Discrete Mathematics

Module designation	Discrete Mathematics
Semester(s) in which the module is taught	2
Person responsible for the module	Devi Eka Wardani Meganingtyas, S.Pd., M.Si
Language	Indonesia
Relation to curriculum	*Compulsory*
Teaching methods	Teaching methods used in this course are: • Lecture (small group discussions and project-based learning) • Structured assignments (individual task)
Workload (incl. contact hours, self-study hours)	Total workload is 510 minutes per week which consists of 150 minutes learning activity, 180 minutes structured task and 180 minutes individual learning per week for 16 weeks. TOTAL WORKLOAD PER SEMESTER 510 X 16 = 8160 minutes = 136 hours
Credit points	136 hours / 30 hours ≈ 4,5 ECTS
Required and recommended prerequisites for joining the module	*Number Theory*

Program intended learning outcomes	PLO 5. Able to make appropriate decisions in the context of solving problems in their area of expertise, based on the results of information and data analysis. PLO 7. Mastering mathematical theoretical concepts including mathematical logic, discrete mathematics, algebra, analysis and geometry, as well as theory of probability and statistics. PLO 10. Able to develop mathematical thinking, starting from procedural/computational understanding to a broad understanding including exploration, logical reasoning, generalization, abstraction, and formal proof. PLO 11. Able to observe, recognize, formulate and solve problems through a mathematical approach with or without the help of software. Course Learning Outcomes (CLO) to be achieved in this course are: CLO 1 : Understand the definition of sets, mathematical induction, inclusion and exclusion principles, multiple sets and statements. CLO 2 : Understand the rules of addition and multiplication, combinations, permutations, generation of combinations and permutations. CLO 3 : Comprehend the relational model for databases, binary relations, equality and partition relations, partial and lattice ordering relations, chaining and chain reciprocation, task scheduling problems. CLO 4 : Understanding of numeric functions, asymptotic behavior of a numeric function, generating functions and combinatorial problems. CLO 5 : Understand recurrence relations, homogeneous solutions, special solutions, total solutions and solutions using generating function methods. CLO 6 : Understanding Groups, Subgroups, Permutation Groups, group codes and codes, isomorphism, automorphism, homomorphism, ring, integral area and ring homomorphism field, polynomial ring and cyclic code. CLO 7 : Understand lattice and algebraic systems, the principle of duality, spreading lattice and

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complementary lattice, boolean lattice and boolean algebra, uniqueness of Boolean algebra, and statement calculus.
CLO 8 : Understand graphs, multiple graphs and weighted graphs, paths and series, shortest paths in weighted graphs, euler paths and series, Hamilton paths and series, salesman problems, factors of a graph and planar graphs.
CLO 9 : Understand trees, rooted trees, path lengths in rooted trees, prefix codes, binary search trees, spanning trees and cut sets, minimum spanning trees, transport networks.

The relationship between PLO and CLO in this course is described as follows:
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<tr><th rowspan="2">CLO</th><th colspan="4">PLO</th></tr>
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<td>Content</td>
<td>Students will learn about:

sets and expressions, permutations and combinations, relations and functions, discrete numeric functions and generating functions, recursive relations and gruf and ring recursive algorithms, boolean algebra, graphs and planar graphs, trees, and cut sets.</td>
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<td>Examination forms</td>
<td>Assessment for this course includes:

20% structured assignments, 30% midterms and 50% final exams</td>
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<td>Study and examination requirements</td>
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Students should have attended all lectures and submitted all scheduled individual and group assignments prior to the final examination.</td>
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Reading list	Main References: Rosen, Kenneth. H., *Discrete Mathematics And Its Applications*, Seventh Edition, McGraw-Hill, 2012. Additional References: Liu, C.L., *Dasar-Dasar matematika Diskret,* Gramedia Pustaka Utama, 1995. Wijaya, Belawati., *Pengantar Matematika Diskret,* Pusat Antar Universitas Ilmu Komputer UI, 1987 Daliyo dan Wardoyo,Retantyo. *Matematika Diskrit,* Proyek Pembinaan Tenaga Kependidikan, Persiapan Perkuliahan Program Lanjutan MIPA LPTK (Program B), FMIPA UGM, 1990. Budayasa, I Ketut, *Matematika Diskrit 1,* Program Pascasarjana Pendidikan Matematika IKIP.