	Universitas Negeri Surabaya Faculty of Engineering, Electrical Engineering Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Calculus I	2020102052	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	1	February 27, 2024

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

Program Objectives (PO)

PO - 1	Students can explain and analyze functions consisting of irrational and rational algebraic functions
PO - 2	Students can explain and analyze the Transcendent Function
PO - 3	Students can explain and analyze Function Limits
PO - 4	Students can explain and analyze Differential Functions

PLO-PO Matrix

P.O
PO-1
PO-2
PO-3
PO-4

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																

Short Course Description	Through this lecture, the case study learning method is used, with the achievement of students being able to explain and analyze the basic concepts of algebraic functions which discuss irrational and rational algebraic functions, linear functions, parabolic functions, cubic functions, polynomial functions and fractional functions. Then discuss Transcendent functions which include Trigonometric functions, Exponential functions, Logarithmic functions, Hyperbolic functions, and Modulus functions. Limit functions, namely the Limit theorem, determining Limit Values by Direct Substitution, Factorization, Multiplication of Companion Numbers, L'Hopital's Theorem, and the application of the Limit theorem at Infinity. Trigonometric Limits, Continuity of functions with limits. The final discussion in this course is differential algebraic functions, logarithms, exponentials, as well as trigonometry and also their inverses.

References

Main :

1. Louis Leithold, 1991, Kalkulus dan Ilmu Ukur Analitik, edisi 5 , Jakarta : Erlangga.
2. Carla C. Morris, Robert M. Stark, 2016, Fundamentals of Calculus, John Wiley & Sons, Inc. Hoboken, New Jersey, USA

Supporters:

	1. S Balachandra Rao, 2005, Differential Calculus, New Age International (P) Ltd., New Delhi, India 2. Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA
Supporting lecturer	Prof. Dr. Ismet Basuki, M.Pd. Dr. Wiryanto, M.Si. Dr. Farid Baskoro, S.T., M.T. Miftahur Rohman, S.T., M.T.

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	1. Students can explain and analyze functions consisting of irrational and rational algebraic functions 2. Students can explain and analyze linear functions, parabolic functions and cubic functions	Ability to explain and analyze irrational and rational algebraic functions, linear functions, parabolic functions and cubic functions	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Irrational and rational algebraic functions **Reference:** *Louis Leithold, 1991, Calculus and Analytical Geometry, 5th edition, Jakarta: Erlangga.* **Material:** Linear Functions, Parabolic Functions, and Cubic Functions **References:** *Carla C. Morris, Robert M. Stark, 2016, Fundamentals of Calculus, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	3%
2	Students can explain and analyze Polynomial Functions and Fractional Functions	Ability to explain and analyze Polynomial Functions and Fractional Functions	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Polynomial Functions **Bibliography:** *Carla C. Morris, Robert M. Stark, 2016, Fundamentals of Calculus, John Wiley & Sons, Inc. Hoboken, New Jersey, USA* **Material:** Fractional Functions **Bibliography:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	3%

3	1. Students can explain and analyze the Transcendent Function 2. Students can explain and analyze Trigonometric Functions	Ability to explain and analyze Transcendent Functions and Trigonometric Functions	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Transcendent Functions **Bibliography:** *Carla C. Morris, Robert M. Stark, 2016, Fundamentals of Calculus, John Wiley & Sons, Inc. Hoboken, New Jersey, USA* **Material:** Trigonometric Functions **Library:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	3%
4	1. Students can explain and analyze Exponential Functions 2. Students can explain and analyze Logarithmic Functions	Ability to explain and analyze Exponential Functions and Logarithmic Functions	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Exponential Functions **Bibliography:** *Carla C. Morris, Robert M. Stark, 2016, Fundamentals of Calculus, John Wiley & Sons, Inc. Hoboken, New Jersey, USA* **Material:** Logarithmic Functions **Bibliography:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	3%
5	Students can explain and analyze the Hyperbolic Function	Ability to explain and analyze Hyperbolic Function	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Hyperbolic Functions **Bibliography:** *Carla C. Morris, Robert M. Stark, 2016, Fundamentals of Calculus, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	1%
6	Students can explain and analyze the Modulus Function (Absolute)	Ability to explain and analyze Modulus (Absolute) Functions	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Modulus Function (Absolute) **References:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	1%

7	1. Students can explain and analyze Function Limits 2. Students can explain and analyze the Limit Theorem	1. Ability to explain and analyze Function Limit Functions 2. Ability to explain and analyze the Limit Theorem Function	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Function Limits **Bibliography:** *Carla C. Morris, Robert M. Stark, 2016, Fundamentals of Calculus, John Wiley & Sons, Inc. Hoboken, New Jersey, USA* **Material:** Limit Theorem **Bibliography:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	1%
8	Mid-term exam with material from Meeting 1 to Meeting 7	Full marks are obtained if you do all the questions correctly	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Test	Written exam 2 X 50 minutes	Written exam 2 X 50 minutes	**Material:** **Library** Questions : *Carla C. Morris, Robert M. Stark, 2016, Fundamentals of Calculus, John Wiley & Sons, Inc. Hoboken, New Jersey, USA* **Material:** Questions **Library:** *Louis Leithold, 1991, Calculus and Analytical Geometry, 5th edition, Jakarta: Erlangga.* **Material:** **Library** Questions : *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	20%

9	1. Students can explain and analyze Limit Values using Direct Substitution 2. Students can explain and analyze Limit Values using Factorization	1. Ability to explain and analyze Limit Values with Direct Substitution 2. Ability to explain and analyze Limit Values with Factorization	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Limit Values with Direct Substitution **Bibliography:** *Carla C. Morris, Robert M. Stark, 2016, Fundamentals of Calculus, John Wiley & Sons, Inc. Hoboken, New Jersey, USA* **Material:** Limit Values with Factorization **Literature:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	1%
10	1. Students can explain and analyze Limit Values by Multiplication of Companion Numbers 2. Students can explain and analyze Limit Values using L'Hopital's Theorem	1. Ability to explain and analyze Limit Values by Multiplication of Friend Numbers 2. Ability to explain and analyze Limit Values using L'Hopital's Theorem	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Limit Values with Multiplication of Numbers **Bibliography:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA* **Material:** Limit Values with L'Hopital's Theorem **Bibliography:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	1%
11	Students can explain and analyze the Application of the Limit Theorem at Infinity	Ability to explain and analyze the Application of the Limit Theorem at Infinity	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Application of the Limit Theorem at Infinity **References:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	1%
12	Students can explain and analyze Trigonometric Limits	Ability to explain and analyze Trigonometric Limits	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Trigonometric Limits **Bibliography:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	1%

13	1. Students can explain and analyze Derivatives of Functions with Limits 2. Students can explain and analyze the Continuity of a Function	1. Ability to explain and analyze Function Derivatives with Limits 2. Ability to explain and analyze Continuity of a Function	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Participatory Activities	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Derivatives of Functions with Limits **Bibliography:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA* **Material:** Continuity of a Function **Bibliography:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	1%
14	1. Students can explain and analyze Differential Algebraic Functions 2. Students can explain and analyze Differential Logarithmic Functions	1. Ability to explain and analyze Differential Algebraic Functions 2. Ability to explain and analyze Differential Logarithmic Functions	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Project Results Assessment / Product Assessment	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Differential Algebraic Functions **Reference:** *S Balachandra Rao, 2005, Differential Calculus, New Age International (P) Ltd., New Delhi, India* **Material:** Differential Logarithmic Functions **Bibliography:** *S Balachandra Rao, 2005, Differential Calculus, New Age International (P) Ltd., New Delhi, India*	15%
15	1. Students can explain and analyze Differential Exponential Functions 2. Students can explain and analyze the basic formulas for deriving trigonometric functions	1. Ability to explain and analyze Differential Exponential Functions 2. Ability to explain and analyze basic formulas for deriving trigonometric functions	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Project Results Assessment / Product Assessment	Problem-based learning, lectures and discussions 2 X 50 minutes	Problem-based learning, lectures and discussions 2 X 50 minutes	**Material:** Differential Exponential Functions **References:** *S Balachandra Rao, 2005, Differential Calculus, New Age International (P) Ltd., New Delhi, India* **Material:** Basic formulas for deriving trigonometric functions. **Reference:** *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	15%

16	Final Semester Exam with material from Meeting 1 to Meeting 15	Full marks are obtained if you do all the questions correctly	**Criteria:** Full marks are obtained if you do all the questions correctly **Form of Assessment** : Test	Written Exam 2 X 50 minutes	Written Exam 2 X 50 minutes	**Material:** Questions **Library:** *Louis Leithold, 1991, Calculus and Analytical Geometry, 5th edition, Jakarta: Erlangga.* **Material:** **Library** Questions : *Carla C. Morris, Robert M. Stark, 2016, Fundamentals of Calculus, John Wiley & Sons, Inc. Hoboken, New Jersey, USA* **Material:** Questions **Library:** *S Balachandra Rao, 2005, Differential Calculus, New Age International (P) Ltd., New Delhi, India* **Material:** **Library** Questions : *Anton, Bivens, Davis, Calculus 10th edition, 2012, John Wiley & Sons, Inc. Hoboken, New Jersey, USA*	30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	20%
2.	Project Results Assessment / Product Assessment	30%
3.	Test	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.