

Lectures		
	Topics	Reading
M 09/03	Labor Day, No Lectures	
W 09/05 Lect. 1	Course organization and introduction to Mathematica, Common Errors for Beginners	Course Notes and Mathematica Notebook <i>I</i>
F 09/07 Lect. 2	Introduction to Mathematica, assignment and evaluation, rules and replacement, basic calculus and plotting, lists and matrices, getting help	Course Notes and Mathematica Notebook <i>II</i>

Laboratory		
F 09/07 Lab 1 (Not Graded)	“First Five Minutes with Mathematica”	<i>Mathematica Help Browser Documentation Center</i>

Homeworks		
Homework Set	Available	Due Date
1	Wednesday 5 Sept.	Friday 14 Sept.

3.016 Home



Full Screen

Close

Quit

Lectures		
	Topics	Reading
M 09/10 Lect. 3	Mathematica programming: functions and patterns, localized variables, logical switches, recursion; Graphics: plotting lists of data, examples	Course Notes and Mathematica Notebook <i>III</i>
W 09/12 Lect. 4	Mathematica: symbolic and numerical operations, operations on expressions, solving equations, numerical solutions, file input and output, using packages	Course Notes and Mathematica Notebook <i>IV</i>
F 09/14 Lect. 5	Mathematica: overview of graphics, animation, interaction, graphics primitives, complete worked examples	Course Notes and Mathematica Notebook <i>V</i>

3.016 Home

Laboratory		
F 09/15 Lab 2	Symbolic calculations and plotting	<i>Mathematica Help Browser</i> Mathematica Tutorial Overviews: “Input and Output in Notebooks,” “Building Up Calculations,” “Algebraic Calculations,” “Calculus,” ; Functions: Integrate, Simplify, NIntegrate, Plot, Plot3D, ContourPlot



Full Screen

Homeworks		
Homework Set	Available	Due Date
1	Wednesday 5 Sept.	Friday 14 Sept.
2	Wednesday 13 Sept.	Friday 28 Sept.

Close

Quit

Lectures		
	Topics	Reading
M 09/17 Lect. 6	Linear algebra: matrix operations, interpretations of matrix operations, multiplication, transposes, index notation	<i>Kreyszig</i> 7.1, 7.2, 7.3, 7.4 (pages: 272–276, 278–286, 287–294, 296–301)
W 09/19 Lect. 7	Linear algebra: solutions to linear systems of equations, determinants, matrix inverses, linear transformations and vector spaces	<i>Kreyszig</i> 7.5, 7.6, 7.7, 7.8, 7.9 (pages: 302–305, 306–307, 308–314, 315–323, 323–329)
F 09/21 Lect. 8	Complex numbers: complex plane, addition and multiplication, complex conjugates, polar form of complex numbers, powers and roots, exponentiation, hyperbolic and trigonometric forms	<i>Kreyszig</i> 13.1, 13.2, 13.5, 13.6 (pages: 602–606, 607–611, 623–626, 626–629)

3.016 Home

Laboratory		
F 09/21 Lab 3	Solving linear systems of equations	<i>Mathematica Help Browser</i> Mathematica Tutorial Overview “Linear Algebra (Introduction, Matrix and Tensor Operations, Matrix Multiplication, Solving Linear Systems)” , Functions: Inverse, Transpose, Eigensystem



Full Screen

Close

Quit

Week of 24-28 September

3.014 Laboratory Week: 3.016 does not meet.

Homeworks		
Homework Set	Available	Due Date
2	Wednesday 12 Sept.	Friday 28 Sept.



[3.016 Home](#)



[Full Screen](#)

[Close](#)

[Quit](#)

Lectures		
	Topics	Reading
M 10/01	No Lecture	
W 10/03 Lect. 9	Matrix eigenvalues: eigenvalue/eigenvector definitions, invariants, principal directions and values, symmetric, skew-symmetric, and orthogonal systems, orthogonal transformations	<i>Kreyszig</i> 8.1, 8.2, 8.3 (pages: 334–338, 340–343, 345–348)
F 10/05 Lect. 10	Hermitian forms, similar matrices, eigenvalue basis, diagonal forms	<i>Kreyszig</i> 8.4, 8.5 (pages: 349–354, 356–361)

Laboratory		
F 10/05 Lab 4	File input/output, plotting data	<i>Mathematica Help Browser</i> Mathematica Tutorial Overview “Files and External Operations (Secs 1-3, 6)” ; Functions: Dimensions, Append, AppendTo, Do, Mean, StandardDeviation, ListPlot, Table, MultipleListPlot, Fit

Homeworks		
Homework Set	Available	Due Date
3	Wednesday 3 Oct.	Friday 19 Oct.

3.016 Home



Full Screen

Close

Quit

Lectures		
	Topics	Reading
M 10/08	Holiday, No Lectures	
W 10/10 Lect. 11	Vector calculus: vector algebra, inner products, cross products, determinants as triple products, derivatives of vectors	<i>Kreyszig</i> 9.1, 9.2, 9.3, 9.4 (pages: 364–369, 371–374, 377–383, 384–388)
F 10/12 Lect. 12	Multi-variable calculus: curves and arc length, differentials of scalar functions of vector arguments, chain rules for several variables, change of variable and thermodynamic notation, gradients and directional derivatives	<i>Kreyszig</i> 9.5, 9.6, 9.7 (pages: 389–398, 400–403, 403–409)

3.016 Home

Laboratory		
F 10/12 Lab 5	Statistics, fitting data, error analysis	Mathematica Help Browser Mathematica Documentation: “guide/CurveFittingAndApproximateFunctions”; Functions: Fit, FindFit



Full Screen

Close

Quit

Lectures		
	Topics	Reading
M 10/15 Lect. 13	Vector differential operations: divergence and its interpretation, curl and its interpretation	<i>Kreyszig</i> 9.8, 9.9 (pages: 410–413, 414–416)
W 10/17 Lect. 14	Path integration: integral over a curve, change of variables, multidimensional integrals	<i>Kreyszig</i> 10.1, 10.2, 10.3 (pages: 420–425, 426–432, 433–439)
F 10/19 Lect. 15	Multidimensional forms of the Fundamental theorem of calculus: Green’s theorem in the plane, surface representations and integrals	<i>Kreyszig</i> 10.4, 10.5, 10.6, 10.7 (pages: 439–444, 445–448, 449–458, 459–462)

Laboratory		
F 10/19 Lab 6	Graphical representations in three and higher dimensions	<i>Mathematica Help Browser</i> Mathematica Tutorial Overview: “Graphics and Sound (secs 1–7)”

Homeworks		
Homework Set	Available	Due Date
3	Wednesday 3 Oct.	Friday 19 Oct.
4	Wednesday 17 Oct.	Friday 9 Nov.

3.016 Home



Full Screen

Close

Quit

Week of 22–26 October

3.014 Laboratory Week: 3.016 does not meet.



3.016 Home



Full Screen

Close

Quit

Lectures		
	Topics	Reading
M 10/29 Lect 16	Multi-variable calculus: triple integrals and divergence theorem, applications and interpretation of the divergence theorem, Stokes' theorem.	<i>Kreyszig</i> 10.8, 10.9 (pages: 463–467, 468–473)
W 10/31 Lect. 17	Periodic functions: Fourier series, Interpretation of Fourier coefficients, convergence, odd and even expansions	<i>Kreyszig</i> 11.1, 11.2, 11.3 (pages: 478–485, 487–489, 490–495)
F 11/02 Lect. 18	Fourier theory: complex form of Fourier series, Fourier integrals, Fourier cosine and sine transforms, the Fourier transforms	<i>Kreyszig</i> 11.4, 11.7, 11.8, 11.9 (pages: 496–498, 506–512 513–517, 518–523)

3.016 Home

Laboratory		
F 11/02 Lab 7	Review of Mathematica functions, programs, and graphics	<i>Mathematica Help Browser</i> Mathematica Tutorial Overview: “Functions and Programs”



Homeworks		
Homework Set	Available	Due Date
5	Thursday 31 Oct.	Wednesday 21 Nov.

Full Screen

Close

Quit

Lectures		
	Topics	Reading
M 11/05 Lect 19	Ordinary differential equations: physical interpretations, geometrical interpretations, separable equations	<i>Kreyszig</i> 1.1, 1.2, 1.3 (pages: 2–8, 9–11, 12–17)
W 11/07 Lect. 20	ODEs: derivations for simple models, exact equations and integrating factors, the Bernoulli equation	<i>Kreyszig</i> 1.4, 1.5 (pages: 19–25, 26–32)
F 11/09 Lect. 21	Higher order differential equations: homogeneous second order, initial value problems, second order with constant coefficients, solution behavior	<i>Kreyszig</i> 2.1, 2.2 (pages: 45–52, 53–58)

Laboratory		
F 11/09 Makeup Lab or Extra Credit	Possibility to make up missed labs and/or review lab exercise for extra credit	

Homeworks		
Homework Set	Available	Due Date
4	Wednesday 17 October	Friday 9 Nov.

3.016 Home



Full Screen

Close

Quit

Lectures		
	Topics	Reading
M 11/12	Holiday, No Lectures	
W 11/14 Lect. 22	Differential operators, damped and forced harmonic oscillators, non-homogeneous equations	<i>Kreyszig</i> 2.3, 2.4, 2.7 (pages: 59–60, 61–69, 78–83)
F 11/16 Lect. 23	Resonance phenomena, higher order equations, beam theory	<i>Kreyszig</i> 2.8, 2.9, 3.1, 3.2, 3.3 (pages: 84–90, 91–96, 105–111, 111–115, 116–121)

Laboratory		
F 11/16 Lab 8	Solutions to ordinary differential equations	<i>Mathematica Help Browser Mathematica Tutorial Overview</i> “Calculus (sec: Differential Equations)”. “DSolve”; Functions: DSolve, NDSolve, NIntegrate

Homeworks		
Homework Set	Available	Due Date
6	Wednesday 14 Nov.	Friday 7 Dec.

3.016 Home



Full Screen

Close

Quit

Lectures		
	Topics	Reading
M 11/19 Lect. 24	Systems of differential equations, linearization, stable points, classification of stable points	<i>Kreyszig</i> 4.1, 4.2 (pages: 131–135, 136–139)
W 12/21 Lect. 25	Linear differential equations: phase plane analysis and visualization	<i>Kreyszig</i> 4.3, 4.4 (pages: 139–146, 147–150)
F 11/23	Holiday, no 3.016 lecture	

Homeworks		
Homework Set	Available	Due Date
5	Wednesday 31 Oct.	Wednesday 21 Nov.

3.016 Home



Full Screen

Close

Quit

Week of 26–30 November

3.014 Laboratory Week: 3.016 does not meet.

Week of 3–7 December



[3.016 Home](#)



[Full Screen](#)

[Close](#)

[Quit](#)

Lectures

	Topics	Reading
M 12/03 Lect. 26	Solutions to differential equations: Legendre's equation, orthogonality of Legendre polynomials, Bessel's equation and Bessel functions	<i>Kreyszig</i> 5.3, 5.5, 5.6 (pages: 177–180, 189–197, 198–202)
W 12/05 Lect. 27	Sturm-Liouville problems: eigenfunction, orthogonal functional series, eigenfunction expansions	<i>Kreyszig</i> 5.7, 5.8 (pages: 203–208, 210–216)
F 12/07	3.014 Laboratory continues, No more Maths lectures	

Homeworks

Homework Set	Available	Due Date
6	Wed. 14 Nov.	Friday 7 Dec.

Week of 10–14 December

3.014 Laboratory Week: 3.016 does not meet.



3.016 Home



Full Screen

Close

Quit