BOROUGH OF MANHATTAN COMMUNITY COLLEGE
City University of New York

Department of Mathematics

Linear Algebra
MAT 315
Instructor Information:
Name: Prof Wladis
Email: profwladis@gmail.com
(This is the best way to reach me.**)**

Class hours: 3
Credits: 3
Phone: 212-220-1363 (email is the best way to reach me)
Office: N539 (inside the math department N520)
Box: in the math department, N520
Office hours: M 1:45-3:45pm, W 12-1pm
Course webpage: www.cwladis.com/math

Course Description: This course is designed to cover the usual topics in a linear algebra course (e.g., vector spaces, matrices, linear equations) as well as several special topics required by coursework for electrical engineering students (Boolean functions, switching circuits, minimal Boolean functions).

Prerequisites/Co-requisites: Prerequisite: Calculus II (MAT 302) or Departmental approval.

Student Learning Outcomes:

1) Students will be able to express and solve systems of linear equations in matrix form using matrix operations.
2) Students will be able to calculate determinants and apply them to solve system of linear equations (Cramer's Rule).
3) Students will be able to identify vector space, subspace, and calculate the dimension of a vector space, kernel and the range of linear transformations.
4) Students will be able to calculate eigenvalues and eigenvectors of a square matrix.

Required Text: Linear Algebra and its Applications, Third Edition, David C. Lay, Addison Wesley Publishers, 2003.

With mymathlab access kit: ISBN-10: 0-321-28062-8,
http://www.mypearsonstore.com/bookstore/product.asp?isbn=0321280628, $134.67 online

Stand-alone mymathlab code with e-book: $70 online
Go to www.coursecompass.com. You will need:

1. a credit card or paypal account,
2. the course ID (**wladis57088**), and
3. the school zip code (**10007**).

On the lower left hand side of the screen, under where it says Students, there is a link that says "How to buy access". Once the student clicks on this they are guided through the purchase.

Evaluation & Requirements of Students:
Assignments:
Instead of being calculated as a percentage, your final grade will be based on a point system that lets you choose to a certain extent which kinds of assignments you would like to complete.

Here are the assignment choices:

- *Homework* (10 points total)

Each chapter has its own homework assignments, which will be assigned in class. Each class day, you will be required to submit a list of the homework problems completed, and you will be called on at random to present some of these problems to the class. Your homework grade will be based on the number of problems that you complete and the quality of your presented work effort in class.

- *Online Quizzes* (10 points total)
  Each chapter has quizzes online at www.coursecompass.com. You can do these quizzes more than once, and they are automatically graded, so you get instant feedback.

  In order to do these assignments, you will need to purchase a mymathlab access code from the publisher Pearson. You have several options: you can buy the book packaged together with the code from the Pearson website (http://www.mypearsonstore.com/bookstore/product.asp?isbn=0321280628), or you can purchase just the code with access to an online e-book at www.coursecompass.com. You will need:
  1. a credit card or paypal account,
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  On the lower left hand side of the screen, under where it says Students, there is a link that says "How to buy access". Once you click on this you will be guided through the purchase.

  Right now the book bundled with the code at the Pearson website costs $134.67, and the mymathlab access with the e-book costs $70. You can save as pdf and print out the e-book section by section, although its use is restricted.

- *Projects* (5 pts each)
  Many of these projects require the software program Maple, which you can download. The projects will be available on the course website www.cwladis.com/math315, and there will be at least one project for each chapter. More detailed instructions on the projects can be found on the website as they are posted.
- *Section Tests* (15 points each)
  We will have about 3 section tests throughout the semester. I will make announcements in class a week or two ahead of time.
- *Final exam* (20 pts)

Your final grade will be calculated out of a maximum of 100 points. The number of points you earn will contribute to your grade using the following grading scale:
A 93-100 **,** A- 90-92, B+ 87-89, B 83-86, B- 80-82, C+ 77-79, C 73-76, C- 70-72, D+ 67-69, D 63-66, D- 60-62, F below 60.

Outline of Topics:

TOPICS

Linear Equations in Linear Algebra

1.1 Systems of Linear Equations
1.2 Row Reduction and Echelon Forms
1.3 Vector Equations
1.4 The Matrix Equation Ax=b
1.5 Solution Sets of Linear Systems
1.6 Applications of Linear Systems
1.6 Linear Independence
1.7 Introduction to Linear Transformations
1.9 The Matrix of a Linear Transformation

Matrix Algebra

2.1 Matrix Operations
2.2 Inverse of a Matrix
2.3 Characterizations of Invertible Matrices
*2.4 Partitioned Matrices
*2.5 Matrix Factorizations

Determinants

3.1 Introduction to Determinants
3.2 Properties of Determinants
3.3 Cramer's Rule, Volume, and Linear Transformations

Vector Spaces

4.1 Vector Spaces and Subspaces
4.2 Null Spaces, Column Spaces, and Linear Transformations
4.3 Linearly Dependent Sets: Bases
4.4 Coordinate Systems
4.5 The Dimension of a Vector Space
4.6 Rank
4.7 Change of Basis

Eigenvalues and Eigenvectors

5.1 Eigenvectors and Eigenvalues
5.2 The Characteristic Equation
5.3 Diagonalization
5.4 Eigenvectors and Linear Transformations

Orthogonality and Least- Squares

6.1 Inner Product, Length, and Orthogonality
6.2 Orthogonal Sets
6.3 Orthogonal Projections
6.4 The Gram-Schmidt Process
6.5 Least Squares Problems

Symmetric Malices and Quadratic Forms

7.1 Diagonalization of Symmetric Matrices
7.2 Quadratic Forms

*** Denotes Optional Material**

College Attendance Policy
At BMCC, the maximum number of absences is limited to one more hour than the number of hours a class meets in one week. For example, this is a four-hour class. In this class, you would be allowed 5 hours of absence (not 5 days). In the case of excessive absences, the instructor has the option to lower the grade or assign an F or WU grade.

Academic Adjustments/Students with Disabilities:
Students with disabilities who require reasonable accommodations or academic adjustments for this course must contact the Office of Services for Students with Disabilities (Room N320; 220-8180). BMCC is committed to providing equal access to all programs and curricula to all students.

BMCC Policy Statement on Plagiarism:
Plagiarism is the presentation of someone else's ideas, words or artistic, scientific, or technical work as one's own creation. Using the idea or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism.
Students who are unsure of how and when to provide documentation are advised to consult with their instructors. The library has guides designed to help students to appropriately identify a cited work. The full policy can be found on BMCC's web site, www.bmcc.cuny.edu.