이산수학

개설학기	2018학년도 2학기
소 속	컴퓨터학부
교 수 명	아난드 폴
학 점	3
수업목표	The main objective of this course it to give basic outlook on Discrete Mathematics which includes, propositions, Induction, proof patterns , Graph Theory and functions. Some advanced topics shall also be covered

주차	주차별 학습내용	차시(모듈)	차시별 학습내용	학습목표	학습목차	학습자료	PPT 슬라이드 수
1	Introduction to Class - Online Lecture Logic of Compound Statement	1	Introduction	1. Main goal of this online course on Discrete Mathematics is to lay foundation for Computer Science courses such as data	1. Why Discrete Mathematics 2. Course Contents 3. Lair Paradox 4. Grading Policy 5. Course Evaluation	참고문헌, ppt 교안	12
		2	Do you speak Math	1. Make Sense of problems, and try to solve them 2. Mathematical Reasoning – Abstractly and Quantitatively 3. Mathematical Modeling of	1. Use of Variables 2. Some Mathematical Statement 3. The Language of Sets 4. Set-Builder Notation		13
		3	Logic of Compound statement	1. Applications of Boolean logic 2. Boolean propositions 3. Boolean variables	1. Applications of Boolean logic 2. Boolean propositions 3. Boolean variables		15
2	Proposition/ Boolean Logic Proposition/ De Morgan's Law Proposition/ Logic	1	Logic of Compound statement	1. Logical operators: Conditional 4 2. Logical operators: Bi-conditional 1	1. Logical operators: Conditional 4 2. Logical operators: Bi-conditional 1	참고문헌, ppt 교안	20
		2	Logic of Compound statement	1. Tautology and Contradiction 2. Logical Equivalence	1. Tautology and Contradiction 2. Logical Equivalence		22

	Equivalence	3	Logic of Compound statement	1. Modus Ponens example 2. Modus Ponens 3. Modus Tollens 4. Modus Tollens cont.. 5. Generalization &	1. Modus Ponens example 2. Modus Ponens 3. Modus Tollens 4. Modus Tollens cont.. 5. Generalization &		23
3	HW on Proposition and Logic of Quantified Statement	1	Logics of Quantified Statement	1. Propositional fufictions 2. Anatomy of a propositional function 3. So, why do we care about	1. Propositional fufictions 2. Anatomy of a propositional function 3. So, why do we care about	참고문헌, ppt 교안	18
		2	Logics of Quantified Statement	1. A note on quantifiers 2. Binding variables 3. Negating quantifications 4. Translating from English	1. A note on quantifiers 2. Binding variables 3. Negating quantifications 4. Translating from English		25
		3	Rules of Inference	1. Rules of inference for the universal quantifier 2. Rules of inference for the existential quantifier	1. Rules of inference for the universal quantifier 2. Rules of inference for the existential quantifier		15
4	More on Quantifiers and In Class Practice of - Induction/ Methods of Proofs	1	Number Theory	1. Why prime numbers? 2. The divides operator 3. Theorem on the divides operator 4. Prime numbers 5. Fundamental theorem of	1. Why prime numbers? 2. The divides operator 3. Theorem on the divides operator 4. Prime numbers 5. Fundamental theorem of	참고문헌, ppt 교안	19
		2	Number Theory and Method of Proof	1. Pseudorandom numbers 2. The Caesar cipher 3. Rot13 encoding 4. Proof methods	1. Pseudorandom numbers 2. The Caesar cipher 3. Rot13 encoding 4. Proof methods		17
		3	Method of Proof	1. Proof by contradiction 2. A note on that problem… 3. How others explain proof by contradiction	1. Proof by contradiction 2. A note on that problem… 3. How others explain proof by contradiction		27
5	Induction practice in the class Strong Induction	1	Set Part	1. What is a set? 2. Set properties 3. Specifying a set 4. Often used sets	1. What is a set? 2. Set properties 3. Specifying a set 4. Often used sets	참고문헌, ppt 교안	21
		2	Set Part	1. Proper subsets: Venn diagram 2. Set cardinality	1. Proper subsets: Venn diagram 2. Set cardinality		32

		3	Set Part	1. Set Identities 2. How to prove a set identity 3. What we are going to prove... 4. Proof by using basic set	1. Set Identities 2. How to prove a set identity 3. What we are going to prove... 4. Proof by using basic set		31
6	Number Theory with Example and Practice	1	Function Part	1. Definition of a function 2. Function terminology 3. More functions 4. Even more functions	1. Definition of a function 2. Function terminology 3. More functions 4. Even more functions	참고문헌, ppt 교안	15
		2	Inverse Function	1. More on inverse functions 2. set X mapping into a Set Y	1. More on inverse functions 2. set X mapping into a Set Y		23
		3	Function Part	1. Graphs of functions 2. Compositions of functions 3. Useful functions 4. Sample floor/ceiling questions	1. Graphs of functions 2. Compositions of functions 3. Useful functions 4. Sample floor/ceiling questions		20
7	Sequence	1	Induction I_Sequence	1. Definitions 2. Sequences 3. Geometric vs. arithmetic sequences 4. Fibonacci sequence	1. Definitions 2. Sequences 3. Geometric vs. arithmetic sequences 4. Fibonacci sequence	참고문헌, ppt 교안	30
		2	Induction II_Weak and Strong	1. How do you climb infinite stairs? 2. Let's use that as a proof method	1. How do you climb infinite stairs? 2. Let's use that as a proof method		28
		3	Induction III_Structual and Recursion	1. Chess and induction 2. Inducting stones 3. Recursion 4. Fibonacci sequence	1. Chess and induction 2. Inducting stones 3. Recursion 4. Fibonacci sequence		40
8	Sets Function Introduction	1	RELATIONS	1. What is a relation 2. Representing relations 3. Relations vs. functions 4. Relations on a set	1. What is a relation 2. Representing relations 3. Relations vs. functions 4. Relations on a set	참고문헌, ppt 교안	21
		2	RELATIONS	1. Combining relations 2. Combining relations via Boolean operators 3. Combining relations via	1. Combining relations 2. Combining relations via Boolean operators 3. Combining relations via		23

		3	RELATIONS	1. Representing relations using directed graphs 2. Reflexivity 3. Irreflexivity	1. Representing relations using directed graphs 2. Reflexivity 3. Irreflexivity		26
9	and Inverse Function example	1	Relations App	1. 6 degrees of separation 2. Connectivity relation 3. How long are the paths in a transitive closure?	1. 6 degrees of separation 2. Connectivity relation 3. How long are the paths in a transitive closure?	참고문헌, ppt 교안	21
		2	RSA Relations App	1. Private key cryptography 2. Public key cryptography 3. Is that number prime? 4. More on the Fermat primality test	1. Private key cryptography 2. Public key cryptography 3. Is that number prime? 4. More on the Fermat primality test		32
		3	PGP Relations App	1. PGP and GnuPG 2. How to "crack" PGP 3. Man-in-the-middle attack: "Normal" RSA communication	1. PGP and GnuPG 2. How to "crack" PGP 3. Man-in-the-middle attack: "Normal" RSA communication		21
10	Relations and Recurrence	1	Counting	1. The product rule 2. The sum rule 3. More complex counting problems 4. The inclusion-exclusion	1. The product rule 2. The sum rule 3. More complex counting problems 4. The inclusion-exclusion	참고문헌, ppt 교안	19
		2	Permutation and Combination	1. The pigeonhole principle 2. Generalized pigeonhole principle 3. Sample questions	1. The pigeonhole principle 2. Generalized pigeonhole principle 3. Sample questions		33
		3	Pascal's Triangle	1. Polynomial expansion 2. Polynomial expansion: The binomial theorem 3. Pascal's triangle	1. Polynomial expansion 2. Polynomial expansion: The binomial theorem 3. Pascal's triangle		27
11	Graph Theory Discussion	1	Graph Theory part	1. Seven Bridges of Ko nigsberg 2. A Graph 3. Euler's Solution	1. Seven Bridges of Ko nigsberg 2. A Graph 3. Euler's Solution	참고문헌, ppt 교안	17
		2	Graph Theory part	1. Same Graphs? 2. Graph Isomorphism 3. Are These Isomorphic? 4. Checking Graph	1. Same Graphs? 2. Graph Isomorphism 3. Are These Isomorphic? 4. Checking Graph		26

		3	Graph Theory part	1. Partitioned into Simple Cycles 2. Proof 3. Tree	1. Partitioned into Simple Cycles 2. Proof 3. Tree		30
12	More on Graph and Trees its related algorithm	1	Application of Graphs	1. minimum spanning tree 2. Prim's Algorithm 3. Kruskal's Algorithm 4. Adjacency matrix for graph 5. Single Source Shortest Path Algorithm	1. minimum spanning tree 2. Prim's Algorithm 3. Kruskal's Algorithm 4. Adjacency matrix for graph 5. Single Source Shortest Path Algorithm	참고문헌, ppt 교안	22
		2	Algorithm	1. What is an algorithm? 2. Some algorithms are harder than others 3. Algorithm 1: Maximum element 4. Maximum element running time	1. What is an algorithm? 2. Some algorithms are harder than others 3. Algorithm 1: Maximum element 4. Maximum element running time		26
		3	Algorithm	1. Insertion sort running time 2. Comparison of running times 3. How does one measure algorithms 4. Bubble sort running time 5. An aside: inequalities	1. Insertion sort running time 2. Comparison of running times 3. How does one measure algorithms 4. Bubble sort running time 5. An aside: inequalities		32
13	Probability and Counting	1	Review of DM	1. Logics 2. Application: A More Complex Deduction 3. Proof 4. Tarski's World	1. Logics 2. Application: A More Complex Deduction 3. Proof 4. Tarski's World	참고문헌, ppt 교안	19
		2	Review of DM	1. fibonacci 2. Mathematical Induction Works Using Dominoes 3. Russell's Paradox	1. fibonacci 2. Mathematical Induction Works Using Dominoes 3. Russell's Paradox		15

		3	Finite State Machine	1. Introduction 2. Machine 3. Finite-State Machine 4. Diagraph Notation 5. Newspaper Vending Box Digraph 6. Regular Expressions	1. Introduction 2. Machine 3. Finite-State Machine 4. Diagraph Notation 5. Newspaper Vending Box Digraph 6. Regular Expressions		17