# Math 240 syllabus

**Text:**

"Differential Equations and Linear Algebra" by Stephen W. Goode and
Scott A. Annin, Third Edition

## (1) Linear algebra, 5 weeks

**DELA, 2.1** Matrices: (T/F review) 6,7, 9; (Problems) 9, 11, 23, 25

**DELA, 2.2** Matrix algebra: (T/F review) 1, 5, 10; (Problems) 5,
13(a), 16, 19, 39, 43

**DELA 2.3** Linear systems: (T/F review) 2, 4, 5; (Problems) 7, 15, 17

**DELA 2.4** Row reduction, echelon matrices: (T/F review) 3, 5, 7;
(Problems) 6, 15, 21

**DELA 2.5** Solving linear systems: (T/F review) 3, 4; (Problems) 3,
10, 17, 22, 24, 35, 49

**DELA 2.6** Inverse matrices: (T/F review) 4, 5, 7; (Problems) 9, 13,
17, 18, 29, 31, 38

**DELA 3.1** Determinants: (T/F review) 2, 3, 6; (Problems) 9, 13, 19,
22

**DELA 3.2** Properties of determinants: (T/F review) 2, 3, 6; (Problems) 5,17, 21, 27, 31, 36, 38, 46, 49, 52

**DELA 4.2** Vector spaces: (T/F review) 1, 4, 7; (Problems) 3, 11, 12,
19, 20

**DELA 4.3** Subspaces: (T/F review) 1, 3, 4; (Problems) 7, 9, 17, 19,
22, 23

**DELA 4.4** Span, linear conditions: (T/F review) 4, 9, 12; (Problems)
7, 9, 12, 15, 17, 19, 25, 27, 28

**DELA 4.6** Bases and dimension: (T/F review) 4, 5, 8; (Problems) 6,
11, 15, 17, 23, 25, 28, 34

**DELA 4.7** Change of basis: (T/F review) 3, 4, 7; (Problems) 5, 19,
23, 27, 38

**DELA 4.9** Rank and nullity: (T/F review) 2, 5, 8; (Problems) 6, 9,
13, 15, 18

**DELA 5.1** Linear maps: (T/F review) 2, 4, 6; (Problems) 4, 9, 15, 23, 27, 35

**DELA 5.5** The matrix of a linear transformation: (T/F review) 1, 4, 6; (Problems) 3, 8, 11, 17, 20

**DELA 5.6** Eigenvalues and eigenvectors: (T/F review) 1, 3, 7; (Problems) 15, 28, 29, 31, 34, 36

**DELA 5.8** Diagonalization: (T/F review) 2, 3, 5; (Problems) 7, 13, 17, 22, 23, 24, 32

**DELA 5.9** Matrix exponentials: (T/F review) 2, 3, 4; (Problems) 7, 11, 15, 19

**DELA 5.11** Jordan canonical form (optional): (T/F review) 2, 5, 10, 12; (Problems) 3, 9, 11, 15, 19, 36

## (2) Higher order ODE, 4 weeks

**DELA 6.1** Linear ODE, initial value problems, boundary value problems: (T/F review) 2, 6, 7; (Problems) 11, 21, 27, 29, 37

**DELA 6.2** Constant coefficients homogeneous equations: (T/F review) 2, 6, 7; (Problems) 5, 11, 17, 33, 40

**DELA 6.3** Undetermined coefficients: (T/F review) 2, 3, 6; (Problems) 9, 17, 23, 35

**DELA 6.4** Complex valued test functions: (T/F review) 1, 2, 5; (Problems) 4, 5, 7, 11

**DELA 6.5** Spring-mass systems and oscillations: (T/F review) 3, 4, 8; (Problems) 5, 13, 15, 23, 26

**DELA 6.7** Variation of parameters (optional): (T/F review) 1, 2; (Problems) 1, 10, 25

**DELA 6.8** Cauchy-Euler equations (optional): (T/F review) 2, 4, 5; (Problems) 7, 11, 16, 21

**DELA 6.9** Reduction of order: (Problems) 2, 5, 8, 11, 15

## (3) Systems of linear ODE, 4 weeks

**DELA 7.1** First order linear systems: (T/F review) 3, 5, 8; (Problems) 5, 9, 11, 15, 18, 20

**DELA 7.2** Vector form of linear systems: (T/F review) 2, 5, 6; (Problems) 5, 7, 12, 13

**DELA 7.3** Fundamental solutions: (T/F review) 1, 3; (Problems) 1, 2, 5, 7

**DELA 7.4** Systems with simple eigenvalues: (T/F review) 2, 4, 5; (Problems) 6, 17, 19, 20, 23, 26

**DELA 7.5** Systems with multiple eigenvalues: (T/F review) 1, 2, 4; (Problems) 7, 15, 16, 17

**DELA 7.8** Matrix exponential solutions (optional): (T/F review) 2, 3, 5; (Problems) 3, 6, 10, 11

**DELA 7.9** Autonomous systems and phase plane analysis: (T/F review) 1, 3, 4; (Problems) 11, 17, 20, 23,

**DELA 7.10** Nonlinear systems: (T/F review) 1, 3, 4; (Problems) 1, 6, 9