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| Identification | Subject | MATH 235, Applied linear algebra and analytic geometry, 6 ECTS | |
| | Department | Mathematics | |
| | Program | Undergraduate | |
| | Term | Fall, 2024 | |
| | Instructor | Rza Mustafayev | |
| | E-mail: | rzamustafayev@gmail.com | |
| | Phone: | (994) 50 634 26 16 | |
| Classroom/hours | Friday: 17:00-18:30, 18:40-20:10 | | |
| Prerequisites | Applied linear algebra and analytic geometry is a second-year, first-semester course. The prerequisite is Calculus 2 course. | | |
| Language | English | | |
| Compulsory/Elective | Required | | |
| Required textbooks and course materials | Core Textbooks: V.V. Konev. Linear Algebra, Vector Algebra and Analytical Geometry, Textbook. Tomsk: TPU Press, 2009, 114 pp. | | |
| Course website | | | |
| Course outline | Applied linear algebra and analytic geometry is a major course at School of Science and Engineering of Khazar University; it plays a role in the understanding of science, engineering, economics, and computer science, among other disciplines. This introductory course covers three content areas: Linear Algebra, Vector Algebra and Analytical Geometry. Each part contains basic mathematical conceptions and explains new mathematical terms. Many useful examples and exercises are presented in the textbook. explained and illustrated by examples and exercises. | | |
| Course objectives | matrix operations, determinants and systems of linear equations, geometrical applications of vector operations, introduction to analytical geometry | | |
| Learning outcomes | By the end of the course the students should be able: <ol style="list-style-type: none"> 1. To do matrix operations 2. To compute determinants 3. To solve systems of linear equations 4. To solve problems about geometrical applications of vector operations | | |
| Teaching methods | Lecture | | x |
| | Group discussion | | x |
| | Experiential exercise | | x |
| | Course paper | | x |
| Evaluation | Methods | Date/deadlines | Percentage (%) |
| | Midterm Exam | | 30 |
| | Class Participation | | 5 |
| | Quizzes | | 20 (2 quizzes) |
| | Activity | | 5 |
| | Final Exam | | 40 |
| | Total | | 100 |
| Policy | <ul style="list-style-type: none"> ▪ Preparation for class <p>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</p> | | |

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 25 % 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.

- **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 | 20.09.2024 20.09.2024 | Matrices: Basic definitions, Matrix operations, Types of matrices, Kronecker Delta Symbol, Properties of Matrix Operations | p. 7-19 |
| 2 | 27.09.2024 27.09.2024 | Determinants: Permutations and Transpositions, Determinant General Definition, Properties of Determinants | p. 20-30 |
| 3 | 04.10.2024 04.10.2024 | Determinant Calculation | p. 31-35 |

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| 4 | 11.10.2024 11.10.2024 | Inverse matrices: Three Lemmas, Theorem of Inverse Matrix, Calculation of Inverse Matrices by Elementary Transformations | p. 36-42 |
| 5 | 18.10.2024 18.10.2024 | Systems of linear equations: Matrix Rank, Basic Concepts, Gaussian Elimination, Homogeneous Systems of Linear Equations | p. 43-53 |
| 6 | 25.10.2024 25.10.2024 | Cramer's Rule, Cramer's General Rule | p.54-59 |
| 7 | 01.11.2024 01.11.2024 | Vectors: Basic Definitions, Geometrical Interpretation Resolution of Vectors into Components, Scalar Product of Vectors | Quiz (10pts) p. 60-65 p. 65-71 |
| 8 | 08.11.2024 08.11.2024 | Victory day | |
| 9 | 15.11.2024 15.11.2024 | Midterm Exam Vector Product, The Scalar Triple Product | p. 72-77 |
| 10 | 22.11.2024 22.11.2024 | Transformation of Coordinates Under Rotation of the Coordinate System | p. 79-81 |
| 11 | 29.11.2024 29.11.2024 | Straight lines: Equations of lines, Lines in a Plane, Angle Between Two Lines | p. 82-89 |
| 12 | 06.12.2024 06.12.2024 | Distance From a Point to a Line, Relative Position of Lines | p. 89-90 |
| 13 | 13.12.2024 13.12.2024 | Planes: General Equation of a Plane, Equation of a Plane Passing Through Three Points, Other Forms of Equations of a Plane | Quiz (10 pts) p. 91-95 |
| 14 | 20.12.2024 20.12.2024 | Angle Between Two Planes, Distance Between a Point and a Plane | p. 95-97 |
| 15 | 27.12.2024 27.12.2024 | Relative Position of Planes, Relative Position of a Plane and a Line, Angle Between a Plane and a Line | p. 97-98 |
| | TBA | Final Exam | |

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