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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Mathematics 1	2120102107	Compulsory Curriculum Subjects - National	T=3	P=0	ECTS=4.77	1	April 28, 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-5	Work independently and in groups
	PLO-11	Design and development of solutions that take into account the environment and sustainability
	PLO-14	Science and engineering knowledge
	Program Objectives (PO)	
	PO - 1	able to understand and calculate vectors
	PO - 2	Able to define, draw and calculate functions
	PO - 3	Able to solve function limits
	PO - 4	Able to understand the continuity of function at one point
	PO - 5	Understand the definition and properties of derivatives and be able to find derivatives of various functions
	PLO-PO Matrix	

P.O	PLO-5	PLO-11	PLO-14
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	Study of the basics of mathematics through understanding the concepts of theorems and their application to various problems including real number systems, complexes, vectors, functions, function limits and continuity, graphs of functions, polar coordinates, derivatives of functions along with their application to straight line equations, minimum maximum values and rate changes related fields so that students can apply them in the field of mechanical engineering	
References	**Main :**	

	1. [1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advance Engineering Mathematic, Edisi ke-7, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United Stated of America 2. [2] D. Varberg, E. J. Purcell, S.E. Rigdon, Calculus, 9th ed., PEARSON, Prentice Hall, 2007. 3. [3] Thomas, 7th ed dan Howard Anton, 10th ed 4. [3] Howard Anton,Elementary Linear Algebra 9th Edition, Wiley, 2005.
	Supporters:
	1. [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445
Supporting lecturer	Iskandar, S.T., M.T. Tri Hartutuk Ningsih, S.T., M.T. Ika Nurjannah, S.Pd., M.T. Handini Novita Sari, S.Pd., 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	Able to explain and understand the real number system, inequalities and absolute values as well as the Cartesian coordinate system.	1. Explain the types of numbers starting from the simplest numbers to the most complex numbers 2. Explains radical power numbers and their mathematical operations 3. Explain and be able to solve equations and inequalities	**Criteria:** 1. Full marks are obtained if you do all the questions correctly 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question **Form of Assessment** : Participatory Activities		Brainstorming discussions and problem-based learning carried out online if offline is not possible 3 x 50	**Material:** Number systems (Real numbers, absolute values, inequalities, complex numbers) **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** Number systems (Real numbers, absolute values, inequalities, complex numbers) **References:** *[2] D. Varberg, EJ Purcell, SE Rigdon, Calculus, 9th ed., PEARSON, Prentice Hall, 2007.*	5%

2	Understand the definition of vectors, relations and operations in vector algebra	Explains the definition of vectors and relations and vector algebra operations	**Criteria:** 1. Full marks are obtained if you do all the questions correctly 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question **Form of Assessment** : Participatory Activities	Problem-based learning and discussion 3 X 50		**Material:** definitions of vectors and relations and vector algebra operations. **Reference:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** definitions of vectors and relations and vector algebra operations. **Reference:** *[3] Howard Anton, Elementary Linear Algebra 9th Edition, Wiley, 2005.*	3%

3	1. Understand vector algebra operations 2. able to calculate the angle formed by 2 vectors 3. calculate the area of a parallelogram 4. able to calculate the parallel volume of the epipedum	1. Explain vector algebra operations 2. Calculating the angle formed by 2 vectors, calculating the area of a parallelogram and calculating the parallel volume of the epipedum	**Criteria:** 1. Full marks are obtained if you do all the questions correctly 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question **Form of Assessment** : Participatory Activities	Problem-based learning and discussion 3 X 50		**Material:** vector algebra operations, angles formed by 2 vectors, area of a parallelogram and parallel volume of the epipedum . **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** vector algebra operations, angles formed by 2 vectors, area of a parallelogram and parallel volume of an epipedum. **References:** *[3] Thomas, 7th ed and Howard Anton, 10th ed*	5%

4	1. Understand vector algebra operations. 2. able to calculate the angle formed by 2 vectors. 3. Able to calculate the area of a parallelogram. 4. able to calculate the parallel volume of the epipedum.	1. able to calculate values in vector algebra operations. 2. Calculate the angle formed by two vectors. 3. calculate the area of a parallelogram 4. calculate the parallel volume of the epipedum	**Criteria:** 1. Full marks are obtained if you do all the questions correctly 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question **Form of Assessment** : Participatory Activities	Problem-based learning and discussion 3 X 50		**Material:** vector algebra operations, angles formed by 2 vectors, area of a parallelogram and parallel volume of the epipedum . **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** vector algebra operations, angles formed by 2 vectors, area of a parallelogram and parallel volume of the epipedum . **Reference:** *[4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445*	5%

5	1. Able to define functions, understand various functions. 2. Able to draw function graphs. 3. able to determine the origin area (domain) and the result area (function). 4. Able to understand graphic shifts. 5. Able to calculate function operations and function composition, 6. Able to draw function graphs in polar coordinates.	1. Explain the definition of function 2. Explain the various functions. 3. Draw function graphs, determine domain areas and function areas. 4. Draw function graphs with translation/shift laws. 5. Explains the occurrence of new functions based on the operation of functions and function composition. 6. Explain the depiction of function graphs in polar coordinates	**Criteria:** 1. Full marks are obtained if you do all the questions correctly. 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question. **Form of Assessment** : Participatory Activities	Problem and discussion based learning. 3 X 50		**Material:** definition of function, various functions, function graphs, domains and function areas, function graphs with translation/shift laws, function graphs in polar coordinates **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** function definitions, various functions, function graphs, domain areas and function areas, function graphs with translation/shift laws, function graphs in polar coordinates. **References:** *[3] Howard Anton, Elementary Linear Algebra 9th Edition, Wiley, 2005.*	3%

6	1. Able to define functions, understand various functions 2. Able to draw function graphs. 3. Able to determine the origin area (domain) and result area (function). 4. Able to understand graphic shifts. 5. Able to calculate function operations and function composition. 6. Able to draw function graphs in polar coordinates.	1. Explain the definition of function. 2. Explain the various functions. 3. Draw function graphs, determine domain areas and function areas. 4. Draw function graphs with translation/shift laws. 5. Explains the occurrence of new functions based on the operation of functions and function composition. 6. Explain the depiction of function graphs in polar coordinates.	**Criteria:** 1. Full marks are obtained if you do all the questions correctly. 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question. **Form of Assessment** : Participatory Activities	Problem-based learning and discussion 3 X 50		**Material:** definition of function, various functions, function graphs, domains and function areas, function graphs with translation/shift laws, function graphs in polar coordinates **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** function definitions, various functions, function graphs, domain areas and function areas, function graphs with translation/shift laws, function graphs in polar coordinates **References:** *[2] D. Varberg, EJ Purcell, SE Rigdon, Calculus, 9th ed., PEARSON, Prentice Hall, 2007.*	5%

7	1. Able to define functions, understand various functions. 2. Able to draw function graphs. 3. Able to determine the origin area (domain) and result area (function). 4. Able to understand graphic shifts. 5. Calculating function operations and function composition. 6. Able to draw function graphs in polar coordinates	1. Explain the definition of function. 2. Explain the various functions. 3. Draw function graphs, determine domain areas and function areas. 4. Draw function graphs with translation/shift laws 5. Explains the occurrence of new functions based on the operation of functions and function composition. 6. Explain the depiction of function graphs in polar coordinates.	**Criteria:** 1. Full marks are obtained if you do all the questions correctly. 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question. **Form of Assessment** : Participatory Activities	Problem-based learning and discussion 3 X 50		**Material:** definition of function, various functions, function graphs, domains and function areas, function graphs with translation/shift laws, function graphs in polar coordinates **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** function definitions, various functions, function graphs, domain areas and function areas, function graphs with translation/shift laws, function graphs in polar coordinates **References:** *[2] D. Varberg, EJ Purcell, SE Rigdon, Calculus, 9th ed., PEARSON, Prentice Hall, 2007.*	3%

8	Midterm exam	Midterm exam	**Criteria:** 1. Full marks are obtained if you do all the questions correctly. 2. The mark is not full if there is an answer to the question that is not correct, and the mark is based on the score per point of the question **Form of Assessment** : Test	Midterm Exam 3 X 50		**Material:** definition of function, various functions, function graphs, domains and function areas, function graphs with translation/shift laws, function graphs in polar coordinates **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445*	20%

9	Able to solve function limits.	1. Explain the definition of limit. 2. Explain limit theorems. 3. Explain the limits of trigonometric functions. 4. Explain the limits of rational numbers. 5. Explain the limit of indefinite numbers. 6. Explain the limits of exponential numbers.	**Criteria:** Full marks are obtained if you do all the questions correctly. **Form of Assessment** : Participatory Activities	Problem-based learning and discussion 3 X 50		**Material:** limits and functions **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** limits and functions **References:** *[3] Thomas, 7th ed and Howard Anton, 10th ed*	5%

10	Able to solve function limits	1. Explain the definition of limit. 2. Explain limit theorems. 3. Explain the limits of trigonometric functions 4. Explain the limits of rational numbers. 5. Explain the limit of indefinite numbers 6. Explain the limits of exponential numbers	**Criteria:** 1. Full marks are obtained if you do all the questions correctly. 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question. **Form of Assessment** : Participatory Activities	Problem and discussion based learning. 3 X 50		**Material:** limits and functions **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** limits and functions **References:** *[3] Thomas, 7th ed and Howard Anton, 10th ed*	2%

11	Able to understand the continuity of function at one point.	Proving the condition that the function is continuous at one point	**Criteria:** 1. Full marks are obtained if you do all the questions correctly. 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question. **Form of Assessment** : Participatory Activities	Problem and discussion based learning. 3 X 50		**Material:** continuous function at one point **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** continuous function at one point **References:** *[3] Howard Anton, Elementary Linear Algebra 9th Edition, Wiley, 2005.*	5%

12	Understand the definition and properties of derivatives and be able to find derivatives of various functions.	1. Explain the definition of a derivative and the properties of a derivative 2. Explain derivatives with chain rules, higher order derivatives, implicit function derivatives and parameter function derivatives	**Criteria:** 1. Full marks are obtained if you do all the questions correctly 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question **Form of Assessment** : Participatory Activities	Problem and discussion based learning. 3 X 50		**Material:** derivatives and derivative properties **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** derivatives and derivative properties **References:** *[3] Howard Anton, Elementary Linear Algebra 9th Edition, Wiley, 2005.*	3%

13	Understand the definition and properties of derivatives and be able to find derivatives of various functions.	1. Explain the definition of a derivative and the properties of a derivative. 2. Explain derivatives with the chain rule, higher order derivatives, implicit function derivatives and parameter function derivatives.	**Criteria:** 1. Full marks are obtained if you do all the questions correctly. 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question. **Form of Assessment** : Participatory Activities	Problem and discussion based learning. 3 X 50		**Material:** derivatives and derivative properties **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** derivatives and derivative properties **Reference:** *[4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445*	3%

14	Able to understand the application of the derivative of a function.	1. Explain the application of the derivative of a function to the velocity of solid particles, the velocity of liquids. 2. extreme values (maximum-minimum) and associated rates of change.	**Criteria:** 1. Full marks are obtained if you do all the questions correctly. 2. The mark is not full if there is an answer to the question that is not correct, and the mark is based on the score per point on the question. **Form of Assessment** : Participatory Activities, Portfolio Assessment	Problem-based learning and discussion 3 X 50		**Material:** derivative of a function on solid particle velocity, liquid velocity, extreme values **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** derivative of a function on solid particle velocity, liquid velocity, extreme values **References:** *[4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445*	3%

15	Able to understand the application of the derivative of a function	1. Explain the application of the derivative of a function to the velocity of solid particles, the velocity of liquids. 2. extreme values (maximum-minimum) and associated rates of change.	**Criteria:** 1. Full marks are obtained if you do all the questions correctly. 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question. **Form of Assessment** : Participatory Activities	Problem and discussion based learning. 3 X 50		**Material:** derivative of a function on solid particle velocity, liquid velocity, extreme values **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** derivative of a function on solid particle velocity, liquid velocity, extreme values **References:** *[3] Thomas, 7th ed and Howard Anton, 10th ed*	5%

16	FINAL SEMESTER EXAMINATION (UAS)	Able to work on questions from Limit, Continuity and Derivative material.	**Criteria:** 1. Full marks are obtained if you do all the questions correctly. 2. The score is not full, if there is an answer to a question that is not correct, the score is adjusted according to the score per point on the question. **Form of Assessment** : Test	Implementation of UAS. 3 x 50		**Material:** limits, continuity and derivatives **References:** *[1]. Spiegel, Murray R, Advanced Calculus, Schaum's Series, Mc. Graw Hill, Singapore, 1981 [2]. Kreyzig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993 [3]. Paul A. Calter, MSME & Michael A. Calter, PH.D, Technical Mathematics with Calculus, 2011, John Willey & Sons Inc. Wesleyan University, United States of America [4]. Huw Fox & W. Bolton, Mathematics for Engineers and Technologists, 2002, Elsevier Science & Technology Books, ISBN: 0750655445* **Material:** limits, continuity and derivatives **References:** *[2] D. Varberg, EJ Purcell, SE Rigdon, Calculus, 9th ed., PEARSON, Prentice Hall, 2007.* **Material:** All material at meeting 9-15 **References:** *[3] Howard Anton, Elementary Linear Algebra 9th Edition, Wiley, 2005.*	25%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	53.5%
2.	Portfolio Assessment	1.5%
3.	Test	45%
		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.