in writing and/or communicate them orally.
PO - 5	Able to solve applied mathematical problems in everyday life with the help of Python programming

PLO-PO Matrix

P.O
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's main aim is to teach basic concepts and techniques for creating computer programs using a simple object-oriented paradigm. Students will be introduced to the concepts of computational thinking, flow diagrams, pseudocode, and algorithms, the history and evolution of programming languages, basic programming concepts, object-oriented programming, and GUIs. Material includes data types, introduction to Objects and Classes, Inheritance, GUI, getting to know function types, I/O streams, and creating simple object-oriented programming projects

References

Main :

1. Horstmann, C. S. 2020. Python for Everyone (3rd Edition). John Wiley & Sons.
2. Mastrodomenico, R. 2022. The Python Book. John Wiley & Sons.
3. Wing, J.M., 2006. Computational thinking. Communications of the ACM, 49(3), pp.33-35.

Supporters:

	1. Jørgensen, K.E., Dahl, S.A. 2021. Python Programming: A Visual Journey for The Beginner with Simple Applications in Mathematics . Kaareskokebok. 2. Severance, C. R. 2016. Python for Everybody: Exploring Data Using Python 3 . CreateSpace Independent
Supporting lecturer	Dimas Avian Maulana, S.Si., M.Si. Riska Wahyu Romadhonia, S.Si., 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	Students are able to integrate computational thinking concepts	1.Students are able to explain the processes in the concept of computational thinking 2.Students are able to solve simple mathematical problems computationally	**Criteria:** Non-test **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 2x50 minutes		**Material:** Computational thinking **Reference:** *Wing, JM, 2006. Computational thinking. Communications of the ACM, 49(3), pp.33-35.*	2%
2	Students are able to integrate the concepts of pseudocode, algorithms and flow diagrams in programming	1.Students are able to understand pseudocode 2.Students are able to understand algorithms in general 3.Students are able to compile a flow diagram for processes in everyday life	**Criteria:** Non-Test **Form of Assessment** : Participatory Activities	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 2x50 minutes		**Material:** Pseudocode, Flowcharts **Bibliography:** *Mastrodomenico, R. 2022. The Python Book. John Wiley & Sons.*	3%
3	Students are able to integrate basic programming concepts in simple programs	1.Students know the history and evolution of programming languages. 2.Students can explain the basics of programming. 3.Students can rewrite the use of variables, statements and operators in programming.	**Criteria:** Non-test **Form of Assessment** : Participatory Activities, Practical Assessment	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 2x50 minutes		**Material:** Basic concepts of Python **Reference:** *Horstmann, CS 2020. Python for Everyone (3rd Edition). John Wiley & Sons.*	2%
4	Integrate selection program controls to resolve a case	1.Defines the if syntax for selecting a condition 2.Defines a switch case with conditions of integer data type 3.Defines a switch case with conditions of the character data type	**Criteria:** Practical Tests and Assignments I **Form of Assessment** : Practical Assessment	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 2x50 minutes		**Material:** Branching concept **Bibliography:** *Horstmann, CS 2020. Python for Everyone (3rd Edition). John Wiley & Sons.*	3%

5	Students are able to use lists, tuples, sets, dictionaries that suit the problems they face	1. Defines list, tuple, set, dictionary 2. Implement list, tuple, set, dictionary in loops 3. Students can create simple programs that contain lists, tuples, sets, dictionaries in Python	**Criteria:** Non-Test **Form of Assessment** : Participatory Activities, Practical Assessment	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 2 x 50 minutes		**Material:** List, Tuple, Set, and Dictionary concepts in Python **Reference:** *Severance, CR 2016. Python for Everybody: Exploring Data Using Python 3. CreateSpace Independent*	3%
6	Use functions to group frequently used statements	1. Defining functions 2. Using a function that does not return a value 3. Explain the role of the return statement 4. Defines function arguments	**Criteria:** Non-Test **Form of Assessment** : Participatory Activities	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 2 x 50 minutes		**Material:** Function Declarations in Python **Reference:** *Severance, CR 2016. Python for Everybody: Exploring Data Using Python 3. CreateSpace Independent*	2%
7	Use functions to group frequently used statements	1. Defines a function with a return value 2. Using functions with return values 3. Explains the scope of variables 4. Declare global variables, auto variables, external variables	**Criteria:** Non-Test **Form of Assessment** : Participatory Activities, Practical Assessment	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 2 x 50 minutes		**Material:** Function Declarations in Python **Reference:** *Severance, CR 2016. Python for Everybody: Exploring Data Using Python 3. CreateSpace Independent*	3%
8	Midterm exam	Able to complete UTS properly and correctly and on time	**Criteria:** UTS test **Form of Assessment** : Test	Written Exam 2 x 50 minutes		**Material:** Material Chapters 1-5 **Bibliography:** *Horstmann, CS 2020. Python for Everyone (3rd Edition) . John Wiley & Sons.*	20%
9	Describe and design classes and namespaces simply	1. Explain and declare the concept of class 2. Explaining and declaring variables in the form of objects 3. Create a simple program that contains classes and objects in the Python language	**Criteria:** Non-Test **Form of Assessment** : Participatory Activities	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive)		**Material:** Class and Object Concepts in Python **Reference:** *Horstmann, CS 2020. Python for Everyone (3rd Edition). John Wiley & Sons.*	2%

10	Integrate file program control to solve a case	1. Create a program to open and close a file 2. Create a program to read and write data into a file 3. Handling exceptions in a program	**Criteria:** Practice **Form of Assessment** : Practical Assessment	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 2 x 50 minutes		**Material:** File Operations in Python **Library:** *Horstmann, CS 2020. Python for Everyone (3rd Edition) . John Wiley & Sons.*	3%
11	Integrate file program control to solve a case	1. Create a program to open and close a file 2. Create a program to read and write data into a file 3. Handling exceptions in a program	**Criteria:** Practice **Form of Assessment** : Practical Assessment	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 2 x 50 minutes		**Material:** File Operations in Python **Library:** *Horstmann, CS 2020. Python for Everyone (3rd Edition) . John Wiley & Sons.*	3%
12	Applying the concept of Object Oriented Program (OOP) and Graphical User Interface (GUI)	1. Able to demonstrate knowledge related to Object Oriented Program (OOP) concepts 2. Able to demonstrate knowledge related to Graphical User Interface (GUI) concepts 3. Able to apply OOP and GUI concepts into programs	**Criteria:** Non-Test **Form of Assessment** : Participatory Activities	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 2 x 50 minutes		**Material:** OOP and GUI concepts in Python **Reference:** *Mastrodomenico, R. 2022. The Python Book . John Wiley & Sons.*	2%
13	Applying the concept of Object Oriented Program (OOP) and Graphical User Interface (GUI)	1. Able to demonstrate knowledge related to Object Oriented Program (OOP) concepts 2. Able to demonstrate knowledge related to Graphical User Interface (GUI) concepts 3. Able to apply OOP and GUI concepts into programs	**Criteria:** Non-Test and Practicum **Form of Assessment** : Participatory Activities, Practical Assessment	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 2 x 50 minutes		**Material:** OOP and GUI concepts in Python **Reference:** *Mastrodomenico, R. 2022. The Python Book . John Wiley & Sons.*	2%

14	Designing computer programs to solve problems related to mathematics	1. Students are able to apply the concepts of branching, looping, functions, classes and objects to the problems raised 2. Students are able to apply OOP and GUI concepts to the problems raised	**Criteria:** Non-Test **Form of Assessment** : Project Results Assessment / Product Assessment	Learning is carried out offline with the following PJBL stages: • Providing basic questions regarding the urgency of the problems raised • Determining the boundaries of the problem in creating the application • Type of programming concept abstraction that will be used • Agreeing on the implementation schedule for working on the GUI application project 2 x 50 minutes		**Material:** Applied mathematics **Bibliography:** *Jørgensen, KE, Dahl, SA 2021. Python Programming: A Visual Journey for The Beginner with Simple Applications in Mathematics . Kaareskokebok.*	10%
15	Designing computer programs to solve problems related to mathematics	1. Students are able to apply the concepts of branching, looping, functions, classes and objects to the problems raised 2. Students are able to apply OOP and GUI concepts to the problems raised	**Criteria:** Non-Test **Form of Assessment** : Project Results Assessment / Product Assessment	Learning is carried out offline with the following PJBL stages: • Monitoring the student process in implementing and realizing the project through presentations of the progress of each group and facilitating students in discussions and questions and answers regarding GUI application development 2 x 50 minutes		**Material:** Applied mathematics **Bibliography:** *Jørgensen, KE, Dahl, SA 2021. Python Programming: A Visual Journey for The Beginner with Simple Applications in Mathematics . Kaareskokebok.*	10%
16	Designing computer programs to solve problems related to mathematics	1. Students are able to apply the concepts of branching, looping, functions, classes and objects to the problems raised 2. Students are able to apply OOP and GUI concepts to the problems raised	**Criteria:** Final Project Presentation **Form of Assessment** : Project Results Assessment / Product Assessment	Learning is carried out offline with the following PJBL stages: • Students present the final results of the project carried out, as well as carry out a demo of the program created with the provisions of a report and presentation using LaTeX 2 x 50 minutes		**Material:** Applied mathematics **Bibliography:** *Jørgensen, KE, Dahl, SA 2021. Python Programming: A Visual Journey for The Beginner with Simple Applications in Mathematics . Kaareskokebok.*	30%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	15%
2.	Project Results Assessment / Product Assessment	51%
3.	Practical Assessment	14%
4.	Test	20%
		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.