**Math 3D Suggested Syllabus**

**Text:** [*https://www.jirka.org/diffyqs/diffyqs.pdf*](https://www.jirka.org/diffyqs/diffyqs.pdf)*,* by Jiří Lebl 6th edition

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| Week | Lectures | Sections Covered | Topics |
| 1 | 1 | 0.2 | Introduction to Differential Equations |
| 1 | 2 | 1.1; 1.2 | Integrals as Solutions, Slope Fields |
| 1 | 3 | 1.3 | Separable Equations |
| 2 | 4 | 1.4 | Linear Equations and Integrating Factors |
| 2 | 5 | 1.5 | Substitution |
| 2 | 6 | 1.6 | Autonomous Equations |
| 3 | 7 | 2.1 | Second Order Linear ODEs |
| 3 | 8 | 2.2 | Constant Coefficient Second Order Linear ODEs |
| 3 | 9 | 2.3 | Higher Order Linear ODEs |
| 4 | 10 | N/A | **Midterm 1** |
| 4 | 11 | 2.5 | Nonhomogeneous Equations |
| 4 | 12 | 2.4; 2.6 | Mechanical Vibrations, Forced Oscillations and Resonance |
| 5 | 13 | 3.1 | Systems of ODEs |
| 5 | 14 | 3.2 | Matrices and Linear Systems |
| 5 | 15 | 3.3 | Linear Systems of ODEs |
| 6 | 16 | 3.4 | Eigenvalue Method |
| 6 | 17 | 3.7 | Multiple Eigenvalues |
| 6 | 18 | 3.8 | Matrix Exponential |
| 7 | 19 | 3.9 | Nonhomogeneous Systems |
| 7 | 20 | N/A | **Midterm 2** |
| 7 | 21 | 6.1 | Laplace Transform |
| 8 | 22 | 6.2 | Transforms of Derivatives and ODEs |
| 8 | 23 | 6.3 | Convolution. |
| 8 | 24 | 6.4 | Dirac Delta Functions and the Laplace Transform |
| 9 | N/A | N/A | (Vacation) |
| 9 | 25 | 7.1 | Power Series |
| 9 | 26 | 7.1 | Cont. |
| 10 | 27 | 7.2 | Series Solutions of Linear Second Order ODEs |
| 10 | 28 | 7.3 | Series Solutions about Singular Points |
| 10 | 29 | N/A | Review |
| 11 |  | Final Exam |  |