

**MA 2121 - DIFFERENTIAL EQUATIONS (4-0)**  
**SYLLABUS**

Text: *Elementary Differential Equations and Boundary Value Problems*, 8<sup>th</sup> edition, Boyce & DiPrima, (John Wiley, ISBN 0-471-43338-1)

<u>HOURS</u>	<u>TOPIC</u>	<u>SECTION</u>
1-1	Introduction, classification of differential equations, linearity	1.1, 1.3
2-3	First-order equations: linear equations, separable equations, existence and uniqueness for linear equations	1.2, 2.1 - 2.2
3-6	Existence and uniqueness for nonlinear equations, exact equations and integrating factors	2.4, 2.6, 2.8
2-8	Applications of first-order equations*	2.3, 2.5
3-11	Second-order linear equations: homogeneous constant-coefficient, fundamental solutions, linear independence, the Wronskian	3.1 - 3.3
3-14	Complex roots, repeated roots, reduction of order	3.4 - 3.5
3-17	Nonhomogeneous equations, undetermined coefficients, variation of parameters	3.6 - 3.7
2-19	Oscillations: free and forced	3.8 - 3.9
1-20	Higher-order linear equations (overview)	4.1 - 4.4
1-21	Series solutions: review of power series	5.1
2-23	Ordinary points, regular singular points	5.2 - 5.4
1-24	Euler-Cauchy equations	5.5
2-26	Laplace transforms: definition, initial value problems	6.1 - 6.2
3-29	Step functions and discontinuous forcing, Dirac delta function	6.3 - 6.5
2-31	Laplace convolution	6.6
3-34	Systems of equations: introduction, review of matrices, linear algebraic systems, eigenvalues and eigenvectors	7.1 - 7.3
4-38	Linear first-order differential systems, homogeneous constant-coefficient systems, complex eigenvalues, repeated eigenvalues	7.4 - 7.8
2-40	Nonhomogeneous linear systems	7.9
4-44	Review, exams, holidays	

\* The instructor will choose which topics among the first-order applications will be covered.