

Week	Topic	Subtopic	Pages	Video Length
1	Matlab	Introduction	0	3:55
1	Matlab	Help	0	1:36
1	Matlab	Functions and Scripts	0	11:20
1	Matlab	Conditional Statements	0	2:24
1	Matlab	Branching	0	4:38
1	Matlab	Loops	0	10:4
1	Matlab	Basic Plotting	0	3:20
1	Matlab	Function Handles	0	4:07
1	Vectors	Introduction	3	5:17
1	Vectors	Operations	2	2:57
1	Vectors	Dot Product	2	3:35
1	Vectors	Norms	4	6:56
1	Vectors	Geometric Interp	2	3:34
1	Vectors	Schwartz and Triange Inequalities	2	3:34
1	Vectors	Linear Combinations	1	1:48
1	Vectors	Matlab	0	4:16
2	Matrices	Introduction	4	4:28
2	Matrices	Operations – 1	4	10:6
2	Matrices	Matrix Vec Uses	1	2:07
2	Matrices	Operations – 2	2	5:00
2	Matrices	Determinant	2	4:01
2	Matrices	Inverse	3	4:58
2	Matrices	Norms	2	3:11
2	Matrices	Matlab	0	8:23
2	Graphs	Introduction	2	4:05
2	Graphs	Adjacency Matrix	3	6:18
2	Graphs	Example	1	2:32
2	Graphs	Matlab	0	3:29
3	Markov Chains	Introduction	4	8:17
3	Markov Chains	Stochastic/Regular Matrix	2	3:36
3	Markov Chains	Example	2	4:04
3	Linear Systems	Introduction	2	4:12
3	Linear Systems	Existance and Uniqueness	3	5:37
3	Linear Systems	Gaussian Elimination	2	5:18
3	Linear Systems	RREF	5	9:10
3	Linear Systems	RREF – Inverse	3	8:20
3	Linear Systems	Matlab	0	7:34
3	Linear Systems	Gaussian Elimination Algorithm	3	8:56

Week	Topic	Subtopic	Pages	Video Length
4	Vector Space	Introduction	2	3:34
4	Vector Space	Rules	3	6:56
4	Vector Space	Subspaces	3	5:40
4	Vector Space	Span	3	6:10
4	Vector Space	Independence	2	3:00
4	Vector Space	Orthogonality	2	5:02
4	Vector Space	Basis	2	5:57
4	Vector Space	Dimension	2	2:42
4	Vector Space	RREF/Basis Connection	4	5:36
4	Functions	Introduction	2	3:58
4	Functions	Terms	3	6:32
4	Functions	Composition	1	2:48
4	Functions	Inverse	2	5:35
5	Linear Transformations	Introduction	3	8:10
5	Linear Transformations	Action of	3	4:11
5	Linear Transformations	Matrix Vector Products	3	4:13
5	Linear Transformations	Geometric Operations	2	2:42
5	Linear Transformations	Kernel, Rank-Nullity Theorem	2	2:31
5	Matrix Subspaces	Introduction	1	1:33
5	Matrix Subspaces	Column Space	3	6:48
5	Matrix Subspaces	Null Space	3	6:58
5	Matrix Subspaces	Row and Left Null Space	1	1:13
5	Matrix Subspaces	Rank-Nullity Theorem	2	3:58
5	Matrix Subspaces	Example	1	1:34
5	Matrix Subspaces	Matrix Rank	2	4:13
5	Matrix Subspaces	Orthogonality	3	6:32
6	Projections	Introduction	2	3:30
6	Projections	Projection Matrix	2	3:10
6	Projections	Example	1	1:30
6	Projections	Onto Subspaces	3	7:28
6	Least Squares	Introduction	3	6:13
6	Least Squares	Curve Fitting Pt 1	3	6:18
6	Least Squares	Curve Fitting Pt 2	2	3:16
7	Numerical Solutions	Introduction	2	4:12
7	Numerical Solutions	Accuracy vs Precision	1	2:10
7	Numerical Solutions	Numerical Errors	1	3:50
7	Numerical Solutions	Significant Figures	2	3:48
7	Numerical Solutions	Numbering Schemes	2	3:30
7	Numerical Solutions	Finite Precision	5	11:23
7	Numerical Solutions	Round-off errors	3	7:40
7	Numerical Solutions	Condition Number	3	4:43
7	Numerical Solutions	Normal Equation Revisited	3	5:00

Week	Topic	Subtopic	Pages	Video Length
9	LU	Introduction	2	4:16
9	LU	Via Gaussian Elimination	4	4:55
9	LU	Generic Algorithm	1	1:39
9	LU	OP Count	4	7:59
9	LU	Failure	2	3:05
9	LU	Pivoting	3	7:36
9	LU	Generic Algorithm – Pivoting	1	2:20
9	QR	Introduction	1	2:35
9	QR	Normal Equations	1	2:54
9	QR	Gram Schmidt	4	7:03
9	QR	Classical	3	6:33
9	QR	Modified	5	8:07
9	QR	Householder	7	11:15
10	Eigensystems	Introduction	4	5:27
10	Eigensystems	Characteristic Equation	2	2:51
10	Eigensystems	Example	2	3:41
10	Eigensystems	Comments	2	3:33
10	Eigensystems	Complex Eigenvalues	2	2:52
10	Eigensystems	Repeated Eigenvalues	3	3:54
10	Eigensystems	Real, Symmetric Matrices	2	4:29
10	Eigensystems	Matrix Diagonalization	4	5:43
10	Eigensystems	Unitary Decomposition	3	3:10
10	Eigensystems	Defective Matrices	1	0:56
10	Eigensystems	Eigendecomposition Summary	1	1:06
10	Eigensystems	Positive Definite Matrices	2	1:47
10	Eigensystems	Power Iteration	5	9:02
10	Eigensystems	Inverse Iteration	2	3:29
11	Eigensystems	Rayleigh Quotient Iteration	2	1:45
11	Eigensystems	Spectrum Calculations	2	2:49
11	Eigensystems	Spectrum Calculations – QR	3	4:21
11	Eigensystems	Spectrum Calculations – Upper Hessenberg	2	3:55
11	Eigensystems	Spectrum Calculations – Summary	1	1:35
11	SVD	Introduction	4	6:25
11	SVD	Formal Definition	3	5:55
11	SVD	Relation to Eigendecomposition	4	9:32
11	SVD	Example	3	4:34
11	SVD	Uses – Psuedo-Inverse	1	3:08
11	SVD	Uses – Low Rank Approximation	6	8:39

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12	Root Finding	Introduction	2	2:31
12	Root Finding	Bisection	2	3:02
12	Root Finding	Regula Falsi	2	1:55
12	Root Finding	Newton Rhapson	4	7:04
12	Root Finding	Secant	1	1:34
12	Root Finding	Fixed Point	3	4:27
12	Nonlinear Systems	Introduction	1	1:10
12	Nonlinear Systems	Fixed Point	1	1:52
12	Nonlinear Systems	Newton Rhapson	4	5:38
12	Nonlinear Systems	Damped Iteration	1	1:50
12	Nonlinear Systems	Example	3	4:29
12	Nonlinear Systems	Matlab Functions	2	2:08
12	Minimization	Introduction	1	1:23
12	Minimization	Brents	1	2:07
12	Minimization	1D Newton	2	2:09
12	Minimization	Steepest Gradient Descent	1	1:35
12	Minimization	Multi – Newton	2	3:39
12	Minimization	Multi – Quasi Newton	2	4:19
12	Minimization	Multi – Steepest Gradient	1	1:08
12	Minimization	Line Search	5	9:03
12	Minimization	Matlab	1	1:15
13	Nonlinear Regression	Introduction	1	1:52
13	Nonlinear Regression	Objective Function	1	1:29
13	Nonlinear Regression	Gauss-Newton	2	4:56
13	Interpolation	Introduction	1	1:25
13	Interpolation	Polynomial	2	3:10
13	Interpolation	Lagrange	2	4:02
13	Interpolation	Runge-Chebyshev	2	3:40
13	Interpolation	Spline – Intro	1	1:58
13	Interpolation	Cubic Splines	3	6:28
13	Interpolation	Hermite Splines	1	2:30
13	Integration	Introduction	1	0:48
13	Integration	Left-Right	2	4:17
13	Integration	Midpoint	1	1:48
13	Integration	Trapezoid	1	1:09
13	Integration	Simpson	1	1:44
13	Integration	Newton-Cotes	1	1:42
13	Integration	Gauss Quadrature	3	8:02
13	Integration	Matlab	1	1:55
14	Probability and Statistics	Review	3	6:04
14	Probability and Statistics	Distribution Functions	3	5:13
14	Probability and Statistics	Covariance	3	6:26
14	Probability and Statistics	Covariance Matrix	3	7:11
14	Probability and Statistics	PCA	3	5:26
14	Probability and Statistics	PCA Example	3	4:18
14	Probability and Statistics	Monte Carlo	2	5:36