Philadelphia University	PHILADELPHIA UNIVERSITY THE WAY TO THE FUTURE	Approval date:
Faculty of Science		Issue:
Department of Mathematics		Credit hours: 3
Academic year 2023/2024	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		Sun, Tues 9:45 – 11:00	6722

Instructor Information

Name	Office No.	Phone No.	Office Hours	E-mail
Dr. Heba Ayyoub	21019	2466	Sat, Mon 09:45 - 11:00 Sun, Tues 11:15 – 12:30	hayyoub@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 to   1) 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, 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 Oct 12 – Oct 16	**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 Learning	Exercises: 1, 2, 5, 6, 7, 8, 9, 13, 14, 15, 19, 20.
Oct 16: Last day to add / drop a course			
2 Oct 19 – Oct 23	1.2 Gaussian Elimination	Face to Face Learning	Exercises: 1, 2, 3, 5, 6, 9, 10, 13, 15, 17.
3 Oct 26 – Oct 30	1.3 Matrices and Matrix Operations	Face to Face Learning	Exercises: 1, 2, 3, 4, 5, 7, 11, 13, 15, 23.
4 Nov 2 – Nov 6	1.4 Inverses; Algebraic Properties of Matrices	Face to Face Learning	**Quiz** Exercises: 1, 2, 4, 5, 6, 10, 11, 15, 17, 19, 21, 25.
5 Nov 9 – Nov 13	1.5 Elementary Matrices and a Method for Finding A^{-1}	Face to Face Learning	**Assignment** Exercises: 1, 2, 3, 5, 7, 9, 11, 13, 15.
6 Nov 9 – Nov 13	1.6 More on Linear Systems and Invertible Matrices	Face to Face Learning	Exercises: 1-5, 9, 11, 13, 18.

Nov 23 – Dec 4: Midterm Exam			
7 Nov 23 – Nov 27	1.7 Diagonal, Triangular, and Symmetric Matrices	Face to Face Learning	**Quiz** Exercises: 1-4, 7, 8, 11, 13, 23, 27.
8 Nov 30 – Dec 4	**Chapter (2): Determinants** 2.1 Determinants by Cofactor Expansion	Face to Face Learning	Exercises: 1, 3, 5, 7, 9, 11, 15, 16, 21, 24, 27.
9 Dec 7 – Dec 11	2.2 Evaluating Determinants by Row Reduction	Face to Face Learning	Exercises: 1, 3, 5, 6, 9, 12, 15, 23.
10 Dec 14 – Dec 18	2.3 Properties of the Determinants; Cramer's Rule	Face to Face Learning	**Assignment** Exercises: 1, 4, 5, 7, 11, 15, 19, 25, 29.
11 Dec 21 – Dec 25	**Chapter (3): Euclidean Vector Spaces** 3.1 Vectors in 2-Space, 3-Space, and n-Space	Face to Face Learning	Exercises: 3, 5, 7, 9, 11, 13, 17, 19.
12 Dec 28 – Jan 1	3.2 Norm, Dot Product, and Distance in R^n	Face to Face Learning	**Quiz** Exercises: 1, 3, 5, 7, 9, 11, 15, 17.
13 Jan 4 – Jan 8	3.3 Orthogonality	Face to Face Learning	Exercises: 1, 3, 5, 7, 9, 11, 13, 15, 19, 25.
14 Jan 11– Jan 15	**Chapter (5): Eigenvalues and Eigenvectors** 5.1 Eigenvalues and Eigenvectors, Similar Matrices	Face to Face Learning	Exercises: 1-3, 5, 7, 9, 11, 13, 15, 16.
15 Jan 18 – Jan 22	5.2 Diagonalization	Face to Face Learning	Exercises: 1, 3, 5, 7, 9, 11, 15, 17, 19, 21.
16	**Jan 25 – Feb 5: 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.

Important Instructions

1. At least two quizzes will be given. Students are not permitted to make up any missed quizzes.
2. Homework problems will be assigned on Microsoft Teams/Moodle. Students are required to submit their solutions by the specified due dates. Late submissions will not be accepted.
3. Students are not allowed to copy solutions for homework problems from other students or any other resources. However, discussing problems with other students is encouraged.
4. The final exam will cover all topics presented in the syllabus.

Course Polices

Policy	Policy Requirements
Passing Grade	The minimum passing grade for the course is (50%).
Missing Exams	• Missing an exam without a valid excuse will result in a zero grade to be assigned to the exam or assessment. • A Student who misses an exam or scheduled assessment, for a legitimate reason, must submit an official written excuse within a week from the exam or assessment due date. • A student who has an excuse for missing a final exam should submit the excuse to the dean within three days of the missed exam date.
Attendance	The student is not allowed to be absent more than (15%) of the total hours prescribed for the course, which equates to four lectures days. If the student misses more than (15%) of the total hours prescribed for the course without a satisfactory excuse accepted by the dean of the faculty, she/he will be prohibited from taking the final exam and the grade in that course is considered (zero), but if the absence is due to illness or a compulsive excuse accepted by the dean of the college, then withdrawal grade will be recorded.
Academic Honesty	Philadelphia University pays special attention to the issue of academic integrity, and the penalties stipulated in the university's instructions are applied to those who are proven to have committed an act that violates academic integrity, such as: cheating, plagiarism (academic theft), collusion, and violating intellectual property rights.