*Approved: JUNE 2017 Effective: FALL 2017*

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| MATERIAL TO BE COVERED | SECTIONS FROM TEXT | TIME LINE |
| First Order Differential Equations: 1st order ordinary differential equations (ODE's). Separable, 1st order linear. Applications: orthogonal trajectories, exponential growth & decay, Newton's Law of Cooling, mixing problems & electric circuits, change of variables, exact differential equations, numerical solutions to first order differential equations , reducing 2nd order to 1st order by substitution. | 1.1 – 1.11 | 6 Hours |
| Matrices & Systems of Linear Equations: Definitions, notation, matrix algebra, special matrices, elementary operations, row echelon form, Guassian elimination, Gauss-Jordon elimination, homogeneous systems, inverse matrices. | 2.1 – 2.8 | 6.5 Hours |
| Determinants: definition, properties, minors and cofactors, determinants and n by n  linear systems. | 3.1 – 3.3 | 4 Hours |
| Vector Spaces: vectors in n-dimensional Euclidean Space, vector space, subspace, linear combination & span, linear independence, Wronskians, basis & dimension, change of basis, | 4.1 – 4.11 | 7 Hours |
| Inner product spaces, Gram-Schmidt processes | 5.1-5.3 | 3 Hours |
| Linear Transformations: definition, transformation of R2, kernel, range, the matrix of a linear transformations | 6.1-6.5 | 5 Hours |
| Eigenvalues & eigenvectors, diagonalization, orthogonal diagonalization of symmetric matrices. | 71.-7.3, 7.5 | 3 Hours |
| Linear Differential Equations of Order n: nth order linear ordinary differential equations: linear differential operators, polynomial differential operators, linear ODE's with constant coefficients, the method of undetermined coefficients with annihilators, oscillation of a mechanical system, variation of parameters. | 8.1 – 8.3, 8.5, 8.7 | 10 Hours |
| Systems of Differential Equations: matrix formulation & solving using  Eigenvalues & Eigenvectors. | 9.1 – 9.4 | 2 Hours |
| The Laplace Transform: definition, inverse transform, transform of derivatives and solving initial value equations and systems, the first shifting theorem. | 10.1, 10.2, 10.4,  10.5 | 4 Hours |
| Series Solutions to linear ODE's | 11..2 | 2 Hours |

### 5-unit class: hours total 72.5 (15 x 4 hours 50 minutes) – hours for exams + 2.5 hour final

This outline allows for 7 hours of exams.

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Math Department Policy can be found at: <https://www.mtsac.edu/math/departmentpolicy.html>