Universidad Carlos III de Madrid

UPDATED: 5 Dec 2018

COURSE: MATHEMATICS FOR DATA ANALYSIS		
MASTER IN BIG DATA ANALYTICS	YEAR: 1	TERM: 1

WEEKLY PLANNING

WEEK	DESCRIPTION	TYPE			NOTES	HOURS	
		LECTURE	PROBLEMS	EXAM		CLASS	WEEKLY TOTAL
1	• **CHAPTER 1: LINEAR SYSTEMS** · Number sets · Fundamental Theorem of Algebra · Introduction to Linear Equations · Geometrical Interpretation · Existence and Uniqueness · Matrix Notation · Gaussian Elimination · Row Equivalence and Echelon Forms · Solving Linear Systems · Homogeneous Systems · Simultaneous Solving · Linear Systems with parameters • **CHAPTER 2: VECTORS** · Vectors	X				3	6
2	• **CHAPTER 2: VECTORS** · Linear Combinations · Subspace Spanned by Vectors · Linear Subspace · Column and Row Spaces · The Matrix Equation Ax=b · Null Space · Revisiting Linear Systems · Linear Independence · Basis for a Linear Subspace · Dimension of a Linear Subspace · Basis for Col A, Row A and Nul A · Rank of a Matrix	X				3	6
3	• **CHAPTER 2: VECTORS** · Coordinate Systems · Introduction to Linear Transformations • **CHAPTER 3: MATRICES** · Matrix Operations · Inverse of a Matrix · The LU factorization · Partitioned Matrices · Determinants	X				3	6
4	• **CHAPTER 3: MATRICES** · Determinants • **CHAPTER 4: DIAGONALIZATION** · Eigenvalues & Eigenvectors · Diagonalization	X				3	6
5	• **CHAPTER 4: DIAGONALIZATION** · Change of Basis · Transformations between Linear Subspaces · Markov Processes • **CHAPTER 5: ORTHOGONALITY** · Dot Product and Modulus · Orthogonal Sets · Orthogonal Matrices · Orthogonal Complement · Orthogonal Projection	X				3	6
6	• **CHAPTER 5: ORTHOGONALITY** · The Gram-Schmidt Process · The QR factorization · Least-Squares Problems · Linear Regressions · Multiple Regressions • **CHAPTER 6: SYMMETRIC MATRICES** · Diagonalization of Symmetric Matrices · Quadratic Forms · Singular Value Decomposition · Reduced SVD	X				3	6
7	• **CHAPTER 6: SYMMETRIC MATRICES** · Pseudoinverse of a Matrix · Karhunen-Loève Expansion · Condition Number · Orthogonal Least-Squares · Principal Component Analysis	X				3	6
8	**EXAM**			X		3	3
	Exam Preparation and Tutorials						30
	TOTAL HOURS:						75