

**MATH 2043 Syllabus****LECTURE:** MTWTh 8:00-8:50am, Spanagel 316**INSTRUCTOR:** Dr. Hongde Hu, 245A Spanagel, [hongde.hu@nps.edu](mailto:hongde.hu@nps.edu)**OFFICE HOURS:** by appointment**TEXT:** *Introduction to Linear Algebra*. 5th ed. By Strang, Gilbert[Wellesley-Cambridge Press](#), 2016. ISBN: 9780980232776.

**COURSE OBJECTIVES:** The fundamental algebra of vectors and matrices including addition, scaling, and multiplication will be covered, including block operations with vectors and matrices. Other topics covered by the course include: algorithms for computing the LU (Gauss) factorization of an  $n \times m$  matrix with pivoting; matrix representation of systems of linear equations and their solution via the LU factorization; basic properties of determinants; matrix inverses; linear transformations and change of basis; the four fundamental subspaces and the fundamental theorem of linear algebra; least squares approximations, and eigenvalues/eigenvectors of matrices.

Hours	TOPICS	Sections
1-1	Vectors and Linear Combinations	1.1
1-2	Lengths and Dot Products	1.2
1-3	Matrices	1.3
2-5	Vectors and Linear Equations	2.1
2-7	Elimination with matrices	2.2-2.3
1-8	Matrix operations	2.4
1-9	Inverse Matrices	2.5
1-10	Elimination=Factorization: $A=LU$	2.6
1-11	Transposes and permutations	2.7
1-12	Vector spaces and subspaces	3.1
1-13	The nullspace: Solving $Ax = 0$	3.2
1-14	Rectangular $PA = LU$ and $Ax = b$	3.3
1-15	Row reduced echelon form	3.3
1-16	Independence, Basis and dimension	3.4
1-17	The Four Fundamental Subspaces	3.5
1-18	Graphs and networks	3.5, 10.1
1-19	Orthogonality	4.1
1-20	Projections and subspaces	4.2
2-22	Least squares approximations	4.3
2-24	Gram-Schmidt and $A = QR$	4.4
1-25	Properties of determinants	5.1
1-26	Permutations and Cofactors	5.2
2-28	Applications of determinants	5.3
2-30	Eigenvalues and eigenvectors	6.1
1-31	Diagonalization; Similar matrices	6.2
1-32	Systems of Differential Equations	6.3
1-33	Symmetric Matrices	6.4
1-34	Positive Definite Matrices	6.5
1-35	Markov Matrices; Google's Page Rank Algorithm	10.3&slides
2-37	Linear transformations	8.1-8.2
2-39	The Search for a good basis	8.3
5-44	Exams, Reviews, Holidays	

**HOMEWORK:** You are encouraged to do as many problems as you can from the book. However, the standard (default) assignment for each week is to read carefully the indicated sections and to prepare for homework the problems I will assign in class. The homework will not be collected, though, the exams may contain similar problems as in the assigned homework.

**TESTS (tentatively):** Three tests will be give (week 4, week 8 and finals' week). No make-up tests will be given except in extraordinary circumstances (e.g. illness - present verified doctor's excuse). If the test dates will be changed (or the material that will be covered on each test), I will announce it in class at least a few days in advance. It is your responsibility to stay informed of such changes.

**GRADING:** The number of possible points is 100. For the letter grade I will use the following scale (be advised that class participation will be considered, especially in the borderline grades) (*there are no exceptions from this scale!!!!*):

A	93 – 100%
A-	90 – 92.99%
B+	87 – 89.99%
B	83– 86.99%
B-	80– 82.99%
C+	77– 79.99%
C	73 – 76.99%
C-	70– 72.99%
D+	67– 69.99%
D	63 – 66.99%
D-	60 – 62.99%
F	0 – 59.99%

**ACADEMIC HONESTY:** Cheating in this course *will not be tolerated* and will be dealt with as harshly as the University permits. I will report any student behavior that appears contrary to the standards of discipline and academic honesty or in violations of the provisions described in the current edition of *NPS Student's Catalog*.

**NOTES:**

- \* It is quite a bit of material to be covered at a very fast pace, so, I advise you not to fall behind.
- \* If it is necessary, there will be updates of this handout. Make sure you check SAKAI, regularly, for info on the course.
- \* **Good luck ! I hope you will all master Linear Algebra and make good grades!**