

## Universidad Carlos III de Madrid

UPDATED: 23 Jun 2017

COURSE: ALGEBRA										
DEGREE: ENERGY ENGINEERING						YEAR: 1		TERM: 1		
WEEKLY PLANNING										
WEEK	SESSION	GROUP	DESCRIPTION	LECTURE	<b>TYPE</b> PROBLEMS	EXAM	NOTES	CLASS	JRS WEEKLY TOTAL	
1	1	Large	PRESENTATION     CHAPTER 1: COMPLEX NUMBERS     Numbers sets     Necessity of complex numbers     Binomial form of a complex number     Graphical representation     Operations     Complex conjugate, modulus, argument     Polar form of a complex number	x			New Chapter!	1.66	7	
	2	Small	CHAPTER 1: COMPLEX NUMBERS     Problems		x			1.66		
2	1	Large	CHAPTER 1: COMPLEX NUMBERS     Roots of complex numbers     Exponential of a complex number     Solving equations     Mandelbrot set	x				1.66	7	
	2	Small	CHAPTER 1: COMPLEX NUMBERS     Problems		x			1.66		
3	1	Large	CHAPTER 2: LINEAR EQUATIONS     Introduction to Linear Equations     Geometrical Interpretation     Existence and Uniqueness     Matrix Notation     Gaussian Elimination     Row Equivalence and Echelon Forms	x			New Chapter!	1.66	7	
	2	Small	CHAPTER 2: LINEAR SYSTEMS     Problems		x	х		1.66		
4	1	Large	CHAPTER 2: LINEAR EQUATIONS     Solving Linear Systems     Homogeneous Systems     Simultaneous Solving     Systems with parameters	x				1.66	7	
	2	Small	CHAPTER 2: LINEAR SYSTEMS     Problems		x			1.66		
	1	Large	CHAPTER 3: THE VECTOR SPACE K <sup>n</sup> Vectors     Linear Subspace     Subspace Combinations     Subspace Spanned by Vectors     Column and Row Spaces	x			New Chapter!	1.66	9	
5	2	Large	CHAPTER 3: THE VECTOR SPACE K <sup>n</sup> The Matrix Equation <i>Ax=b</i> Null Space     Revisiting Linear Systems	x				1.66		
	3	Small	CHAPTER 3: THE VECTOR SPACE K <sup>n</sup> Problems		x	x		1.66		
6	1	Large	CHAPTER 3: THE VECTOR SPACE K <sup>n</sup> Linear Independence     Basis for a Linear Subspace     Dimension of a Linear Subspace     Basis for Col <i>A</i> , Row <i>A</i> and Nul <i>A</i> Rank of a Matrix     Coordinate Systems	x				1.66	7	
	2	Small	CHAPTER 3: THE VECTOR SPACE K <sup>n</sup> Problems		x			1.66		

1         Log 2         Since 2 (Since 2)         1         X         X         X         X         1         1.00         1.00           2         Since 3         Since 3         Since 3         X         X         X         X         X         1.00         1.00           1         C         Since 3         Since 3         Since 3         X         X         X         X         Nov Chapter 1         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00 <td< th=""><th></th><th></th><th></th><th>• <u>CHAPTER 3</u>: THE VECTOR SPACE K<sup>n</sup></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>				• <u>CHAPTER 3</u> : THE VECTOR SPACE K <sup>n</sup>							
$ \begin{array}{ c c c } \hline \begin{tabular}{ c c c } \hline \begin{tabular}{ c c c } \hline \begin{tabular}{ c c c } \hline \hline \begin{tabular}{ c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c } \hline \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	7	1	Large	· Coordinate Systems	x				1.66		
11111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111 <th< td=""><td></td><td></td><td>Introduction to Linear Transformations</td><td></td><td></td><td></td><td></td><td></td><td>7</td></th<>				Introduction to Linear Transformations						7	
$ \begin{array}{ c c c c c } & & & & & & & & & & & & & & & & & & &$		2	Small	• CHAPTER 3: THE VECTOR SPACE K <sup>n</sup>		x			1.66		
1     Lange     -************************************				Problems							
				• <u>CHAPTER 4</u> : MATRIX ALGEBRA							
B       Image: Intersection Addition in the section of Addition of Addition in the section of Addition of Addition in the section of Addition	8	1	Large		x			New Chapter!	1.66		
i     2     Small     Problems     i     X     X     X     X     L68       1     Lange     -CRAFER 3: MARXALCEBRA - Section of Marxin - Section of				Conjugate Transpose of a Matrix     Inverse of a Matrix						7	
Image: bias in the section of the sectin of the section of the section of the				CHAPTER 4: MATRIX ALGEBRA							
1         Lurge         Improves of Minices - Determinants - Determina			Small	Problems		x	x		1.66		
a				• <u>CHAPTER 4</u> : MATRIX ALGEBRA							
9         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1			Large		x				1.66		
i     Small     Problems     i     X     i     i.e.     i.	9									7	
Image: border				• CHAPTER 4: MATRIX ALGEBRA							
1         1         Large         ::::::::::::::::::::::::::::::::::::		2	Small	Problems		X			1.66		
$\begin{array}{c c c c c c } \hline 1 & \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$				• CHAPTER 5: EIGENVALUES & EIGENVECTORS							
101010101001001001001001002Small•••••••••••••••••••••••••••••••••		1	Large		x			New Chapter!	1.66	7	
1     2     Small     Problems     X     X     X     X     1.66       1     Large     CMAPTER 5: EIGENVALUES & EIGENVECTORS     X     Image: Chapter 6: EiGENVALUES & EIGENVECTORS     X     Image: Chapte	10										
Image: border		2		• CHAPTER 5: EIGENVALUES AND EIGENVECTORS		v	<b>_</b>		1 66		
1         1.arge : Transformations between Linear Subspaces         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X         X <t< td=""><td></td><td>2</td><td>Sman</td><td>Problems</td><td></td><td></td><td></td><td></td><td>1.00</td><td></td></t<>		2	Sman	Problems					1.00		
$\begin{array}{c c c c c c } \hline 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 &$				• <u>CHAPTER 5</u> : EIGENVALUES & EIGENVECTORS							
11 $\begin{tabular}{ c                                   $		1	Large		x				1.66		
$\begin{array}{ c c c c } \hline 2 & \operatorname{Small} & \operatorname{Problems} & & X & X & & & & & & & & & & & & & & $	11	2	Small	Transformations between Linear Subspaces						7	
$ \begin{array}{ c c c } \hline  c c c c c c c c c c c c c c c c c c $				• CHAPTER 5: EIGENVALUES AND EIGENVECTORS		x			1.66		
$\begin{array}{c c c c c } 1 & $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$				Problems							
$\begin{array}{c c c c c } \hline 1 & \ \begin{tabular}{ c c } & \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $				• <u>CHAPTER 6</u> : ORTHOGONALITY							
$ \begin{array}{ c c c c c } \hline \hline$					x			New Chapter!	1.66		
$ \begin{array}{ c c c } \hline \begin{tabular}{ c c } \hline \hline \begin{tabular}{ c c } \hline \hline \$	12			· Unitary Matrices						7	
1       Large       . Orthogonal Complement Orthogonal Projection The Gram-Schmidt Process       X       Image: Complement Orthogonal Projection The Gram-Schmidt Process       1.66       1.66         2       Small       . CHAPTER 6: ORTHOGONALITY Problems       X       X       Image: Complement Orthogonal Complement Problems       1.66       1.66         1       Y       Problems       X       X       X       Image: Complement Problems       1.66       1.66       1.66       1.66         1       Large       . CHAPTER 6: ORTHOGONALITY - Least-Squares Problems       X       X       Image: Complement Problems       New Chapter 1       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66       1.66 <td></td> <td>2</td> <td>Small</td> <td>PROBLEMS (To be determined)</td> <td></td> <td>x</td> <td>x</td> <td></td> <td>1.66</td> <td></td>		2	Small	PROBLEMS (To be determined)		x	x		1.66		
$\frac{1}{10}  10^{\circ}  0^{\circ} \operatorname{CM} $				• <u>CHAPTER 6</u> : ORTHOGONALITY							
131111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111 <t< td=""><td></td><td>1</td><td>Large</td><td></td><td>x</td><td></td><td></td><td></td><td>1.66</td><td></td></t<>		1	Large		x				1.66		
2       Small       Problems       X       X       1.66         1       Arrow CHAPTER 5: ORTHOGONALITY       Least-Squares Problems       Arrow Chapter!       1.66         1       Large       •CHAPTER 7: NORMAL MATRICES       X       New Chapter!       1.66         2       Schur Decomposition       •Schur Decomposition       Normal Matrices       X       New Chapter!       1.66         2       Small       •CHAPTER 6: ORTHOGONALITY       Problems       X       X       X       New Chapter!       1.66         2       Small       •CHAPTER 7: NORMAL MATRICES       X       X       X       X       1.66         2       Small       •CHAPTER 7: NORMAL MATRICES       X       X       X       X       1.66         2       Small       •CHAPTER 7: NORMAL MATRICES       X       X       X       X       1.66         1       Order       Interest       •CHAPTER 7: NORMAL MATRICES       X       X       X       X       1.66         1       Interest       •CHAPTER 7: NORMAL MATRICES       Interest       X       X       X       1.66         1       Interest       •CHAPTER 7: NORMAL MATRICES       Interest       Interest       Interest	13		Small							7	
Image: state in the state in therest in the state in the state in the state i				CHAPTER 6: ORTHOGONALITY		v			1.00		
1 Large L			Small	Problems		X			T.00		
1       Large       • CHAPTER 7: NORMAL MATRICES • Schur Decomposition • Normal Matrices • Particular Cases of Normal Matrices • CHAPTER 7: NORMAL MATRICES • Problems • CHAPTER 7: NORMAL MATRICES • CHAPTER 7: NORM				• <u>CHAPTER 6</u> : ORTHOGONALITY							
$ \begin{array}{c c c c c c } 1 & \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$				· Least-Squares Problems					1.66		
$ \frac{1}{1} 1$		1	Large	• <u>CHAPTER 7</u> : NORMAL MATRICES	x			New Chapter!			
14Image: constraint of the section of th											
2       Small       Problems       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       x       <	14	2	Small							7	
2       Small       • CHAPTER 7: NORMAL MATRICES       X       X       X       X       1.66         Problems       Image: Comparison of the sector of th				CHAPTER 6: ORTHOGONALITY							
<ul> <li>CHAPTER 7: NORMAL MATRICES</li> <li>Problems</li> <li>M</li> <li>Subtotal</li> <li>48.14</li> <li>100</li> <li>Subtotal</li> <li>48.14</li> <li>148.14</li> <li>15.16</li> <li>TUTORIALS AND EXAMEN PREPARATION</li> <li>TUTORIALS AND EXAMEN PREPARATION</li> <li>TINAL EXAM</li> <li>TOtal 2 (Hours of class plus student bottom work bottom student student bottom st</li></ul>				Problems		×	×		1 66		
Image: constraint of the state of the				• CHAPTER 7: NORMAL MATRICES					1.00		
Image: Constraint of the second state of the second sta				Problems							
15-16       TUTORIALS AND EXAMEN PREPARATION       28.36         17       FINAL EXAM       X       3.5         18       Total 2 (Hours of class plus student homework hours between weeks 15-18)       31.86								Subtotal	48.14	100	
17     FINAL EXAM     X     3.5       Image: Constraint of the state				Total 1 (Hours of class plus student homework hours between weeks 1-14)						148.14	
Total 2 (Hours of class plus student homework hours between weeks 15-18)         31.86										28.36	
	17										
TOTAL (Total 1 + Total 2)         180				Total 2 (Hours of class plus s	tudent hon	nework ho	urs betwe	en weeks 15-18)	31.86		
	TOTAL (Total 1 + Total 2)							18	30		