

BRONX COMMUNITY COLLEGE
of the City University of New York
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

Syllabus: **MTH 34** *Differential Equations and Selected Topics in Advanced Calculus* (4 credits/4 hours)

Prerequisite: **MTH 33 or equivalent; and CUNY English Proficiency, or ENG 100 or 110, if required**

Textbook: *Elementary Differential Equations and Boundary Value Problems*, 10th ed., W.E. Boyce and R.C. DiPrima,
John Wiley Publ. (2012).

| Day | Section/Topic | Suggested Problems |
|------------|--|---------------------------------------|
| 1 | Ch. 1: Introduction | |
| | 1.1 Mathematical models, direction fields | p7/ 1,3,11, 21, 23 |
| | 1.2 Solutions to some DEs | p15/ 1,7,9,12, 13 |
| | 1.3 Classification of DEs | p24/ 7, 9, 13, 25 |
| 2 | Ch. 2: First Order DEs | |
| | 2.1 Linear equations; integrating factors | p39/ 5,9,15, 17, 38, 39 |
| | 2.2 Separable equations | p48/ 1,3,5,13, 17, 23, 27, 30, 31, 33 |
| 3 | 2.3 Modeling with first order DEs | p60/ 1,3,,5,10, 12, 21, 23, 32 |
| 4 | 2.4 Linear vs. nonlinear DEs | p76/ 3,9,13, 15, 23, 27, 29 |
| | 2.5 Autonomous DEs and population dynamics | p88/ 1,3,5,9, 13, 21, 25 |
| 5 | 2.6 Exact equations | p101/ 1- 13 odd |
| 6 | Exam | |
| 7 | Ch. 3: Second Order Linear Equations | |
| | 3.1 Homogenous equations with constant coefficients | p144/ 1-15 odd, 25 |
| | 3.2 Solutions to homogenous equations; the Wronskian | p155/1-9 odd, 13, 14, 23, 25, 31 |
| 8 | 3.2 The Wronskian (cont.) | |
| 9 | 3.3 Complex roots of the characteristic equation | p164/1-6, 7-21 odd, 34, 35 |
| | 3.4 Repeated roots; reduction of order | p172/ 1-15 odd, 23-29 odd, 32, 33, 41 |
| 10 | 3.5 Nonhomogenous equations; undetermined coefficients | p184/1-19 odd, 35, 37 |
| 11 | 3.6 Variation of parameters | p190/1,3,5,9,15, 22, 23 |
| 12 | 3.7 Mechanical and electrical vibrations | p203/ 1,3, 7, 11, 12, 28, 29 |
| | 3.8 Forced vibrations | p217/ 1,5,7,11,18,19 |
| 13 | Ch. 4: Higher Order Linear Equations | |
| | 4.1 n th order linear equations | p226/ 3,7,8-10, 11, 13, 18 |
| 14 | 4.2 Homogenous equations with constant coefficients | p233/ 1-6, 9, 11-31 odd, 39 |
| 15 | Exam | |
| 16 | Ch. 5 Series Solutions of Second Order Linear Equations | |
| | 5.1 Review of power series | p253/1-15 odd, 21-27 odd |
| 17 | 5.2 Series solutions near and ordinary point I | p263/1-13 odd, 15, 17, 21 |
| 18 | 5.4 Euler equations; regular singular points | p280/1-33 odd |
| 19 | 5.5 Series solutions near a regular singular point I | p286/1-11 odd, 12, 14 |
| 20 | Ch. 6: The Laplace Transform | |
| | 6.1 Definition of the Laplace transform | p315/ 1,5,7,11, 15-23 odd, 25, 30 |
| 21 | 6.2 Solution of IVPs | p324/1-27 odd, 29, 31 |
| 22 | 6.3 Step functions | p333/5, 7, 11, 13, 17, 19, 23,27 |
| | 6.4 Discontinuous forcing functions | p340/ 1-11 odd |

| Day | Section/Topic | Suggested Problems |
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| 23 | Ch. 10: Partial Differential Equations and Fourier Series | |
| | 10.1 Two-point BVPs | p595/1-21 odd |
| | 10.2 Fourier series | p605/ 1,7,9,13-23 odd |
| 24 | 10.2 Fourier series (cont.) | |
| | 10.3 The Fourier convergence theorem | p612/ 1-11 odd, 13, 15 |
| 25 | 10.4 Even and odd functions | p620/1-7, 15-21 odd, 29, 33 |
| 26 | 10.5 Separation of variables | p630/ 1-13 |
| 27 | Exam | |
| 28 | Review | |

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updated EA 8/22 for Prereq