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

Course Syllabus

<table>
<thead>
<tr>
<th>Course Title: Linear Algebra 2</th>
<th>Course code: 250341</th>
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<tbody>
<tr>
<td>Course Level: 2</td>
<td>Course prerequisite (s) and/or corequisite (s): Linear Algebra 1</td>
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<tr>
<td>Lecture Time: Sun ,,Tues., and Thursday 09:10 - 10:00</td>
<td>Credit hours: 3 credit hours</td>
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</tbody>
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Academic Staff Specifics

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
<th>Office Number and Location</th>
<th>Office Hours</th>
<th>E-mail Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Rahma aldaqa</td>
<td>Assist.Prof.</td>
<td>818</td>
<td>Sun 10:00-11:00</td>
<td><a href="mailto:Raldaqa@philadelphia.edu.jo">Raldaqa@philadelphia.edu.jo</a></td>
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<td>Mon 09:30-10:30</td>
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<td>Thu 10:00-11:00</td>
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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 9th 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

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<tr>
<th>Allocation of Marks</th>
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<tr>
<td>Assessment Instruments</td>
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<tr>
<td>First examination</td>
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<td>Second examination</td>
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<tr>
<td>Final examination: 50 marks</td>
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<tr>
<td>Reports, research projects, Quizzes, Home works, Projects</td>
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<tr>
<td>Total</td>
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**Documentation and academic honesty**
- Documentation style (with illustrative examples)
- Protection by copyright
- Avoiding plagiarism.

**Course/module academic calendar**

<table>
<thead>
<tr>
<th>Week</th>
<th>Basic and support material to be covered</th>
<th>Homework/reports and Their due dates</th>
</tr>
</thead>
</table>
| (1)  | **CH01: System Of Linear Equations And Matrices**  
- Introduction to systems of linear equations  
- Gaussian elimination  
- Matrices and matrix operations  
- Inverses, Rules of matrix arithmetic | Homework Ex 1.1,1.2,1.3,1.4 |
| (2)  |  
- Elementary matrices and a method for finding A⁻¹  
- Further results on systems of equations and invertibility  
- Diagonal, Triangular, and Symmetric Matrices | Homework Ex 1.5,1.6,1.7 |
| (3)  | **CH02: Determinants**  
- Determinants by Cofactor Expansion  
- Evaluating Determinants by Row Reduction | Homework Ex 2.1,2.2 |
| (4)  |  
- Properties of the Determinant Function  
- A combinatorial Approach to Determinants | Homework Ex 2.3,2.4 |
| (5)  | **CH05: General Vector Spaces**  
- Real vector spaces  
- Subspaces | Homework Ex 5.1,5.2, reports |
| (6) First examination |  
- Linear independence  
- Basis and dimension | Homework Ex 5.3,5.4 |
| (7)  |  
- Row Space, Column Space, and Null Space  
- Rank and Nullity | Homework Ex 5.5,5.6 |
| (8)  | **CH06: Inner Product Space**  
- Inner Products  
- Angle and Orthogonality in Inner Product Spaces | Homework Ex 6.1,6.2 |
| (9)  |  
- Orthonormal Bases; Gram Schmidt process | Homework Ex 6.3, some reports |
| (10) | **CH07: Eigenvalues and Eigenvectors**  
- Eigenvalues and eigenvectors | Homework Ex 7.1 |
| (11) Second examination |  
- Diagonalization  
- Powers of a matrix | Homework Ex 7.2 |
| (12) | **CH08: Linear Transformations**  
- General Linear Transformations | Homework Ex 8.1 |
| (13) |  
- Kernel and Range | Homework Ex 8.2 |
| (14) |  
- Inverse Linear Transformations | Homework Ex 8.3 |
| (15) Specimen examination (Optional) |  
- Matrices of Linear Transformations | 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 Eric Carlen_ Freeman 2007
- Linear Algebra and its applications by Gilbert Srang _Belmont,CA 2006

**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 algebra)
- [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:**

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