Course Guide Applied Linear Algebra 221: Spring 2026: DH 4164, M-W-F 8:15-9:05 AM

Date	Topic	Lecture Notes/ Text	Assignment
M: 1-19	Lecture 1: systems of linear equations and the row reduction technique		
W: 1-21	Lecture 2: reduced row echelon form		
F: 1-23	Lecture 3: linear systems as matrix-column products, linear combinations and dependence		
M: 1-26	Lecture 4: matrices and their algebra, introduction to index notation argumentation		
W: 1-28	Lecture 5: the standard basis and matrix calculation		Mission 1
F: 1-30	Lecture 6: matrices with a particular set of skills		
M: 2-2	Lecture 7: elementary matrices and the CCP (Column Correspondence Property)		
W: 2-4	Lecture 8: invertible matrices, properties and calculation		
F: 2-6	Lecture 9: null space, column space and the rank nullity theorem		
M: 2-9	Questions		Mission 2
W: 2-11	Boss Fight 1 [allowed a 3x5 inch card of formulas and a non-graphing calculator]		
F: 2-13	Lecture 10: linear transformations and the standard matrix		
M: 2-16	Lecture 11: introduction to vector spaces, examples and the subspace test		
W: 2-18	Lecture 12: concept of basis and the coordinate map		
F: 2-20	Lecture 13: matrix of a linear transformation of vector spaces		
M: 2-23	Lecture 14: coordinate change for vectors		
W: 2-25	Lecture 15: coordinate change for linear transformations		
F: 2-27	Lecture 16: determinants		
M: 3-2	Lecture 17: geometry and determinants		
W: 3-4	Lecture 18: Cramer's Rule and the formula for the inverse of a matrix		Mission 3
F: 3-6	Lecture 19: Euclidean geometry, orthonormal bases and orthogonal transformations		
M: 3-9	Lecture 20: vector projections, Gram-Schmidt-Algorithm and the QR-decomposition		
W: 3-11	Lecture 21: independent subspaces and orthogonal projections for subspaces		
F: 3-13	Lecture 22: the closest vector problem & least squares analysis		
	March 16-20, Spring Break		
M: 3-23	Questions		Mission 4
W: 3-25	Assessment Day: no class.		
F: 3-27	Boss Fight 2 [allowed a two-sided page of notes and a non-graphing calculator]		
M: 3-30	Lecture 23: the calculus of matrix-valued functions of a real variable and systems of ODEs, diagonalization		
W: 4-1	Lecture 24: properties and examples of real eigenvectors		
F: 4-3	Lecture 25: properties and examples of real eigenvectors		
M: 4-6	Easter Monday		
W: 4-8	Lecture 26: generalized eigenvectors and the Jordan form		
F: 4-10	Lecture 27: the matrix exponential, Cayley Hamilton Theorem		
M: 4-13	Lecture 28: properties and examples of complex eigenvectors		
W: 4-15	Lecture 29: generalized complex eigenvectors and the matrix exponential		Mission 5
F: 4-17	Lecture 30: the real spectral theorem		
M: 4-20	Lecture 31: diagonalization of quadratic forms		

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W: 4-22	Lecture 32: the singular value decomposition part I		
F: 4-24	Lecture 33: the singular value decomposition part II		
M: 4-27	Questions		Mission 6
W: 4-29	Boss Fight 3 [allowed a two-sided page of notes of formulas and a non-graphing calculator]		
F: 5-1	Lecture 34: something fun.		
M: 5-4	Attack Strategies for the Final Boss Fight		
W: 5-6	Reading Day (May 6)		
R: 5-7	Final Boss Fight [allowed a two-sided page of notes and a non-graphing calculator] (May 7, 8:00-10:00)		

Grading: usual 1000pts scale with:

Boss Fights = 3(200pts) = 600pts, Missions = 5(40pts) = 200pts, (I keep the top 5 scores), Final Boss Fight = 200pts.

Grade Replacement Policy: the Final Boss Fight may replace the grade for Boss Fight 1 or 2 or 3 if helpful. If you miss a Mission then I used the nearest Test percentage to form its replacement. However, if there is no excuse for missing the Mission then you earn a zero. The Mission grade replacement is only offered in the case that you have a university approved excuse. In the event you miss both the Mission and the Test with a university approved absence or delay then those points may be transferred to the Final Exam.

Advice: There really is no substitute for working through the Missions. They will required sustained effort over several days for best results. If you understand the Missions then the Boss Fights should be unsurprising. Once the solution to the Mission is posted submissions are no longer accepted. Otherwise there is a 10pt per day late penalty (missions turned in at the end of class are typically marked late, you should put the mission on the desk at the front of class when you arrive). I try to not take off points for missed classes, however, since students coming late to class was a major distraction last time I taught at 8:15, I will take off 75pts if you are routinely late (3 strikes and then I impose the penalty, I'd rather not, but I tried to reign in lateness with quizzes last year and it didn't have any effect, perhaps this will be heard). You should come to class and pay attention for best results. If you plan to work on other classes during my class then please do not attend. You'll know you were late when I look at you and say "strike one". I will begin implementing this policy on the second class meeting. First day is free.

Formatting of Missions: please follow instructions. Print name means to print your first and last name as they appear in Canvas. I expect a single, well-placed staple in the upper left corner. There should only be work on one-side of the paper. This goes for the attached work as well as the Problem Sheet you need to print out. Notice that I have instructed you to show complete solutions for some problems, so it is important that you print out the Mission for the sake of the grader and for the sake of you earning the 5pts for formatting. Finally, if in doubt, ask. My email is jcook4@liberty.edu. (Canvas Messaging does not work well, please use email instead)

Bonus Points: it is possible to earn bonus points for pointing out errors in the lecture notes pdfs. However, to earn these points a screen shot and description of the problem must be emailed to jcook4@liberty.edu. I plan to write new notes this term, these will be published in pdf format as the semester unfolds. I do have older typed notes if you need additional examples, there are oodles in there. I decided to start fresh this term for a change.