## King Saud University College of Science Mathematics Department

## Form (H) <br> Short course description

| Course title: Introduction to Linear <br> Algebra | Course number and code: MATH 240 |
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| Previous course requirement: MATH <br> $\mathbf{1 3 2}$ | Language of the course: English |
| Course level: 5 th | Effective hours: $4(3+2+0)$ |

Course description
Matrices and their operations, types of matrices. Elementary transformations. Determinants and their elementary properties. Inverse of a matrix. Linear systems of equations. Vector spaces, linear independence, finite dimensional spaces, subspaces. Inner product spaces. Linear transformations, kernel and image of a linear transformation. Eigenvalues and eigenvectors of a matrix and of a linear operator.

Course objectives

| 1- Introduce Matrices |
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| 2- Introduce Determinants. |
| 3- Introduce Systems of linear equations. |
| 4- Introduce Vector spaces. |
| 5- Introduce Inner product spaces. |
| 6- Introduce Linear transformations. |
| 7- Introduce Eigenvalues and Eigenvectors |

Learning outcomes (understanding, knowledge, and intellectual and scientific skills)
After studying this course, the student is expected to be able to:
Define matrix operations and state their main properties.
Calculate the determinants and matrices inverses and other operations.
Solve a system of linear equations in the matrix form.
Define vector spaces and subspacess, find their bases and dimension.
Decide whether a set is a vector space.
Decide whether a set of vectors is a basis.
Compute the length of a vector and the angle between two vectors in 2D and 3D.

| Find the matrix of a linear transformation <br> relative to ordered bases. |  |
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| Compute the eigenvalues and eigenvectors of a <br> matrix and decide whether it is diagonalizable. |  |

Textbook adopted and supporting references

| Title of the book | Author's name | Publisher's name | Date of publication |
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| 1-Elementary Linear <br> Algebra with <br> Supplemental <br> Applications | Anton and Rorres | John Wiley, | 2015 |
| 2- Topics in Algeba. | N. Herstein | Ginn and Company | 1964 |
| 3- Algebra | T. W. Hungerford | Springer | 1974. |
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