Arab Academy for Science, Technology and Maritime Transport
College of Computing & Information Technology

| University/Academy: | Arab Academy for Science, Technology and Maritime Transport | | |
|---|---|---|---|
| Faculty/Institute: | College of Computing & Information Technology | Course title | Linear Algebra |
| Program: | B. Sc. of Computer Science | Course code | BA 204 |

# Form No. (11A)
# Knowledge and skills matrix for a course

| Week | Course content | Knowledge | Intellectual skills | Professional skills | General skills |
|---|---|---|---|---|---|
| 1 | • Classification of Matrix<br>• Matrix Algebraic Operations | • Define what is meant by Matrix<br>• Describe types of matrices and its Algebraic operations | • Examine and Evaluate Algebraic operations of Matrices | | |
| 2 | • Matrix transpose ; Determinants | • Define The transpose of Matrix<br>• Define The Matrix Determinants | • Extract Determinants with different order | | |
| 3 | • Matrix inverse | • Describe Matrix Inverse | • Evaluate Matrix Inverse<br>• Solve square linear system with unique solution using matrix inverse | | |
| 4 | • Equivalent matrices – rank of the matrix | • Define Equivalent Matrices<br>• Define Matrix Rank | • Examine Equivalent Matrices<br>• Evaluate Matrix Rank | • Apply the Eigen values and Eigen vectors in applications such as graph Laplacian | • Communicate scientific findings in vector space |
| 5 | • System of linear equations | • Define General form of System of linear equations<br>• Discuss the solution of linear system | • Solve linear system of linear equations | | |
| 6 | • Consistence of system of linear equations | • Identify consistency of the linear system | • Examine the consistency of the linear system and find its solution | | |
| 7 | • Vector algebra | • Define Vector<br>• Discuss Vectors Algebraic Operations | • Solve Algebraic operations about vector addition, scalar multiplication, inner products, projections, norms, orthogonal vectors | | |
| 8 | • Eigen values and Eigen vectors | • Define Eigen values and Eigen vectors of a given matrix | • Determine the Eigen values and Eigen vectors of a given matrix | | |

| Week | Course content | Knowledge | Intellectual skills | Professional skills | General skills |
|------|----------------|-----------|---------------------|---------------------|----------------|
| 9 | • Vector space | • Define Vector space<br>• Describe The characteristics of a Vector Space | • Examine the characteristics of a Vector Space on different problems | | |
| 10 | • Subspaces | • Define The Subspace of a Vector Space | • Examine the Subspace of given problems | | |
| 11 | • Linear independence , The span | • Define linear independence ; Span<br>• Describe linear independence vectors , Spanning sets | • Solve algebraic problems about linear independence, spanning sets | • Build a matlab computer program to calculate Gram-Schmidt<br>• Evaluate numerical stability | |
| 12 | • Basis and Dimension | • Define basis and dimension of a vector space | • Determine basis and dimension of abstract vector spaces | | |
| 13 | • Orthonormal basis<br>• Gram-Schmidt process | • Define Orthonormal basis (A.5)<br>• Describe Gram-Schmidt process | • Apply Gram-Schmidt process to orthogonalize vectors | | • Enlist researchable problemsin the field of linear algebra |
| 14 | • Linear transformation<br>• Diagonalization | • Define linear mapping<br>• Describe Matrix diagonalization | • Examine linear maps<br>• Apply diagonalization process | | |
| 15 | General Revision | | | | |

**Course Instructor**

Name: **Dr.  Nehad Nashaat**

Signature:

**Head of Department**

Name: **Dr. Samah Senbel**

Signature: