Course Name : Discrete Mathematics								
Course Code	Course Type	Regular Semester	Lecture (hours/we ek)	Seminar (hours/we ek)	Lab. (hours/we ek)	Credits	ECTS	
CMP 130	В	Spring	3.00	1.00	0.00	3.50	5.00	
	Lecturer	Vladimir Muka, M	sc					
Assistant		Vladimir Muka, Msc						
Course language		Albanian						
Course level		Bachelor						
Learning any area of mathematics requires a comprehension of the conce occurring in the area (each of which requires a clear definition) and a kno of certain valid statements, each of which is either an axiom (whose truth accepted without proof) or a theorem (whose truth can be established with of concepts and other statements). This is best accomplished if we can uproofs of theorems and are able to write some proofs of our own. In course discrete mathematocs will be introduced to several methods of proof that used to establish the truth of theorems as well as ways to show that state are false. These methods are based on logic, which allow us to use reason show that a given statement is true or false. Although it is not our intentic into any of this in great depth, it is our goal to present enough details and examples so that a sound introduction to proofs can be obtained. Develog good understanding of proofs requires a great deal of practice and experi comprehending how others prove theorems. The main areas of study are proofs, predicates and Quantifiers theory, set theory, number theory, relafunctions, sequences, numerical series and induction				nowledge uth is with the aid understand urse nat can be atements soning to ntion to go and loping a erience and re logic and elations and				
Objectives		The objective of the Discrete Mathematics course is to provide students broad and accessible guide to the fundamentals of discrete mathematics and to show how it may be applied to various areas, especially computer science and information technology. Through this course it is intended to learn students schemes and algorithms of mathematical logic in order to have them as effective tools for solving various problem situations. To achieve this goal, in the teaching materials of the discrete mathematics course, concepts related to mathematical logic, predicates and quantifier, mathematical theory of sets, mathematical reasoning, number theory, relations, functions, recurrences, algorithms, sequence, numerical series and mathematical induction.						
Core Concepts		1. Propositional Logic 2. Predicates and Quantifiers 3. Proof Methods 4. Sets, 5. Relations 6. Functions, 7. Algorithms 8. Divisibility 9. Mathematical induction 10. Sequencs. Progressions. 11. Sequences and sums 12. Relations 13. Correctness of programs						
Course Outlin	ne							
Week				Торіс				
1	Margaret L. Li Applications, College, faqe fifth Edition, f Algebra & Trig	nomials. Factoring. Rational Expressions. Equations. Inequalities. Exponents. Radicals. aret L. Lial, Raymond N. Greenwell, and Nathan P. Ritchey. (2017) Calculus with cations, Eleventh Edition, faqe 22-50. Robert Blitzer (2018). College algebra. Miami Dade ge, faqe 111-126, 173-177, 182-187 Mark Dugopolski, (2009) Algebra for College Students, Edition, faqe 125-127, 377-433, 527-533 Michael Sullivan, Chicago State University (2011), ora & Trigonometry ninth Edition, faqe 119-134 Adapted lectures in Albanian: Discrete ematics. Vladimir Muka						
2	Compound St Equivalences. page 23 – 40.	nts; Compound Statements; Truth Values; Evaluating the Truth of More General and Statements; Logical Equivalence; Tautologies and Contradictions; Summary of Logical ances. Susanna S. Epp., (2010) Discrete mathematics with applications Fourth edition, 40. Kevin Ferland, (2017) Discrete mathematics and applications second edition, page apted lectures in Albanian: Discrete mathematics. Vladimir Muka						

3	Logical Equivalences Involving []; Representation of If-Then As Or; The Negation of a Conditional Statement; The Contrapositive of a Conditional Statement; The Converse and Inverse of a Conditional Statement; Only If and the Biconditional; Necessary and Sufficient Conditions; Susanna S. Epp., (2010) Discrete mathematics with applications Fourth edition, page 41 – 60. Kevin Ferland, (2017) Discrete mathematics and applications second edition, page 33-37 Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka
4	The Universal Quantifier: \forall ; The Existential Quantifier: \exists ; Formal Versus Informal Language; Universal Conditional Statements; Equivalent Forms of Universal and Existential Statements; Implicit Quantification; Negations of Quantified Statements; Negations of Universal Conditional Statements; The Relation among \forall , \exists , \land , and \lor ; Vacuous Truth of Universal Statements; Variants of Universal Conditional Statements; Necessary and Sufficient Conditions, Only If Susanna S. Epp., (2010) Discrete mathematics with applications Fourth edition, page 108 – 132. Kenneth H. Rosen (2018) Discrete mathematics and its applications Eighth edition, page 40 – 96. T Veerarajan (2018) Discrete mathematics page 30-49 Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka
5	Sets and Subsets, Set Equality, Set Operations and their properties, unions, intersections, differences, and complements, The algebraic laws of set theory. Dual statement and principle of duality. Ordered pairs and cartesian product. Power sets. T Veerarajan (2018) Discrete mathematics page 281-296 Susanna S. Epp., (2010) Discrete mathematics with applications Fourth edition, page 336-374 Gary Chartrand, Ping Zhang (2011) Discrete Mathematics, page 53-72. Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka
6	Methods of Proof, Quantified Statements, direct Proof, Proof by Contrapositive, Proof by Cases, Counterexamples, Existence Proofs, Proof by Contradiction. Gary Chartrand, Ping Zhang (2011) Discrete Mathematics, page 79-108 Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka
7	Tautologies and Contradictions; Logical Equivalences. The algebraic laws of set theory. Methods of Proof Susanna S. Epp., (2010) Discrete mathematics with applications Fourth edition, page 35 - 40. Kenneth H. Rosen (2018) Discrete mathematics and its applications Eighth edition, page 70 - 96 Gary Chartrand, Ping Zhang (2011) Discrete Mathematics, page 79-108 Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka
8	Midterm
9	Number Theory, Prime Number Theory, Primes and Common Divisors, Algorithms, Greatest Common Divisors, Least Common Multiple, The Euclidean Algorithm, gcds as Linear Combinations, Theory of Congruences. Gerard O'Regan (2021)- Guide to Discrete Mathematics_ Second Edition, page 55-74 Kenneth H. Rosen (2018)- Discrete Mathematics and Its Applications-Eighth Edition, page 271-290 Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka
10	Binary System and Computer Representation of Numbers, Modular Arithmetic, Representations of Integers, Algorithms for Integer Operations, Modular Exponentiation, Gerard O'Regan (2021)-Guide to Discrete Mathematics_ Second Edition, page 75-77 Kenneth H. Rosen (2018)- Discrete Mathematics and Its Applications- Eighth Edition, page 259-270 Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka
11	Relations on Sets . The Inverse of a Relation; Directed Graph of a Relation; n-ary Relations. Reflexivity, Symmetry, and Transitivity. Properties; Properties of Relations on Infinite Sets. Equivalence Relations .The Relation Induced by a Partition; Definition of an Equivalence Relation; Equivalence. Classes of an Equivalence Relation. Antisymmetry; Partial Order Relations Susanna S. Epp., (2010) Discrete mathematics with applications Fourth edition, page 442-450 Jon Pierre Fortney (2020) - Discrete Mathematics for Computer Science-page 76-86 Kenneth H. Rosen (2018)- Discrete Mathematics and Its Applications- Eighth Edition, page 599-606 Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka
12	Modular Arithmetic with Applications to Cryptography. Properties of Congruence Modulo n; Finding an Inverse Modulo n. Partial Order Relations. Antisymmetry. partially and Totally Ordered Sets; Susanna S. Epp., (2010) Discrete mathematics with applications Fourth edition, page 460-470 B.S.Vatsa, Suchi Vatsa, (2009), Discrete Mathematics, fourth Edition – page 43-50 Kenneth H. Rosen (2018)- Discrete Mathematics and Its Applications- Eighth Edition, page 607-640 Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka

		nctions Defined on General Sets.Checking Whether a Function Is Well Defined;			
13	Functions Acting on Sets. Domain and range. One-to-One Functions; One-to-One Functions on Infinite Sets; Onto Functions; Onto Functions on Infinite Sets; Relations between Exponentialand Logarithmic Functions; One-to-One Correspondences; Composition of Functions.; Composition of One-to-One Functions; Composition of Onto Functions. Inverse function Susanna S. Epp., (2010) Discrete mathematics with applications Fourth edition, page 384-427 Gary Chartrand, Ping Zhang (2011) Discrete Mathematics, page 159-183 Kevin Ferland (2017) Discrete Mathematics and Applications- Second Edition, page 309-333 Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka				
14	Definition and graph of numeric sequence. Factorial. Find the formula for the general term of a sequence. Recurrent formula. Arithmetic progression. The general term of an arithmetic progression. Properties of arithmetic progression. Arithmetic progression series. Sum n the first terms of an arithmetic progression. T Veerarajan (2018) Discrete mathematics page 94-116 Richard Johnsonbaugh (2014), Discrete Mathematics Seventh Edition, page 154-166 Calvin Jongsma, (2019) - Introduction to Discrete Mathematics via Logic and Proof, page 169-177 Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka				
15	Geometric progression. Formula for the general term. Properties of geometric progression. Geometric progression series. Infinitely decreasing geometric progression, q <1. Mathematical induction. T Veerarajan (2018) Discrete mathematics page 92-94 Gary Chartrand, Ping Zhang (2011) Discrete Mathematics, page-128 Calvin Jongsma, (2019) - Introduction to Discrete Mathematics via Logic and Proof, page 149-169 Kevin Ferland (2017) Discrete Mathematics and Applications- Second Edition, page 227-238 Adapted lectures in Albanian: Discrete mathematics. Vladimir Muka				
16	Final Exam				
P	Prerequisites	The student must attend the course at a minimum rate of 75%.			
	Literature	Leksione te pershtatura ne shqip: Matematika Diskrete-Vladimir Muka			
References		 Kenneth H. Rosen (2018)- Discrete Mathematics and Its Applications- Eighth Edition. Jon Pierre Fortney (2020) - Discrete Mathematics for Computer Science. T Veerarajan (2018) Discrete mathematics. Calvin Jongsma, (2019) - Introduction to Discrete Mathematics via Logic and Proof Gerard O'Regan (2021)- Guide to Discrete Mathematics_ Second Edition. Richard Johnsonbaugh (2014), Discrete Mathematics Seventh Edition. Oscar Levin (2017) Discrete Mathematics_ An Open Introduction, Second Edition. Kevin Ferland (2017) Discrete Mathematics and Applications- Second Edition. Jean Gallier (2015) Discrete Mathematics. Gary Chartrand, Ping Zhang (2011) Discrete Mathematics. 			
Course Outcome					
1	Regarding knowledge and understanding, at the end of the course, the student is expected to be able to: • Explain basic models of discrete mathematics and technology. • To explain how these models can be applied to the respective problems.				
2	Regarding the competencies and skills at the end of the course, the student is expected to be able to: • Analyze the given problems in a logical way. • To express problems in formal language • To solve problems using recursive methods • To solve combinatorial problems				

Course Evaluation						
In-term Studies	Quantity	Percentage				
Midterms		1	35			
Quizzes		2	14			
Projects		0	0			
Term Projects		0	0			
Laboratory		0	0			
Class Participation	1	1				
Total in-term evaluation percent						
Final exam percent						
Total						
ECTS Workload (Based on Student Workload)						
Activities	Quantity	Duration (hours)	Total (hours)			
Course duration (Including the exam week: 16x Total hours of the course)	16	4	64			
Study hours outside the classroom (Preparation, Practice, etc.)	14	4	56			
Duties	0	0	0			
Midterms	1	0	0			
Final Exam	1	5	5			
Other	0	0	0			
Total Work Load						
Total Work Load / 25 (hours)						
ECTS						