Identification	**Subject**	MATH 310, Applied Differential Equations, 6 ECTS	
	Department	Mathematics	
	Program	Undergraduate	
	Term	Fall, 2022	
	Instructor	Matanat Mursalova	
	E-mail:	matanat.mursalova@khazar.org, metanet.mursalova@mail.ru	
	Phone:	(+994) 70-693-74-58	
	Classroom/hours	Saturday: 8:30-10:00, 10:10-11:40	
Prerequisites	*Applied Differential Equations* is a second-year, first-semester course. The prerequisite is Calculus 2.		
Language	English		
Compulsory/Elective	Required		
Required textbooks and course materials	**Core Textbooks:** 1. William E.Boyce and Richard C. DiPrima, Elementary Differential Equations and Boundary Value problems, 10th edition, 2012 **Supplementary book** 2. Dennis G. Zill, Warren S. Wright, and Michael R. Cullen, Differential Equations with Boundary-Value Problems, 8th edition, 2013, 673 p.		
Course website			
Course outline	Applied Differential Equations is a foundational course at School of Science and Engineering of Khazar University; it plays an important role in the understanding of science, engineering, economics, and computer science, among other disciplines. This introductory course covers a number of integration methods of differential equations and introduce preliminary techniques of using of Laplace transform, Review of Matrices, Systems of Linear Algebraic Equations; Linear independence; Eigenvalues; Eigenvectors; Nonhomogeneous Linear Systems.		
Course objectives	Some methods of integration of n-th order ordinary differential equations with constant and non-constant coefficients; To find Laplace transform and inverse Laplace transform; To solve differential equations with Laplace transform method; To find eigenvalues and eigenvectors.		
Learning outcomes	By the end of the course the students should be able: • To solve first order linear differential equations • To solve higher order homogeneous and nonhomogeneous equations with constant coefficients • To find Laplace transform and inverse Laplace transform • To solve initial value problem • To find eigenvalues and eigenvectors		
Teaching methods	**Lecture**		x
	Group discussion		x
	Experiential exercise		x
	Course paper		x
	Others		
Evaluation	**Methods**	**Date/deadlines**	**Percentage (%)**
	Midterm Exam		30
	Class Participation		5
	Quizzes		20 (2 quizzes)
	Activity		5
	Final Exam		40
	Total		100

Policy	▪ **Preparation for class** **Due to the pandemic situation the course will be organized by using Teams application.** The structure of this course makes your individual study and preparation outside the class extremely important. The lecture material will focus on the major points introduced in the text. Reading the assigned chapters and having some familiarity with them before class will greatly assist your understanding of the lecture. After the lecture, you should study your notes and work relevant problems and cases from the end of the chapter and sample exam questions.Throughout the semester we will also have a large number of review sessions. These review sessions will take place during the regularly scheduled class periods. ▪ **Attendance** Students who do not attend more than 30% of online classes will not be allowed to take the exam. ▪ **Quizzes and examinations** Quizzes may be given unannounced throughout the term. There will be no make-up quizzes. No make-up exams. If students miss an exam, a zero score will be assigned to the missed exam. ▪ **Withdrawal (pass/fail)** This course strictly follows grading policy of the School of Science and Engineering. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year. ▪ **Cheating/plagiarism** Cheating or other plagiarism during the Quizzes, Mid-term and Final Examinations will lead to paper cancellation. In this case, the student will automatically get zero (0), without any considerations. ▪ **Professional behavior guidelines** The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited. ▪ **Ethic** Use of any electronic devices is prohibited in the classroom. All devices should be turned off before entering class. This is a university policy and violators will be reprimanded accordingly! Students should not arrive in late to class!

Tentative Schedule

Week	**Date/Day (tentative)**	**Topics**	**Textbook/ Assignments**
1	17.09.22 17.09.22	• Linear Equations; Method of integrating factor • Separable equations	**2.1, 2.2**
2	24.09.22 24.09.22	• Exact equation, integrating factors • Homogeneous equations with constant coefficients	**2.6, 3.1**
3	01.10.22 01.10.22	• Solutions of linear homogeneous equations; the Wronskian • Complex roots of the characteristic equation	**3.2, 3.3,**
4	08.10.22 08.10.22	• Repeated roots; Reduction of order • Nonhomogeneous Equations	**3.4, 3.5**
5	15.10.22 15.10.22	• Method of Undetermined Coefficients • Variation of parameters	**3.5, 3.6**

6	22.10.22 22.10.22	• Homogeneous equations with constant coefficients • Practice	**4.2**
7	29.10.22 29.10.22	• The Method of Undetermined Coefficients. • The method of variation of parameters	**4.3, 4.4** **Quiz (10 pts)**
8	05.11.22 05.11.22	• Definition of the Laplace Transform • Solution of Initial Value Problem	**6.1, 6.2**
9	12.11.22 12.11.22	• **Midterm Exam** • Step Functions	**6.3**
10	19.11.22 19.11.22	• Review of Matrices • Practice	**7.2**
11	26.11.22 26.11.22	• Systems of Linear Algebraic Equations; Linear independence; Eigenvalues; Eigenvectors • Practice	**7.3**
12	03.12.22 03.12.22	• Homogeneous Linear systems with Constant coefficients • Practice	**7.5**
13	10.12.22 10.12.22	• Complex Eigenvalues • Practice	**7.6**
14	17.12.22 17.12.22	• Fundamental Matrices • Practice	**7.7** **Quiz (10 pts)**
15	24.12.22 24.12.22	• Repeated Eigenvalues, Nonhomogeneous Linear Systems • Practice	**7.8**
	TBA	**Final Exam**	

This syllabus is a guide for the course and any modifications to it will be announced in advance.