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

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Catalog description: "Methods of solving ordinary differential equations. Selected topics from among the following: hyperbolic functions, power series, Fourier series, gamma functions, Bessel functions, problems of motion, electric circuits, damped and forced vibrations, Laplace transform."

Grading:

Homework assignments will be assigned are to be turned in. Quizzes will be given at the instructors discretion and will reflect the homework assignments. *No make-up quizzes will be given. Your lowest Homework will be dropped.* Homework assignments will assist in understanding the material but will NOT be sufficient to learn this material well. You should be doing many more problems.

Term Tests :
There will be two in-class term tests. *No make-up exams will be given.* If you miss a test, you must contact me within 24 hours should you wish to have your absence excused. A doctor's note is needed to justify illness. Any student with a *justified* absence during a test will have his or her *(uncurved)* final exam grade count in place of the missed test. You are responsible for the material in the course readings in addition to any material and announcements made during lecture, regardless of whether or not you were in attendance.

All grades will be assigned by the standard 10-point scale. Pluses and minuses will be assigned at instructor's discretion.

Homework	25%
Test 1	20%
Test 2	20%
Final Exam	35%

Resources:

Math Tutoring Lab: http://fsw01.bcc.cuny.edu/mathdepartment/tutoringlab/lab.htm

Review material for the final exam can be found on the City College Math Department website for Math 39100. As a course designed for engineering students, the presentation will not emphasize proofs as much as techniques and methods of computation, along with applications of techniques to problems in physics. Students majoring in mathematics will benefit by reading the proofs of major theorems presented in this course.

Topic	Assigned problems
Chapter 1.	**Introduction**
1.1 Mathematical models, direction fields	p7/ 1, 3, 11, 21, 23
1.2 Solutions to some differential equations	p15/ 1, 7, 9, 12, 13
1.3 Classification of DEs	p24/ 7, 9, 13, 25
Chapter 2.	**First Order Differential Equations**
2.1 Linear equations; integrating factors	p39/ 5, 9, 15, 17, 38, 39
2.2 Separable equations	p48/ 1,3,5,13,17,27,31,33
2.3 Modeling with first order DEs	p60/1,3,5,10,12,21,23,32
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
2.6 Exact equations	p101/ 1–13 odd
Chapter 3.	**Second Order Linear Equations**
3.1 Homogeneous equations with constant coefficients	p144/ 1–15 odd, 25
3.2 Solutions to linear homogeneous equations; the Wronskian	p155/ 1–9 odd, 13, 14, 23, 25, 31
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
3.5 Nonhomogeneous equation; undetermined coefficients	p184/ 1–19 odd, 35, 37
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
Chapter 4.	**Higher Order Linear Equations**
4.1 n^{th}-order linear equations	p226/ 3, 7–10, 11, 13, 18
4.2 Homogeneous equations with constant coefficients	p233/ 1–6, 9, 11–31 odd, 39
Chapter 7.	**Systems of First Order Linear Equations**
7.1 Introduction	p363/ 1–5, 7, 17, 19, 21
7.2 Review of matrices	p376/ 1, 3, 9, 11-15 odd, 21, 23, 25
7.3 Systems of linear algebraic equations	p388/ 1–23 odd
7.5 Homogeneous linear systems	p405/ 1, 7–15 odd, 25, 29, 32, 33
7.6 Complex eigenvalues	p417/ 1, 7, 9, 13, 17, 25, 28

7.8 Repeated eigenvalues	p436/ 1, 3, 7, 9, 13
Chapter 5.	**Series Solutions of Second Order Linear Equations**
5.1 Review of power series	p253/ 1–15 odd, 21–27 odd
5.2 Series solutions near an ordinary point I.	p263/ 1–13 odd, 15, 17, 21
5.4 Euler equations; regular singular points	p280/ 1–33 odd
5.5 Series solutions near a regular singular point I	p286/ 1–11 odd, 12, 14
Chapter 6.	**The Laplace Transform**
6.1 Definition of the Laplace transform	p315/ 1, 5, 7, 11, 15–23 odd, 25, 30
6.2 Solution of IVPs	p324/ 1–27 odd, 29, 31
Chapter 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
10.3 The Fourier Convergence Theorem	p612/ 1–11 odd, 13, 15
10.4 Even and odd functions	p620/ 1–7, 15–21 odd, 29, 33
10.5 Separation of variables	p630/ 1–13