

MATH-204
Differential Equations & Laplace Transforms

Prof. Kevin TeBeest, Ph.D.

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Course Learning Objectives:

1. Understand the nature of a differential equation and the solution of a differential equation.
2. Solve linear differential equations and common first-order differential equations encountered in subsequent engineering courses and in engineering practice.
3. Use the Laplace transform together with its basic properties as a useful method to solve appropriate differential equations.
4. Solve differential equations using MAPLE.

APPROXIMATE LECTURE SCHEDULE^{1,2}

WEEK	SECTIONS
1	Review Basic Integration 1.1 – Definitions and Terminologies 2.2 – Separable Variables
2	2.3 – 1st Order Differential Eqns. (Integrating Factors) 2.5 – Substitutions: Bernoulli Equations
3	2.5 – Substitutions: Homogeneous Differential Eqns. 2.4 – Exact Differential Eqns.
4	EXAM 1 (tentative) 4.1 – Higher Order Linear Differential Eqns. – Concepts and Theory 4.3 – Homogeneous Linear ODEs with Constant Coefficients
5	4.4 – Nonhomogeneous Linear ODEs with Constant Coefficients: Superposition Principle 4.6 – Nonhomogeneous Linear ODEs: Variation of Parameters
6	5.1.1 – Spring-Mass Apparatus w/o Drag: Simple Harmonic Motion (i.e., free undamped motion) 5.1.2 – Spring-Mass Apparatus w/ Drag: Free Damped Motion EXAM 2 (tentative)
7	5.1.3 – Spring-Mass Apparatus: Driven (Forced) Motion 5.1.4 – LRC Series Circuits (Analogous Systems)
8	7.1 – Laplace Transform (Definition and Tables) 7.2 – Inverse Laplace Transform and Transform of a Derivative
9	7.3.1 – 1st Translation Theorem and Inverse 7.3.2 – 2nd Translation Theorem and Inverse EXAM 3 (tentative)
10	7.4 – Transforms of Integrals (Convolution Theorem and Inverse) 7.5 – Dirac Delta Function and Impulses
11	Finish remaining material FINAL EXAM – date to be set by the Registrar’s Office

¹ This schedule is approximate as some sections will take longer to cover than others. You should refer to the “Course Web Site” daily for actual assignments.

² Maple assignments, quizzes, and supplemental application problems will be scattered throughout the material.