



COURSE: LINEAR ALGEBRA		
DEGREE: Aerospace Engineering	YEAR: 1	TERM: 1

WEEK	SESSION 45, 46 & 47	DESCRIPTION	GROUP		WEEKLY PROGRAMMING FOR STUDENTS		
			LECTURE	SEMINAR	NOTES	LECTURE HOURS	STUDENT WORK
1	15/9	0. Complex Numbers 0.1 First operations <ul style="list-style-type: none"> • Definition. Binomial form • Sum and product • Graphical representation 0.2 Further operations <ul style="list-style-type: none"> • Conjugate, modulus and argument • Division 	X		Book study, Appendix A [N]	1,66	6
1	16/9, & 18/9	Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	
2	22/9	0.2 Exponential form <ul style="list-style-type: none"> • Exponential form • Roots of a complex number 	X		Book study, Appendix A [N]	1,66	6
2	23/9, & 25/9	Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	
3	29/9	1. Systems of linear equations 1.1 Solving linear equations <ul style="list-style-type: none"> • Matrix notation • Gaussian elimination 1.2 Row reduction and echelon forms <ul style="list-style-type: none"> • Uniqueness • Solutions of linear systems 	X		Book study, chapters 1.1-1.2 [L]	1,66	6
3	30/9 & 2/10	Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	
4	6/10	1.3 Vector equations <ul style="list-style-type: none"> • Vectors and linear combinations • Subset spanned by vectors 1.4 The matrix equation $Ax=b$ <ul style="list-style-type: none"> • Matrix times vector • Solutions of a SLE 	X		Book study, chapters 1.3-1.5 [L]	1,66	6
4	7/10 & 9/10	Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	

5	13/10	2. Matrices 2.1 Matrix Operations <ul style="list-style-type: none"> • Sum and product by scalars • Product • Transpose of a matrix 2.2 Inverse of a matrix <ul style="list-style-type: none"> • Relation with the uniqueness of $Ax=b$ • Computation 	X		Book study, chapters 2.1-2.3 [L]	1,66	6
5	14/10 & 16/10	Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	
6	20/10	3. Vector spaces 3.1 Vector Spaces and Subspaces <ul style="list-style-type: none"> • Sub-spaces generated by vectors • Null Space and Columns space 	X		Book study, chapters 2.8, 4.1-4.2 de [L]	1,66	6
6	21/10, & 23/10	Midterm test on chapters 0, 1 and 2 Selected exercises		X	Odd numbered exercises. Compare with solutions (*)	1,66	
7	27/10	3.2 Linear Independence and basis <ul style="list-style-type: none"> • The spanning set theorem • Basis for $Nul(A)$ and $Col(A)$ 	X		Book study, chapters 1.7, 2.9, 4.3 [L]	1,66	
7	28/10 & 30/10	Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	
8	3/11	3.3 Coordinate Systems 3.4 The dimension of a vector space <ul style="list-style-type: none"> • The basis theorem • The dimensions of $Nul(A)$ and $Col(A)$ 3.5 Rank <ul style="list-style-type: none"> • The Rank theorem • 3.6 Change of basis 	X		Book study, chapters 4.4-4.5 [L] and 2.9, 4.6-4.7 [L]	1,66	6
8	4/11 & 6/11	Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	
9	10/11	3.7 Linear transformations <ul style="list-style-type: none"> • The matrix of a linear transformation • Kernel and range of a linear transformation 	X		Book study, chapters 1.8-1.9 [L]	1,66	6
9	11/11 & 13/11	Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	
10	17/11	4. Eigenvalues and eigenvectors 4.1 Definitions <ul style="list-style-type: none"> • Revisiting determinants • Linear Independence of eigenvalues • Eigenspaces 4.2 The characteristic equation	X		Book study, chapters 3.1 -3.2, 5.1-5.2 [L]	1,66	6
10	18/11 & 20/11	Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	

11	24/11	4.3 Diagonalization • The diagonalization theorem • Diagonalizing matrices	X		Book study, chapter 5-3 [L]	1,66	
11	25/11 & 27/11	Selected exercises		X	Odd numbered exercises. Compare with solutions (*)	1,66	
12	1/12	5. Orthogonality 5.1 Inner product, length and orthogonality 5.2 Orthogonal sets • Orthogonal and orthonormal basis • Orthogonal matrices	X		Book study, chapters 6.1-6.2 [L]	1,66	6
12	2/12 & 4/12	Midterm test on chapters 3 and 4 Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	
13	4/12	5.3 Orthogonal projection • The best approximation theorem 5.4 The Gram-Schmidt process	X		Book study, chapters 6.3-6.4 [L]	1,66	6
13	9/12 & 11/12	Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	
14	15/12	5.5 Least square problems • Normal equations 6. Diagonalization of symmetric matrices • Spectral theorem	X		Book study, chapter 6.5 [L] and	1,66	6
14	16/12 & 18/12	Selected exercises (*)		X	Additional exercises from collection and textbooks (*)	1,66	6
Subtotal 1						50	90
Total 1 (Hours of class plus student homework hours between weeks 1-15)						140	
16 - 18	Assessment, evaluation preparation. Final Test					3	7
Subtotal 2						3	7
Total 2 (Hours of class plus student homework hours between weeks 16-18)						10	
TOTAL (Total 1 + Total 2)							150

(*) Discussion of selected exercises from the course collection and from the recommended textbooks (W.K. Nicholson's ([N]) or D. C. Lay's ([L])) related with the theory session of the week. Compare with the solutions in the book