



**Philadelphia University**  
**Faculty of Science**  
**Department of Basic Sciences and Mathematics**  
**first semester, 2014/2015**

**Course Syllabus**

<b>Course Title: Linear Algebra 1</b>	<b>Course code:250241</b>
<b>Course Level: 1</b>	<b>Course prerequisite (s) and/or corequisite (s): None</b>
<b>Lecture Time: Sun .Tue and Thu 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>Amin Witno</b>	<b>Assist.Prof.</b>	<b>2-820</b>	<b>Sun Tue Thu 10:00-11:00 Mon Wed 11:00- 12:00</b>	<b>awitno@gmail.com</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 matrix operations.

To understand eigenvectors and eigenvalues and systems of linear equations.

To enable students to solve linear equations using matrices.

To carry on Transformations and inverse transformations.

## Course/ module components

- Books (title , author (s), publisher, year of publication)

### 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: 50 marks

<u>Allocation of Marks</u>	
Assessment Instruments	Mark
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

week	Basic and support material to be covered	Homework/reports and Their due dates
(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>• Matrices and matrix operations</li> <li>• Elementary matrices and a method for finding <math>A^{-1}</math></li> </ul>	Homework sheet 1
(2)	<ul style="list-style-type: none"> <li>• Diagonal, Triangular, and Symmetric Matrices</li> <li>• Gaussian elimination</li> <li>• Further results on systems of equations and invertibility</li> </ul>	Homework sheet1 due to
(3)	<b><u>Ch02: Determinants</u></b> <ul style="list-style-type: none"> <li>• The Determinant Function</li> <li>• Evaluating Determinants by Row Reduction</li> </ul>	Homework sheet2
(4)	<ul style="list-style-type: none"> <li>• Properties of the Determinant Function</li> <li>• Cofactor Expansion: Cramer's Rule</li> </ul>	Homework sheet2 due to
(5)	<b><u>CH05: General Vector Spaces</u></b> <ul style="list-style-type: none"> <li>• Real vector spaces</li> <li>• Sub spaces</li> </ul>	Homework sheet3 due to
(6) First examination	<ul style="list-style-type: none"> <li>• Linear independence</li> <li>• Basis and dimension</li> </ul>	Homework sheet4 due to
(7)	<ul style="list-style-type: none"> <li>• Row Space, Column Space, and Null Space</li> <li>• Rank and Nullity</li> </ul>	Homework sheet5 due to
(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 sheet6 due to
(9)	<ul style="list-style-type: none"> <li>• Orthonormal Bases; Gram Schmidt process</li> </ul>	Homework sheet7
(10)	<ul style="list-style-type: none"> <li>• Change of basis</li> <li>• Rotation of coordinate axes</li> </ul>	Homework sheet7 due to
(11) Second examination	<b><u>Ch07: Eigenvalues and Eigenvectors</u></b> <ul style="list-style-type: none"> <li>• Eigenvalues and eigenvectors</li> </ul>	Homework sheet8
(12)	<ul style="list-style-type: none"> <li>• Diagonalization</li> <li>• Powers of a matrix</li> </ul>	Homework sheet8 due to
(13)	<b><u>Ch08: Linear Transformations</u></b> <ul style="list-style-type: none"> <li>• General Linear Transformations</li> </ul>	Homework sheet9
(14)	<ul style="list-style-type: none"> <li>• Kernel and Range</li> <li>• Inverse Linear Transformations</li> </ul>	Homework sheet9 Due to
(15) Specimen examination (Optional)	<ul style="list-style-type: none"> <li>• Matrices of Linear Transformations</li> </ul>	Homework sheet10 due to
(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:**

- Linear Algebra and its applications by Howard Anton \_Addison Wesley 2002.
- Linear Algebra by L.W.Jhonson&R.D.Riess&J.t.arnold- Addisson Wesely 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/ocwwweb/mathematics.....>(video lectures).
- <http://en.wikipedia.org/wiki/Linear-algebra.....>(several links and text books)