NEW SCHOOL OF ECONOMICS

SATBAYEV UNIVERSITY N§E

Approved by

Director of Project management Institute
Aldashev A._____

Director of Scientific and Educational center of mathematical economics
Aubakirova S._____

«____» _____ 20___г.

SYLLABUS

Satbayev-NSE
Academic Year 2019-2020
Spring 2020

Discipline: Algebra MT1173

Credits: 3

Course/Syllabus designer: S. Khrushchev

Date: "15" January 2020

Almaty, 2020

Course: Algebra 1, Code: NSE1073   (3 credit hours)

Spring Semester, 2020

Prerequisities:
Calculus AP

Location: Room 203 Time: Wednesday 14:20-16:20 AM

Instructor: Prof. S.V.Khrushchev

Instructor	Time and venue		Contact	
	Classes	**Office hours**	**Tel.:**	**e-mail**
Professor, Doctor of Science in Math & Physics	Wednesday 14.20-16.20, Room 203	Room	mobile: 8 778 970 01 64	**s.khrushchev@satbayev .university**

Pre-requisition: Introduction to Calculus

Course description
The course is destined for students studying economics. It includes five parts: 1) Vector spaces, 2) Linear independence, bases, and dimension, 3) Linear transformations and change of basis, 4) Diagonalisation, 5) Applications of diagonalisation.
 The main aim of the course is to enable students to acquire **theoretical** skills in the methods of algebra, as required for their use in further mathematics subjects and economics-based subjects; to prepare students for further courses in mathematics and/or related disciplines

Learning outcomes

At the end of this course and having completed the reading and activities you should have:
a) used the concepts, terminology, methods and conventions covered in the course to solve mathematical problems in this subject;
b) the ability to solve unseen mathematical problems involving understanding of these concepts and application of these methods;
c) seen how algebra can be used to solve problems in economics and related subjects;
d) the ability to demonstrate knowledge and understanding of the underlying principles.

  Textbook: **1. Anthony, M. and M. Harvey.** *Linear Algebra: Concepts and Methods*. (Cambridge
                University Press, 2012)
                2. Anthony, M. and Biggs, N., *Mathematics for Economics and Finance,*
                Cambridge University Press, Cambridge, UK, 1996

Further Reading:

3. Anthony M., Harvey M. Algebra MT 173 *(Undergraduate study in Economics, Management, Finance and the Social Sciences, LSE 2013)*

4. Anton, H. and C. Rorres. Elementary Linear Algebra, International Student Version *(Wiley 2010, 10th ed, ISBN 9780470561577)*

Planned Schedule:

Week	Classes				Assignments
	Topic	**Lecture**	**Practice**	**Textbooks**	
1.	**Vector spaces.** Definition, examples, linear combinations, subspaces.	2	1	[1], pp. 149-158, [3], pp. 173-190	Jan 12
2.	Null space and range of a matrix, linear span, row space, problems.	2	1	[1], pp. 158-171, [3], pp. 179-190	Jan 19 **Mock Exam 1**
3.	**Linear independence, bases and dimension**. Linear independence, linear independence and span, linear independence and span in $\mathbf{R}^n$, bases, problems.	2	1	[1], pp. 172-185, [3], pp. 191-200	Jan 26 Assignment 1 **Quiz 1**
4.	Coordinates, dimension, dimension and bases of subspaces, basis and dimension in $\mathbf{R}^n$, the rank-nullity theorem, problems	2	1	[1], pp. 185-209, [3], pp. 200-214	Feb 2
5.	**Linear transformations and change of basis**. Linear transformations, linear transformations and matrices, linear transformations on $\mathbf{R}^2$.	2	1	[1], pp. 210-220 [3], pp. 215-222	Feb 9 Assignment 2 **Quiz 2**
6.	Range and null space, coordinate change, change of basis and similarity	2	1	[1], pp. 220-246 [3], pp. 222-236	Feb 16
7.		2	1		Assignment 3 Feb 23
8.	**Mid-term exam**				Feb 25 – March 5
9.	**Diagonalization.** Eigenvalues and eigenvectors, diagonalisation of a square matrix, trace and determinant, conditions for diagonalisation in terms of eigenvectors, problems.	2	1	[1], pp. 247-260 [3], pp. 237-241	March 9
10.	Diagonalization and change of a basis, similar matrices, examples when diagonalization is not possible, matrices with distinct eigenvalues, algebraic and geometric multiplicity.	2	1	[1], pp. 260-278 [2], pp. 246-252 [3], pp. 107-111	March 16 **Quiz 3**
11.	**NAURYZ HOLIDAYS**	2	1		**March 20-March 26**
12.	**Applications of diagonalisation**. Powers of matrices, systems of difference equations, linear systems of differential equations	2	1	[1], pp. 279-290 [1], pp. 296-303, [3], pp. 111-125	March 30 Assignment 4 **Quiz 4**

13.	Markov chains.	2	1	[1], pp. 131-148, [3], pp. 128-145	April 6 Assignment 5 **Quiz 5**
14.	**Mock Exam 2**	2	1		April 13
15.	**Mock Exam 3**	2	1		April 20
16.	**Final exams 22-April 30**				

Evaluation criteria:

Mock exam and activity	10%
Quizzes	20%
Assignments	10%
Mid-term exam	20%
Final exam	40%
Total points	**100%**

Attendance and activity at classes is one of the components of you total grade. If a student is late for a class or leave class before the end at least twice, then it is equivalent to one missed class independently of a reason. Student activity during lectures and practice will be estimated in points.

Quizzes of 15-20 min duration will be given at practice. The total number of quizzes is 5 accordingly with the number of topics.

5 *assignments* in written form should be presented before the deadline announced by teacher. A student may be asked by teacher to explain submitted solutions.

Mid-term exam includes three chapters: *Basics, Linear Systems, Matrix Inversion and Determinants (up to co-factors)* . The questions contain both theoretical and practical problems.

Final exam includes whole course material. It is conducted in written form. The duration of final exam is 3 hours. No additional questions to the main question card are provided for increase of the final result. No retake exam is provided.

*Grade policy***:** The final grade will be calculated in accordance with the General Scale of KBTU.

Course policy and ethic rules **:**

- don't miss and be late for classes;
- switch off your mobile phones during classes;
- if you miss quiz or exam due a valid reason you should notify the teacher in advance;
- prompting and copying off are not allowed; a student exposed in that will be evaluated by "F";
- calculators may not be used during exams and quizzes, however, it is recommended to use TI-nspire CX CAS (your calculators for Calculus AP) to check your calculations beyond the time of exams.

Time schedule of graduating

№	Form of the control	Week																Points
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	Mock exam and activity	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		10
2	Quizzes			*			*					*		*		*		20
3	Assignments			*			*					*		*		*		10

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4	Mid-term exam								*									20
5	Final exam																*	40
	Total points																	100

GRADING SCALE:

Total Points	Grade	Equivalent GPA
95 – 100	**A**	**4.0**
90 – 94.9	**A-**	**3.7**
85 – 89.9	**B+**	**3.3**
80 – 84.9	**B**	**3.0**
75 – 79.9	**B-**	**2.7**
70 – 74.9	**C+**	**2.3**
65 – 69.9	**C**	**2.0**
60 – 64.9	**C-**	**1.7**
55 – 59.9	**D+**	**1.3**
50 – 54.9	**D**	**1.0**
Less than 50	**F**	**0.0**

Students who missed more than 20% of the classes without a documented reason shall receive a letter grade "F" (Fail). Students who received only 30% of the total grade before the final exam shall not be allowed to take one. Students are required to receive at least 50% on the final examination to pass the course. If a student receives less than 50% on the final exam, (s)he shall receive a letter grade "F" (Fail)

HOMEWORK ASSIGNMENTS

All the homework assignments must be done by you only. You can discuss your homework with other students but the write-up must be done independently. No late homework assignment will be accepted. In fact, most of the assignments are electronic.

Satbayev University INTRANET

You will be required to access Satbayev University Intranet regularly. I suggest visiting this site at least every other day. All homework assignments, solutions to them, quiz material, grades, articles to submit will be posted on the Intranet.

ACADEMIC HONESTY

All students are expected to practice academic honesty in and out of class. Instances of academic dishonesty can result in a student receiving a letter grade of "F" for the course and referral to University judicial organizations, for possible expulsion. Academic dishonesty includes, but is not limited to, plagiarism, cheating on exams, and obtaining unauthorized assistance in completing exams and assignments.

CELL PHONES, PAGERS, LAPTOPS,&CALCULATORS POLICY

You are responsible to see it that your cell phone does not ring during class. Should your phone ring in class, you will be asked to leave class. In addition, after the first infraction, you will be asked to leave class and will receive 'Absence' for attendance in the Intranet journal for each time your phone rings. Please be considerate of your classmates and teacher and avoid this problem. The ISE does not allow students to use laptops during the class sessions unless a student is given a special permission (due to disability). You are not allowed to use cell phones, pagers or programmable calculators during the tests; therefore, bring a calculator to every class.

LEARNING ASSISTANCE

The ISE at KBTU wants to be certain you have access to as many learning aids as possible. Here are some ways you can supplement your classroom experience. The tutorial sessions with myself will provide necessary assistance through extended practice. You can also see me during my office hours for additional assistance which is the best way to get helped.
If you have a disability that may have some impact on your work in this class and for which you may require accommodations, please contact the ISE Dean. You can contact her by calling: 7-727-272-39-72 or sending an email to: tk.82@mail.ru. Once you have received your accommodation letters, please meet with me to discuss the provisions of those accommodations as soon as possible.

EXAMS

All students must take the exams at the scheduled times. Please make travel and other plans accordingly. This is especially true for the final exams. The final exams are cumulative. All students must take final exams. Do not plan traveling if you expect bad weather conditions or problems with buying tickets; failure to take your quiz or exam because of these reasons is totally your responsibility. No make-up exam will ever be given except for the cases described below.

I never give make-up quizzes nor do I accept late homework. Only if you provide a letter from a doctor or the Dean of the ISE explaining the reason of your absence can you take a make-up quiz but only before the class following the official date of quiz (this does not however guarantees that you will actually be able to do that due to various schedule conflicts). It is a sole responsibility of a student to get all the necessary material and to submit required work on time in case of absence in class.

Should a class be cancelled on the day of an exam, the exam will be held during the next scheduled class.
Should you miss a midterm or final exam, you will need to provide a letter from the Dean of the ISE explaining why you should be allowed to make up that exam. Failure to do so will result in a grade of "F" for that exam and zero points will be awarded.

Составитель Профессор НОЦМЭ ИУП – Хрущев Сергей Витальевич