|  |  |  |
| --- | --- | --- |
| **Philadelphia University** |  | **Approval date:** |
| **Faculty of Science** | **Issue:** |
| **Department of Mathematics** | **Credit hours: 3** |
| **Academic year 2025/2026** | **Course Syllabus** | **Bachelor** |

**Course information**

|  |  |  |
| --- | --- | --- |
|  **Course #** | **Course title** | **Prerequisite** |
| **0250241** | **Linear Algebra (1)** | **0216111** |
| **Course type** | **Class time** | **Room #** |
| 🞏 University Requirement 🞏 Faculty Requirement 🗹 Major Requirement 🞏 Elective 🗹 Compulsory | Sat. and Mon. | 21004 |
| Degree / NQF Level | 🗹 Diploma degree (6) 🞏 Bachelor degree (7) |

**Instructor Information**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Office No.** | **Phone No.** | **Office Hours** | **E-mail** |
| Dr. Rola Alseidi |  |  | Sat- Tues. | ralseidi@philadelphia.edu.jo |

**Learning Method**

|  |
| --- |
|  **Learning Method** |
| 🗹 **Face to face** 🞏 **Online** 🞏 **Blended** |

**Course Description**

|  |
| --- |
| **Course Description** |
| This module is an introduction to Linear Algebra for lower-level undergraduate students. Topics include systems of linear equations, matrices, matrix operations and inverses, determinants, Cramer’s Rule, Euclidean vector spaces, and Eigenvalues and Eigenvectors. |
| **Course Objectives** |
| At the conclusion of the course, students will be able to1. Carry on Matrix Operations.
2. Solve Systems of Linear Equations using Matrices, and Gaussian Elimination.
3. Understand the concepts of Vector Spaces.
4. Understand Subspaces, and Basis.
5. Carry on Row Space, Column Space, and Null Space.
 |

**Course Learning Outcomes**

|  |
| --- |
| **Outcomes** |
| **Knowledge** |
| K1 | To enable students to carry on Matrix Operations. |
| K2 | To enable students to solve Systems of Linear Equations using Matrices, and Gaussian Elimination. |
| K3 | To understand of the concepts of vectors and linear algebra. |
| K4 | To understand the concepts of Euclidean Vector Spaces. |
| **Skills** |
| S1 | Mathematical thinking develops communication and practical skills. |
| S2 | Scientific thinking and applications develop communication skills. |
| **Competence** |
| C1 | Applying the principles of systems of linear equations and matrices in some real world problems.  |
| C2 | Applying the concepts of linear algebra in simple experiments. |

**Learning Resources**

|  |  |
| --- | --- |
| **Course textbook** | Elementary Linear Algebra 11th Edition. Author Howard Anton, Chris Rorres, Wiley 2015. |
| **Supporting References**  | * Elementary Linear Algebra by Larson R., Falvo D. C., 6th ed.

Houghton Mifflin Harcourt Publishing Company, New York, 2009.* Linear algebra with applications by [Leon](http://library.philadelphia.edu.jo/scripts/minisa.dll/175/PAUTHOR/Leon?KEYSEARCH&DISPLAY=AUTHORS+), Steven J., 9th edition

Boston: Pearson Education Limited, 2015.  |
| **Teaching Environment** | 🗹 **Classroom** 🞏 **Laboratory** 🞏 **Learning platform** 🞏 **Other** |

**Meetings and Subjects Timetable**

|  |  |  |  |
| --- | --- | --- | --- |
| **Week** | **Topic** | **Learning Methods** | **Tasks** |
| 1 | **Course Syllabus:**Explanation of the study plan for the course and what is expected to be accomplished by the students.**Chapter (1): Systems of Linear Equations and Matrices** 1.1 Introduction to Systems of Linear Equations  | Face to Face | Exercises: 1, 2, 5, 6, 7, 8, 9, 13, 14, 15, 19, 20. |
| 2 | 1.2 Gaussian Elimination  | Face to Face | Exercises: 1, 2, 3, 5, 6, 9, 10, 13, 15, 17. |
| 3 | 1.3 Matrices and Matrix Operations  | Face to Face | Exercises: 1, 2, 3, 4, 5, 7, 11, 13, 15, 23. |
| 4 | 1.4 Inverses; Algebraic Properties of Matrices | Face to Face | **Quiz**Exercises: 1, 2, 4, 5, 6, 10, 11, 15, 17, 19, 21, 25. |
| 5 | 1.5 Elementary Matrices and a Method for Finding $A^{-1}$ | Face to Face | **Assignment**Exercises: 1, 2, 3, 5, 7, 9, 11, 13, 15. |
| 6 | 1.6 More on Linear Systems and Invertible Matrices  | Face to Face | Exercises: 1-5, 9, 11, 13, 18. |
| 7 | 1.7 Diagonal, Triangular, and Symmetric Matrices  | Face to Face | **Quiz**Exercises: 1-4, 7, 8, 11, 13, 23, 27. |
| 8 | **Chapter (2): Determinants** 2.1 Determinants by Cofactor Expansion  | Face to Face | Exercises: 1, 3, 5, 7, 9, 11, 15, 16, 21, 24, 27. |
| 9 | 2.2 Evaluating Determinants by Row Reduction  | Face to Face | Exercises: 1, 3, 5, 6, 9, 12, 15, 23. |
| 10 | 2.3 Properties of the Determinants; Cramer's Rule | Face to Face | **Assignment**Exercises: 1, 4, 5, 7, 11, 15, 19, 25, 29. |
| 11 | **Chapter (3): Euclidean Vector Spaces** 3.1 Vectors in 2-Space, 3-Space, and $n$-Space | Face to Face | Exercises: 3, 5, 7, 9, 11, 13, 17, 19. |
| 12 | 3.2 Norm, Dot Product, and Distance in $R^{n}$  | Face to Face | **Quiz**Exercises: 1, 3, 5, 7, 9, 11, 15, 17. |
| 13 | 3.3 Orthogonality  | Face to Face | Exercises: 1, 3, 5, 7, 9, 11, 13, 15, 19, 25. |
| 14 | **Chapter (5): Eigenvalues and Eigenvectors**5.1 Eigenvalues and Eigenvectors, Similar Matrices | Face to Face | Exercises: 1-3, 5, 7, 9, 11, 13, 15, 16. |
| 15 | 5.2 Diagonalization | Face to Face | Exercises: 1, 3, 5, 7, 9, 11, 15, 17, 19, 21. |
| 16 | **Final Exam** |

**Assessment Methods and Grade Distribution**

|  |  |  |  |
| --- | --- | --- | --- |
| **Assessment Methods** | **Grade Weight** | **Assessment Time (Week No.)** | **Link to Course Outcomes** |
| **Mid Term Exam** | 30% | 8 | K1, K2, S1, C1 |
| **Various Assessments \*** | 30% | Continuous | S1, S2, C1 |
| **Final Exam** | 40% | 16 | K3, K4, S1, C1, C2 |
| **Total** | 100% |  |  |

\* Includes: quiz, in class and out of class assignment, presentations, reports, videotaped assignment, group or individual projects.