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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Basic mathematic	4920203057	Compulsory Study Program Subjects	T=3	P=0	ECTS=4.77	1	August 24, 2023

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model: Case Studies

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

PLO-17	Mastering mathematical and statistical theories related to data science

Program Objectives (PO)

PO - 1	Able to demonstrate knowledge and insight related to mathematical logic, functions, limits, differentials and integrals related to data science
PO - 2	Able to design solutions to problems related to mathematical logic, functions, limits, differentials and integrals using various methods
PO - 3	Able to solve problems related to mathematical logic, functions, limits, differentials and integrals independently and responsibly

PLO-PO Matrix

P.O	PLO-17
PO-1	
PO-2	
PO-3	

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																

Short Course Description: This course examines mathematical logic, function concepts, limit concepts, continuity, matrices, differentials, integrals and their applications through active learning with a combination of discussion, question and answer methods and giving assignments and solving problems related to data science.

References

Main :

1. Hass, J., Heil C., & Weir, M.D., et.al. 2018. Thomas, Calculus 14th Edition (Revised). Boston: Pearson
2. Purcell, E.J., Varberg, D., and Rigdon, S.E. 2007. Calculus 9th Edition. Ontario: Pearson, Prentice Hall

Supporters:

1. Thomas Jr., G., et. al. 2010. Thomas 19 Calculus 12th Edition . Boston: Addison-Wesley
2. Abadi, & Wintarti, A. 2014 (in press). Kalkulus, Buku 1 . Surabaya
3. Moesono, D. 1994. Kalkulus I (Edisi Revisi) . Surabaya: University Press Surabaya.
4. Stewart, J. 2012. Calculus 7th Edition . Belmont: Brooks/Cole
5. Morash, R.P., 1987. Bridge to Abstract Mathematics. New York: Random House Inc.

Supporting lecturer	Dr. Dian Savitri, S.Si., M.Si. Yuliani Puji Astuti, S.Si., M.Si. 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	Able to apply mathematical logic in drawing conclusions	1. Describe statements and propositions 2. Describe and differentiate the concepts of conjunction, disjunction, and implication 3. Apply appropriate mathematical logic methods (Modus Ponens, Tolens, or Syllogism) in drawing conclusions	**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) 3 x 50		**Material:** Mathematical Logic **Bibliography:** *Morash, RP, 1987. Bridge to Abstract Mathematics. New York: Random House Inc.*	2%
2	Able to apply mathematical logic in drawing conclusions	1. Describe statements and propositions 2. Describe and differentiate the concepts of conjunction, disjunction, and implication 3. Apply appropriate mathematical logic methods (Modus Ponens, Tolens, or Syllogism) in drawing conclusions	**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) 3 x 50		**Material:** Mathematical Logic **Bibliography:** *Morash, RP, 1987. Bridge to Abstract Mathematics. New York: Random House Inc.*	2%
3	Able to describe and visualize the function of one variable, the source area and the result area in the form of a two-dimensional graph	1. Demonstrates knowledge of related functions 2. Determine the origin and result regions of a function 3. Create a graph of a function of one variable	**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) 3 x 50		**Material:** **Library** Function : *Hass, J., Heil C., & Weir, MD, et.al. 2018. Thomas, Calculus 14th Edition (Revised). Boston: Pearson*	2%

4	Able to describe and visualize the function of one variable, the source area and the result area in the form of a two-dimensional graph	1. Demonstrate knowledge of related functions 2. Determine the origin and result regions of a function 3. Create a graph of a function of one variable	**Criteria:** Non-Tests and Student Worksheets **Form of Assessment** : Practice / Performance	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 3 x 50		**Material:** **Library** Function : *Hass, J., Heil C., & Weir, MD, et.al. 2018. Thomas, Calculus 14th Edition (Revised). Boston: Pearson*	2%
5	Able to determine the limit of a function at a certain point	1. Determining the limit of a function at one point intuitively 2. Define the concept of limit formally 3. Determines the limit value of the function at a certain point	**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) 3 x 50		**Material:** Limits **References:** *Purcell, EJ, Varberg, D., and Rigdon, SE 2007. Calculus 9th Edition. Ontario: Pearson, Prentice Hall*	3%
6	Able to determine continuity of function at a certain point	1. Describe the conditions for continuity of a function 2. Determines the continuity of a function at a certain point 3. Determining the discontinuity of a function	**Criteria:** Non-Test **Form of Assessment** : Practice / Performance	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 3 x 50		**Material:** Limits and Continuity **References:** *Hass, J., Heil C., & Weir, MD, et.al. 2018. Thomas, Calculus 14th Edition (Revised). Boston: Pearson*	3%
7	Determine the derivative of the function	1. Determine the derivative of an algebraic function 2. Determines the derivative of an implicit function 3. Using the chain rule solves the derivative of the function 4. Determine the second derivative of a function	**Criteria:** Non-Tests and Student Worksheets **Form of Assessment** : Participatory Activities, Practice/Performance	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 3 x 50		**Material:** Derivative Functions **Library:** *Purcell, EJ, Varberg, D., and Rigdon, SE 2007. Calculus 9th Edition. Ontario: Pearson, Prentice Hall*	4%

8	Midterm exam	Able to complete UTS well, correctly and on time	**Criteria:** UTS test **Form of Assessment** : Participatory Activities, Tests	Written Exam 2 x 50		**Material:** Chapters 1-3 **References:** *Hass, J., Heil C., & Weir, MD, et.al. 2018. Thomas, Calculus 14th Edition (Revised). Boston: Pearson* **Material:** Chapters 1-2 **Bibliography:** *Purcell, EJ, Varberg, D., and Rigdon, SE 2007. Calculus 9th Edition. Ontario: Pearson, Prentice Hall*	20%
9	Able to apply differential concepts in real problems	1. Determine the extreme points and inflection points of functions using differentials 2. Develop a mathematical model of the given real problem 3. Solving real problems using the differential concept	**Criteria:** Non-Tests and Assignments **Form of Assessment** : Participatory Activities, Practice/Performance	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 3 x 50		**Material:** Derivative Applications **Bibliography:** *Hass, J., Heil C., & Weir, MD, et.al. 2018. Thomas, Calculus 14th Edition (Revised). Boston: Pearson*	5%
10	Able to determine the integration results of a function using integration techniques	1. Determine the indefinite integral of a function using integration techniques: algebraic substitution and rational fractions 2. Determine the definite integral of a function with certain integral limits and use integration techniques: algebraic substitution and rational fractions	**Criteria:** Non-Test **Form of Assessment** : Participatory Activities, Practice/Performance	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 3 x 50		**Material:** Integral **Bibliography:** *Hass, J., Heil C., & Weir, MD, et.al. 2018. Thomas, Calculus 14th Edition (Revised). Boston: Pearson*	4%

11	Able to determine the integration results of a function using integration techniques	1. Determining the indefinite integral of a function using integration techniques: partial integration 2. Determining the definite integral of a function with certain integral limits and using integration techniques: partial integration	**Criteria:** Non-Test **Form of Assessment** : Participatory Activities, Practice/Performance	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 3 x 50		**Material:** Integrals **Bibliography:** *Purcell, EJ, Varberg, D., and Rigdon, SE 2007. Calculus 9th Edition. Ontario: Pearson, Prentice Hall*	4%
12	Able to determine the integration results of a function using integration techniques	1. Determining the indefinite integral of a function using integration techniques: trigonometric substitution 2. Determining the definite integral of a function with certain integral limits and using integration techniques: trigonometric substitution	**Criteria:** Non-Tests and Student Worksheets **Form of Assessment** : Participatory Activities, Practice/Performance	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 3 x 50		**Material:** Integral Techniques **References:** *Hass, J., Heil C., & Weir, MD, et.al. 2018. Thomas, Calculus 14th Edition (Revised). Boston: Pearson*	4%
13	Able to apply integral concepts in mathematical problems	1. Determines the area under the curve and between two curves 2. Determines the arc length of the path	**Criteria:** Non-Test **Form of Assessment** : Participatory Activities, Practice/Performance	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 3 x 50		**Material:** Integral Applications **Bibliography:** *Purcell, EJ, Varberg, D., and Rigdon, SE 2007. Calculus 9th Edition. Ontario: Pearson, Prentice Hall*	5%
14	Able to apply integral concepts in mathematical problems	1. Determines the volume of a rotating object 2. Determine the surface area of a rotating object	**Criteria:** Non-Tests and Student Worksheets **Form of Assessment** : Participatory Activities, Practice/Performance	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 3 x 50		**Material:** Integral Applications **Bibliography:** *Purcell, EJ, Varberg, D., and Rigdon, SE 2007. Calculus 9th Edition. Ontario: Pearson, Prentice Hall*	5%

15	Able to apply integral concepts in real problems	1. Develop a mathematical model of the given real problem 2. Solving real problems using integral concepts	**Criteria:** Non-Tests and Assignments **Form of Assessment** : Participatory Activities, Practice/Performance	• Scientific approach: observing, asking, exploring • Method: lecture, discussion, question and answer, giving assignments • Learning strategy: accentuation of information processing (cognitive) 3 x 50		**Material:** Integral Applications **Literature:** *Hass, J., Heil C., & Weir, MD, et.al. 2018. Thomas, Calculus 14th Edition (Revised). Boston: Pearson*	5%
16	Final exams	Solve UAS questions well, correctly and on time	**Criteria:** UAS test **Form of Assessment** : Participatory Activities, Tests	Written Exam 2 x 50		**Material:** Chapters 4-8 **References:** *Hass, J., Heil C., & Weir, MD, et.al. 2018. Thomas, Calculus 14th Edition (Revised). Boston: Pearson* **Material:** Chapters 3-7 **Bibliography:** *Purcell, EJ, Varberg, D., and Rigdon, SE 2007. Calculus 9th Edition. Ontario: Pearson, Prentice Hall*	30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	52%
2.	Practice / Performance	23%
3.	Test	25%
		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.