Math 2250 Syllabus

**Linear Algebra and Differential Equations**

This course treats topics in linear algebra and differential equations, using matrix and linear algebra to understand linear differential equations and systems of linear differential equations.

**Text**[**: Differential Equations and Linear Algebra, 3rd Edition, by Edwards and Penney**](http://www.pearsonhighered.com/educator/product/Differential-Equations-and-Linear-Algebra/9780136054252.page) , chapters 1-7, 9-10.

**Course outline**:

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| Week 1 | 1.1-1.3 | Differential equations and modeling, anti-differentiation, slope fields |
| Week 2 | 1.4-1.5; EP3.7 | Separable and linear differential equations; Initial value problems and slope fields; Electrical circuits. |
| Week 3 | 2.1-2.3 | Applications to populations, velocity models; equilibria and stability for autonomous differential equations |
| Week 4 | 2.4-2.6, 3.1-3.3 | Numerical methods; matrices, linear systems, reduced row echelon form. |
| Week 5 | 3.3-3.5 | Matrix operations, algebra, and inverses |
| Week 6 | 3.6, 4.1 | Determinants, review, introduction to linear combinations |
| Week 7 | 4.1-4.4 | Linear combinations, independence, bases, dimension for vector spaces |
| Week 8 | 5.1-5.3 | Linear differential equations of 2nd order and higher order |
| Week 9 | 5.3-5.5 | Constant coefficient linear differential equations: homogeneous and non-homogeneous problems; mechanical applications |
| Week 10 | 5.5-5.6, EP3.7 10.1-10.2 | Non-homogeneous differential equations; mechanical and circuit applications; introduction to Laplace transform. |
| Week 11 | 10.3-10.5 | Laplace transform and inverse transform, applications to differential equations; unit step functions; review |
| Week 12 | EP7.6, 10.5, 6.1-6.2, 7.1 | Impulse functions; eigenvalues and eigenvectors for matrices; introduction to systems of differential equations |
| Week 13 | 7.2-7.4 | First order systems and input-output models; second order spring systems of differential equations |
| Week 14 | 7.4; 9.1-9.3 | Nonlinear systems of differential equations; linearization and stability at equilibria; phase plane analysis |
| Week 15 | 9.3-9.4 | Nonlinear population and mechanical systems phase plane analysis; course review. |

**Course format**: There are four 50-minute lecture presentations per week (or equivalent), and one 50-minute section meeting. Section meetings focus on weekly homework and concepts. Additional software-based project work is drawn from the suggestions in the text. Students are evaluated on the basis of regular homework and/or quizzes based on that homework; project work; 2-3 midterm exams administered during their section meetings; and an in-class final exam administered during the University scheduled time.

[Current Math 2250-4 home page](http://www.math.utah.edu/~korevaar/2250spring12) [Current Math 2250 coordinating page](http://www.math.utah.edu/~korevaar/coord2250/)