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

APPROVED BY
Dean of FIT
Suliev. R. N. _____
«____»_____ 20__

SYLLABUS

Discipline: Programming Language Theory
Number of credits: 3 (3/0/0)
Term: _____ 20__
Instructor's full name: Alimzhan Amanov

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: Computation Theory, Algorithms and Data structures
Course Objective:

This course is designed to teach the theoretic reasoning of programming languages. Every good programmer must be literate and precise about properties of programming languages, understand the conceptual difference between programming languages' computational model, semantics.

Course Goals:

Develop intuition of type system, operational and denotational semantics. Investigate different approaches in designing the programming language.

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

- functional programming, notion of lambda calculus
- Proof properties of well typed systems
- Distinguish programming languages by different categories (semantics, type system)

Literature:

Required:

1. Benjamin C. Pierce. 2002. Types and Programming Languages (1st. ed.). The MIT Press.
2. Instructor's notes.

Supplementary:

3. John C. Mitchell. 1996. Foundations of programming languages. MIT Press, Cambridge, MA, USA.
4. https://www.cis.upenn.edu/~bcpierce/tapl/resources.html - resources for book (1).

Methodology:

Homeworks, self-study, quizzes, bonus exercises, reward for extra work

COURSE CALENDAR

W	Class work		
	Topic	**Chapters**	**Seminars and TSIS**
1-2	**L1. Languages, syntax and semantics. Computational model** ● **Different computational models** ● **Syntax & semantics** ● **Types of semantics** ● **Context free Grammars (CFG)** ● **Backus-Naur form (BNF)** ● **CFG and BNF as syntax description**	**1-2**	**HW 1**
3-4	**L2. Untyped Arithmetic expressions. Implementation.** ● **Defining BN syntax** ● **Defining BN semantics** ● **Well define proof**	**3-4**	**HW 2**
4-6	**L3. Untyped Lambda Calculus** ● **Syntax** ● **Semantics/evaluation. alpha/beta-conversion.** ● **Evaluation strategies** ● **Church numerals and bools, pairs, lists** ● **Arithmetic on church numerals** ● **Recursion**	**5,6,7**	**HW 3**
8,9	**L4. Simple Types** ● **Typed arithmetic expressions** ● **Simply typed lambda calculus** ● **SAFETY = PROGRESS + PRESERVATION** ● **Proof of important properties of typed system**	**8,9,10**	**HW 4**
10, 11	**L5. Simple extensions. Syntax sugar and desugar.** ● **Base types** ● **Ascription (“as”)** ● **“Let” bindings** ● **Pairs, tuples** ● **Records** ● **Recursion**	**11**	**HW 5**

	• **Lists**		
12, 13	**L6. References. Exceptions**	**13-14**	**HW 6**
14	**L7. Subtyping**	**15**	**HW 7**
15	**L8. Imperative Objects. Notions of OOP**	**18**	**HW 8**

COURSE ASSESSMENT PARAMETERS

Type of activity	Final scores
Quizzes	20%
TSIS	40%
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																	20%
2.	HW		*		*		*		*		*		*		*	*		60%
3.	Final exam																*	40%
	Total																	**100%**

*There are 2-3 quizzes hidden within 15 weeks. Student is allowed to make up a quiz **if and only if** student did not attend the class for serious reason and did notice teacher a day prior to the lesson.*

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.