

**American University of Beirut
Department of Mathematics
Spring 2012**

**Math 218 – Elementary Linear Algebra with Applications
Syllabus for all sections**

Textbook: Introduction to Linear Algebra with Applications, J. DeFranza–D. Gagliardi

Course Description: An introduction to linear algebra at a less theoretical level than Math 219. Systems of linear equations and Gaussian elimination, vectors in \mathbf{R}^n , matrices, determinants, vector spaces, subspaces and dimension, orthogonal projection and least-squares approximation, eigenvalues, eigenvectors and selected applications. Students cannot receive credit for both Math 219 and Math 218.

Prerequisites: Mathematical maturity at a level equivalent to having taken Math 211. In particular, facility with sets, logic, mathematical induction and some background in basic mathematical proof.

Course Learning Outcomes:

- Define systems of linear equations and use Gaussian elimination to solve linear systems.
- Find the transpose and inverse of a matrix using elementary row operations.
- Evaluate determinants using several techniques and use the properties of determinants to determine if a matrix is non singular.
- Determine subspaces, spanning sets and bases of vector spaces and demonstrate linear independence or dependence of a set of vectors.
- Relate linear transformations to matrices and compute their rank.
- Compute the eigenvalues and eigenvectors of a matrix and learn the diagonalization of matrices.
- Define inner product spaces, angles and orthogonality, orthonormal bases.
- Apply the Gram–Schmidt process to construct orthonormal bases.
- Perform orthogonal diagonalization of a symmetric matrix.

Homework and Exams: There will be weekly sets of homework or drop quizzes, two exams and a final. For the homework assignments **only** the questions in bold are to be handed in.

The grades allocated towards the final grade are:

- Exam I..... 25%
- Exam II..... 25%
- Homework/Drop Quizzes..... 10%
- Final Exam..... 40%

Exam Dates:

- Exam I, Saturday 17 March, 2012: time and place to be announced.
- Exam II, Saturday 21 April, 2012; time and place to be announced.

Please make a note from now of the dates of Exam I and Exam II, as given above; make sure that you keep those times reserved for Math 218.

Course Policy:

- The grade for an unexcused missed exam will be zero.
- The university policy regarding incomplete work and other issues will be followed. Check the AUB catalogue for details.
- Regular attendance is expected. Students are responsible for all the materials presented in class, including announcements about course procedure.
- Last day for withdrawal from courses: 27 April, 2012.

Assignments

Section	Suggested Problems
1.1	3, 10, 12, 18, 21, 25, 28, 29, 32 , 34, 38, 40 , 43, 44 .
1.2	8, 20 , 22, 24, 26, 28 , 32, 34, 36 , 40, 42, 46 , 48, 50 , 51.
1.3	12, 16, 18, 20 , 22, 24, 27 , 28, 29, 30, 32 , 35, 36 , 38, 40, 42 , 43, 44 .
1.4	6, 11, 12 , 13, 16, 18, 19 , 20, 24, 26 , 27, 28, 30 , 32, 34, 37, 38 , 40.
1.5	6, 12, 16, 22, 26 , 28, 32 .
1.6	2, 3, 4 , 18, 20, 23 , 25, 28, 30 , 32, 36 , 40, 43, 52, 53 , 54.
2.1	16, 21, 22 , 28, 30 , 34, 36, 38.
2.2	9, 10 , 12, 15, 16 , 19, 20 , 22, 24, 27 , 28, 33, 37, 38 , 39.
2.3	7, 8 , 9, 10, 13 , 14, 20, 21, 24 , 27, 28 , 31, 32, 37, 38 , 42.
3.1	3, 4 , 7, 8 , 9, 10 , 12, 14 , 15, 16, 17 , 25, 28, 31.
3.2	2, 4, 7, 8 , 9, 11, 13, 14 , 16, 18, 20 , 23, 24, 26, 30 , 32, 36, 38 , 40, 43, 50 .
3.3	3, 4 , 6, 10 , 11, 12, 16, 19, 20, 22 , 24, 28, 36, 41, 42 , 44.
3.4	3, 4, 8 , 11, 16, 22 , 24.
4.1	2, 3, 4 , 5, 10, 11 , 12, 14 , 16, 18, 22, 26 , 28, 30, 32, 34, 36 , 38, 42.
4.2	4, 6 , 7, 10 , 12, 14, 16, 18 , 20, 26 , 28, 29, 30, 32 , 34, 40, 43.
4.3	2, 8 , 10, 12, 16 , 19, 20, 22, 26 , 27, 29, 30, 31, 32 .
4.4	2, 6 , 10, 14, 16 , 17, 20 , 24, 32 .
4.5	2, 4, 6, 8, 10 , 12, 16 , 17, 18 .
5.1	2, 4, 8, 12, 14 , 17, 18, 19 , 20, 21, 23, 24, 28 , 29, 32 , 35.
5.2	2, 4, 6, 8, 12 , 16, 20, 22, 24 , 27, 28, 30, 31, 32 , 33, 34, 35 , 38.
6.1	2, 3, 4, 11, 12, 13, 14, 15, 16 , 18, 24, 30 .
6.2	2, 6, 8, 10 , 12, 18 , 20, 22, 28, 30 .
6.3	4, 8, 12 , 14, 16 , 18, 20 , 24, 31, 34, 36 , 37.
6.4	4, 6, 10, 14 , 16, 18, 22 , 27, 29.
6.5	2, 4, 6, 8 .
6.6	2, 4, 6, 8, 10, 12 , 14, 20, 22, 24 .