



Teacher

Dr. Neil Course

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office: C333

Required Text

- William E. Boyce and Richard C. DiPrima, *Elementary Differential Equations and Boundary Value Problems*, Wiley.

Note: You must buy a new copy of this book which includes a code for WileyPlus

Homework Website

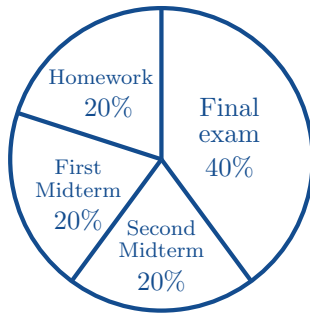
wileyplus.com

Course Website

Handouts, exam dates, your results, etc. will be posted at www.neilcourse.co.uk/math216.html

Contents

“Mathematics is not a spectator sport.”



This course has 4 hours of lectures per week.. I expect you to spend atleast 8 hours every week, studying outside of class. Every week you should be reading the textbook, attempting the exercise questions in the text book and making use of the WileyPlus website.

All of the homework will utilise the WileyPlus website. It is your responsibility to log in to this website weekly and to complete each piece of homework before its deadline.

Office Hour

If you have any questions, you can find me in my office (C333) each

- Monday, from 16:00 to 17:00.

Alternately, you can email your questions to me.

Syllabus

Classification of differential equations; Direction fields; First order differential equations: solution of separable, linear and exact differential equations, substitution methods and order reduction, autonomous equations and population dynamics; Higher order differential equations: linear, homogeneous equations with constant coefficients, nonhomogeneous equations, the method of undetermined coefficients, the method of variation of parameters; Laplace transform solutions of initial value problems; Linear systems of differential equations: homogeneous differential equations in \mathbb{R}^2 , homogeneous differential equations in \mathbb{R}^3 , matrix exponential and fundamental matrix solutions, solutions of systems of nonhomogeneous equations, Laplace transform methods; Power series methods: series solution near ordinary points, regular singular points, the method of Frobenius.

Schedule¹

Week	Topics Covered	Independent Study Expected
1	Introduction 1.1 Some Basic Mathematical Models; Direction Fields 1.2 Solutions of Some Differential Equations 1.3 Classification of Differential Equations	Buy the book Register for WileyPlus Read Chapter 1
2	First Order Differential Equations 2.1 Linear Equations; Method of Integrating Factors 2.2 Separable Equations 2.4 Differences Between Linear and Nonlinear Equations	Read Chapter 2 Use WileyPlus
3	2.5 Autonomous Equations and Population Dynamics 2.6 Exact Equations and Integrating Factors	Read Chapter 2 Use WileyPlus
4	Second Order Linear Equations 3.1 Homogeneous Equations with Constant Coefficients 3.3 Complex Roots of the Characteristic Equation 3.4 Repeated Roots	Read Chapter 3 Use WileyPlus
5	3.5 Nonhomogeneous Equations; Method of Undetermined Coefficients 3.6 Variation of Parameters Higher Order Linear Equations 4.2 Homogeneous Equations with Constant Coefficients	Read Chapters 3-4 Use WileyPlus
6	The Laplace Transform	Read Chapter 6 Use WileyPlus
7	The Laplace Transform	Read Chapter 6 Use WileyPlus
8	Systems of First Order Linear Equations 7.1 Introduction 7.4 Basic Theory of Systems of First Order Linear Equations 7.5 Homogeneous Linear Systems with Constant Coefficients	Read Chapter 7 Use WileyPlus
9	<i>no lessons</i>	Reread your lecture notes and textbook
10	7.6 Complex Eigenvalues 7.7 Fundamental Matrices	Read Chapter 7 Use WileyPlus
11	<i>no lessons</i>	Reread your lecture notes and textbook
12	7.8 Repeated Eigenvalues	Read Chapter 7 Use WileyPlus
13	7.9 Nonhomogeneous Linear Systems	Read Chapter 7 Use WileyPlus
14	Series Solutions of Second Order Linear Equations Series Solutions Near an Ordinary Point The Power Series Method	Read Chapter 5 Use WileyPlus
15	The Power Series Method Regular Singular Points The Method of Frobenius	Read Chapter 5 Use WileyPlus

¹subject to change