



MODULE HANDBOOK MAX-PLUS ALGEBRA

**MASTER DEGREE PROGRAM
DEPARTMENT OF MATHEMATICS
FACULTY OF SCIENCE AND DATA ANALYTICS
INSTITUT TEKNOLOGI SEPULUH NOPEMBER**

MODULE HANDBOOK

MAX-PLUS ALGEBRA

Module name	Max-Plus Algebra	
Module level	Master	
Code	KM185212	
Course (if applicable)	Max-Plus Algebra	
Semester	Spring (Genap)	
Person responsible for the module	Prof. Dr. Subiono, M.Sc.	
Lecturer	Prof. Dr. Subiono, M.Sc.	
Language	Bahasa Indonesia and English	
Relation to curriculum	Master degree program, mandatory, 2 nd semester.	
Type of teaching, contact hours	Lectures, <60 students	
Workload	1. Lectures : 3 x 50 = 150 minutes per week. 2. Exercises and Assignments : 3 x 60 = 180 minutes (3 hours) per week. 3. Private learning : 3 x 60 = 180 minutes (3 hours) per week.	
Credit points	3 credit points (sks)	
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.	
Mandatory prerequisites	Module theory	
Learning outcomes and their corresponding ILOs	Course Learning Outcome (CLO) after completing this module, CLO 1 : A mature student is able to develop math and writing mathematical proofs by default. CLO 2 : Students are able to appreciate the importance of understanding the structure of algebra to a higher - level concepts. CLO – 3 :Students can create awareness khususnya symbolic thinking within the framework of algebra supertropical CLO – 4 : Students are able to develop an understanding of the concept and be able to draw conclusions and theories particularly pituitary max plus algebra idea to issue a large scale computing system	

	<p>CLO – 5 : Students have the understanding and the ability to use mathematical models to analyze issues, particularly the issue of scheduling and other disciplines related fields.</p> <p>CLO – 6 : Students are able to develop an understanding matematika framework that supports science and technology, and mathematics as well as communicate the results of the development of understanding orally in the form of presentations and writing standard in mathematics</p>	
Content	<p>This course is presented on a study of a fundamental concept Algebra Max Plus and development that is supertropical algebra. The discussion focused on aspects of Theory and Applications. Furthermore, given the understanding Petri net in general, especially the relationship with the max plus algebra and given the ability to perform numerical computation in any discussion of using Scilab Max Plus Algebra Toolbox. Problem-based discussion is an integrated part in the study. Assessment of learning outcomes is done through an evaluation board, presentations and discussion of learners in the classroom</p>	
Study and examination requirements and forms of examination	<ul style="list-style-type: none"> • In-class exercises • Assignment 1, 2, 3 • Mid-term examination • Final examination 	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom.	
Reading list	<p>Main :</p> <ol style="list-style-type: none"> 1. Subiono. "Lecture Notes: Ajabar Max Plus and Applications", Department of Mathematics FMKSD-ITS, 2018. 2. Subiono and Kistosil Fahim, On Computing Supply Chain Scheduling Using Max Plus Algebra, Applied Mathematical Science, Journal for Theory and Applications, vol. 10, no. 10, 477-486, 2016 DOI 10.12988 / ams.2016.618. 3. Kistosil Fahim, Subiono and Jacob van der Woude, On a generalization of power algorithms over max-plus algebra, DEDS, Discrete Event Dyn Syst (2017) 27: 181-203, DOI 10.1007 / s10626-016-0235-4, Springer Science + Business Media New York in 2017. 4. Subiono, "On Classes of Min Max Plus Systems and Their Applications", PhD. Thesis, TU Delft, The Netherlands, (2000) 5. Olsder GJ, Heidegott B. and JW van der Woude, Maxplus at Work, Modeling and Analysis of Synchronized System: A Course on Max-Plus Algebra and ITS Applications, Princeton University Press, 2006 6. Subiono, and JW van Woude, "Power Algorithms for (mas, +) - and Bipartite (min, max, +) - Systems", Discrete Event Dynamic Systems: Theory and Applications, Volume 10, pp 369-389, 2002 7. CG Cassandras and Stephane LaFortune, Introduction to Discrete Event Systems, Second Edition, Springer, 2008 8. Peter Butkovic, "Max-Linear Systems: Theory and Algorithms", Spriger 2010 	

	<ol style="list-style-type: none"> 9. Michel Gondran and Michel Minoux, "Graph, Dioids and Semirings, New Models and Algorithms", Springer, 2008 10. Christos G. Cassandras and Stephane LaFortune, "Introduction to Discrete Event Systems, Second Edition", Spriger 2008 11. James L. Peterson, "Petri Net Theory and the Modeling of Systems", Printice Hall, Inc., 1981 <p>Supporting :</p> <ol style="list-style-type: none"> 1. Dieky Adzkiya, "Building Petri Net Model of Traffic Lights and simulation", Thesis Department of Mathematics ITS, (2008) 2. Peter Fendiyanto " Supervisory Control on Traffic Management Systems at Airports Using Petri Net ", Thesis Department of Mathematics ITS, (2016)
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