



**Philadelphia University**  
**Faculty of Science**  
**Department of Basic Sciences and Mathematics**  
**First Semester, 2014/2015**

**Course Syllabus**

<b>Course Title: Linear Algebra 2</b>	<b>Course code: 250341</b>
<b>Course Level: 2</b>	<b>Course prerequisite (s) and/or corequisite (s): Linear Algebra 1</b>
<b>Lecture Time: Sun .,Tues., and Thursday 09:10 - 10:00</b>	<b>Credit hours:3 credit hours</b>

**Academic Staff**

**Specifics**

<b>Name</b>	<b>Rank</b>	<b>Office Number and Location</b>	<b>Office Hours</b>	<b>E-mail Address</b>
<b>Dr.Rahma aldaqa</b>	<b>Assist.Prof.</b>	<b>818</b>	<b>Sun 10:00-11:00 Mon 09:30-10:30 Tue 10:00-11:00 Wed 09:30-10:30 Thu 10:00-11:00</b>	<b>Raldaqa@philadelphia.edu.jo</b>

**Course module description:**

It includes the study of linear equations, matrix operations, vector space and subspace, eigenvalues and eigenvectors, rotation of coordinate axes-, diagonalization, general linear transformations, and inverse transformations.

**Course module objectives:**

- To enable the students to carry on matrix operations.
- To enable students to solve linear equations using matrices.
- To understand the concepts of vector spaces.
- To understand eigenvectors and eigenvalues and systems of linear equations.
- To carry on transformations and inverse transformations.

**Course/ module components****Text Book****Title: Elementary Linear Algebra 9<sup>th</sup> Edition.****Author Howard Anton****Publisher: Wiley 2003**

- **Support material (s) (vcs, acs, etc) .**
- **Study guide (s) (if applicable)**
- **Homework and laboratory guide (s) if (applicable) .**

**Teaching methods:**

Lectures, discussion groups, tutorials, problem solving, debates, etc.

**Learning outcomes:**

- Knowledge and understanding  
**Understanding of the concepts of vectors and linear algebra .**
- Cognitive skills (thinking and analysis).  
**Applying the principles of systems of linear equations and matrices in some real world problems**
- Communication skills (personal and academic).  
**Scientific thinking and applications develops communication skills**
- Practical and subject specific skills (Transferable Skills).  
**Applying the concepts of linear algebra in simple experiments**

**Assessment instruments**

- Short reports and/ or presentations, and/ or Short research projects.
- Quizzes.
- Home works.
- Final examination: 40 marks

<b><u>Allocation of Marks</u></b>	
<b>Assessment Instruments</b>	<b>Mark</b>
First examination	<b>20%</b>
Second examination	<b>20%</b>
Final examination: 50 marks	<b>40%</b>
Reports, research projects, Quizzes, Home works, Projects	<b>20%</b>
Total	<b>100</b>

**Documentation and academic honesty**

- Documentation style (with illustrative examples)
- Protection by copyright
- Avoiding plagiarism.

**Course/module academic calendar**

<b>Week</b>	<b>Basic and support material to be covered</b>	<b>Homework/reports and Their due dates</b>
(1)	<b><u>CH01: System Of Linear Equations And Matrices</u></b> <ul style="list-style-type: none"> <li>• Introduction to systems of linear equations</li> <li>• Gaussian elimination</li> <li>• Matrices and matrix operations</li> <li>• Inverses ,Rules of matrix arithmetic</li> </ul>	Homework Ex 1.1,1.2,1.3,1.4
(2)	<ul style="list-style-type: none"> <li>• Elementary matrices and a method for finding <math>A^{-1}</math></li> <li>• Further results on systems of equations and invertibility</li> <li>• Diagonal, Triangular, and Symmetric Matrices</li> </ul>	Homework Ex 1.5,1.6,1.7
(3)	<b><u>Ch02: Determinants</u></b> <ul style="list-style-type: none"> <li>• Determinants by Cofactor Expansion</li> <li>• Evaluating Determinants by Row Reduction</li> </ul>	Homework Ex 2.1,2.2
(4)	<ul style="list-style-type: none"> <li>• Properties of the Determinant Function</li> <li>• A combinatorial Approach to Determinants</li> </ul>	Homework Ex 2.3,2.4
(5)	<b><u>CH05: General Vector Spaces</u></b> <ul style="list-style-type: none"> <li>• Real vector spaces</li> <li>• Subspaces</li> </ul>	Homework Ex 5.1,5.2, reports
(6) First examination	<ul style="list-style-type: none"> <li>• Linear independence</li> <li>• Basis and dimension</li> </ul>	Homework Ex 5.3,5.4
(7)	<ul style="list-style-type: none"> <li>• Row Space, Column Space, and Null Space</li> <li>• Rank and Nullity</li> </ul>	Homework Ex 5.5,5.6
(8)	<b><u>Ch06: Inner Product Space</u></b> <ul style="list-style-type: none"> <li>• Inner Products</li> <li>• Angle and Orthogonality in Inner Product Spaces</li> </ul>	Homework Ex 6.1,6.2
(9)	<ul style="list-style-type: none"> <li>• Orthonormal Bases; Gram Schmidt process</li> </ul>	Homework Ex 6.3, some reports
(10)	<b><u>Ch07: Eigenvalues and Eigenvectors</u></b> <ul style="list-style-type: none"> <li>• Eigenvalues and eigenvectors</li> </ul>	Homework Ex 7.1
(11) Second examination	<ul style="list-style-type: none"> <li>• Diagonalization</li> <li>• Powers of a matrix</li> </ul>	Homework Ex 7.2
(12)	<b><u>Ch08: Linear Transformations</u></b> <ul style="list-style-type: none"> <li>• General Linear Transformations</li> </ul>	Homework Ex 8.1
(13)	<ul style="list-style-type: none"> <li>• Kernel and Range</li> </ul>	Homework Ex 8.2
(14)	<ul style="list-style-type: none"> <li>• Inverse Linear Transformations</li> </ul>	Homework Ex 8.3
(15) Specimen examination (Optional)	<ul style="list-style-type: none"> <li>• Matrices of Linear Transformations</li> </ul>	Homework Ex 8.4, reports
(16) Final Examination	Review and Exercises	

### **Expected workload:**

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

### **Attendance policy:**

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

### **Module references:**

#### ***Books :***

- Linear Algebra and its applications by Howard Anton \_Addison Wesley 2002.
- Linear Algebra by L.W.Jhonson&R.D.Riess&J.t.arnold- Addisson Wesley 2007.
- Linear Algebra by Eric Carlen\_ Freeman 2007
- Linear Algebra and its applications by Gilbert Strang \_Belmont,CA 2006
- Linear Algebra and its applications by David C.Lay\_ pearson/addisson wesly2006.

#### **Journals:**

- [www.math.technion.ac.il](http://www.math.technion.ac.il)
- [http://archives.math.utk.edu/topics/linear algebra.](http://archives.math.utk.edu/topics/linear%20algebra)
- [www.elsevier.com/wps/find/journaldescription.cws-home](http://www.elsevier.com/wps/find/journaldescription.cws-home)
- [www.ilasic.math.uregina.ca/iic/journal](http://www.ilasic.math.uregina.ca/iic/journal)

#### **Websites:**

- [www.numbertheory.org/book](http://www.numbertheory.org/book)
- <http://ocw.mit.edu/ocwweb/mathematics>.....(video lectures).
- <http://en.wikipedia.org/wiki/Linear-algebra>.....(several links and text books)

