JSC «Kazakh-British Technical University»
Faculty of Information Technology
Chair of Information Systems Management

APPROVED BY
Dean of FIT
Hajiyev. F. A.
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«____»_____ 20__

SYLLABUS

Discipline: Discrete Structures CSCI 1103
Number of credits: 3 credits (3/0/0)
Term: _____ 20__
Instructor's full name:

Personal Information about the Instructor	Time and place of classes		Contact information
	Lessons	Office Hours	e-mail
Alimzhan Amanov	According to the schedule	According to the schedule	a.amanov@kbtu.kz

Course duration: 3 hours a week, 15 weeks
Course prerequisites: It is assumed a sufficient knowledge of elementary mathematics in content of the school course.
Course Objective:
At the end of the course, students are expected to:

- create compound statements, expressed in mathematical symbols or in English, to determine the truth or falseness of compound statements and to use the rules of inference to prove a conclusion statement from hypothesis statements by applying the rules of propositional and predicate calculus logic;
- prove mathematical statements involving numbers by applying various proof methods, which are based on the rules of inference from logic;
- prove the validity of sequences and series and the correctness of repeated processes by applying mathematical induction; define and identify the terms, rules, and properties of set theory and use these as tools to support problem solving and reasoning in applications of logic, functions, number theory, sequences, counting, trees and graphs, and finite state machines;
- solve recursive problems by applying knowledge of recursive sequences; create graphs and trees to represent and help prove or disprove statements, to make decisions or select from alternative choices, to calculate probabilities, to document derivation steps, or to solve problems;

Course Goals:

Develop computer programming and debugging skills in building projects with abstract data types.

We assume that after successful completion of this course students will be able:

- to solve problems using some existing (or developing new) algorithms or data structures
- analyze algorithms in terms of efficiency, complexity etc.
- develop implementation skills in algorithms and data structures

Knowledge:

during the study of this course, students must obtain knowledge about how to: explain with examples the basic terminology of functions, relations, and sets; perform the operations associated with sets, functions, and relations; convert logical statements from informal language to propositional and predicate logic expressions; apply formal methods of symbolic propositional and predicate logic, such as calculating validity of formulae and computing normal forms; Identify the proof technique used in a given proof; determine which type of proof is best for a given problem; explain the parallels between ideas of mathematical and/or structural induction to recursion and recursively defined structures; explain the relationship between weak and strong induction and give examples of the appropriate use of each; state the well-ordering principle and its relationship to mathematical induction; apply counting arguments, including sum and product rules, inclusion-exclusion principle and arithmetic/geometric progressions; apply the pigeonhole principle in the context of a formal proof; be familiar with elementary concepts of Languages and Automata theory and understand their role in Computer Science.

Literature:

Required:

1. Kenneth Rosen: "Discrete Mathematics and Its Applications", 7 th edition, 2012, McGraw-Hill. Press, 2009
2. Instructor's notes.

Supplementary:

1. Graham, Ronald L.; Knuth, Donald E.; Patashnik, Oren (1989). Concrete Mathematics - A foundation for computer science. Advanced Book Program (1st ed.). Reading, MA, USA: Addison-Wesley Publishing Company. pp. xiv+625. ISBN 0-201-14236-8. MR 1001562

Methodology:

Class discussion, class assignments, A/V presentation, real-life experience, classroom exercises, self-study, self study and again self-study.

COURSE CALENDAR

W	Class work	
	Topic	**Chapters**
1	**L1. Sets, operations on sets** ● **Sets, definitions** ● **Posets** ● **Cartesian product** ● **Operations on sets**	**Ch 2.1, 2.2**
2	**L2. Functions** ● **Definition, domain, range, image** ● **Injective, surjective, bijective functions**	**Ch 2.3**
4,5	**L3. Number theory** ● **Divisibility, modular arithmetic** ● **Prime numbers, sieve, gcd, lcm** ● **Diofant equations** ● **Euler function, Fermat's theorem** ● **Solving Congruences** ● **Chinese remainder theorem**	**Ch 2.1 -** **- Ch.2.4** **Ch 4.4**
6	**L4. Induction and recursion** ● **Mathematical induction** ● **Strong induction** ● **Recursive algorithms**	**Ch 5.1-5.3**
8,9, 10	**L5. Counting** ● **Sum and product rules** ● **Binomial coefficients** ● **Pigeonhole principle** ● **Inclusion exclusion principle**	**Ch 6.1-6.5** **Ch 8.5-8.6**
12, 13, 14	**Graphs** ● **Defenitions, connectivity, trees** ● **Euler Paths, hamilton paths** ● **Planar graph**	**Ch 10.1, 10.2, 10.4, 10.5, 10.7**
16	**Exam.** Test questions.	

COURSE ASSESSMENT PARAMETERS

Type of activity	Final scores
Quizzes	60%
TSIS	0%
Final exam	40%
Total	**100%**

Criteria for evaluation of students during semester:

	Assessment criteria	Weeks															Total scores
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1.	Quizzes				*				*				*			*		80%
2.	TSIS	*	*	*		*	*	*		*	*	*		*	*			0%
3.	Final exam																*	20%
	Total																	**100%**

Academic Policy

KBTU standard academic policy is used.

- Cheating, duplication, falsification of data, plagiarism, and crib are not permitted under any circumstances!
- Attendance is mandatory.

Attention. Missing 20% attendance to lessons, students will be taken from discipline with filling in F (Fail) grade.

Students must participate fully in every class. While attendance is crucial, merely being in class does not constitute "participation". Participation means reading the assigned materials, coming to class prepared to ask questions and engage in discussion.

- Students are expected to take an active role in learning.
- Written assignments (independent work) must be typewritten or written legibly and be handed in time specified. Late papers are not accepted!
- Students must arrive to class on time.
- Students are to take responsibility for making up any work missed.
- Make up tests in case of absence will not normally be allowed.
- Mobile phones must always be switched off in class.
- Students should always be appropriately dressed (in a formal/semi-formal style).
- Students should always show tolerance, consideration and mutual support towards other students.