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The typical form for the ODE is the following initial value problem:

$$\frac{dx}{dt} = f(t;x) \text{ and } x(0) = x_0 \text{ where } f: \mathbb{R} \times \mathbb{R}^n \rightarrow \mathbb{R}^n.$$

The aim is to find some curve  $t \mapsto x(t) \in \mathbb{R}^n$  so that the initial value problem holds. When does this have solutions? Are these solutions unique? An example of an ODE

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related to vibrations of  
bridges (or springs) is  
the following  $Mx'' +$   
 $c\dot{x} + kx = F$

## **MA2AA1 (ODE's): Lecture Notes**

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ODE is the following  
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solutions? Are these solutions unique? An example of an ODE related to vibrations of bridges

## **MA2AA1 (ODE's): Lecture Notes**

There are many books which can be used in conjunction to the module, but none are required. The lecture notes displayed during the lectures will be posted on blackboard. The lectures will also

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be recorded on  
panopto. There is  
absolutely no need to  
consult any book.

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## **MA2AA1 (ODE's): Lecture Notes - Imperial College London ...**

MA2AA1 (ODE's): The  
inverse and implicit  
function theorem  
Sebastian van Strien  
(Imperial College)  
February 3, 2013 ...  
These notes include

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examples that are taken from the internet. Differential Equations MA2AA1 Sebastian van Strien (Imperial College) 0. Definition of Jacobian

## **MA2AA1 (ODE's): The inverse and implicit function theorem**

Preface. The purpose of these lecture notes is to provide an introduction to computational methods for

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the approximate solution of ordinary differential equations (ODEs). Only minimal prerequisites in differential and integral calculus, differential equation theory, complex analysis and linear algebra are assumed.

## **Numerical Solution of Ordinary Differential Equations**

A most general ODE

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has the form  $F(x, y, y', \dots, y^{(n)}) = 0$ ,  
(1.1) where  $F$  is a given  
function of  
 $n+2$  variables and  $y = y(x)$  is an unknown  
function of a real  
variable

$x$ . The maximal order of the derivative  $y^{(n)}$  in (1.1) is called the order of the ODE. The ODEs arise in many areas of Mathematics, as well as in Sciences and Engineering.

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**Ordinary Di**

**fferential Equation**

Lecture 5: Existence  
and Uniqueness

Theorems, Picard's  
Iteration Lecture 6:

Numerical Methods

Lecture 7: Second  
Order Linear ODE

Lecture 8:

Homogeneous Linear  
ODE with Constant

Coefficients Lecture 9:

Non-homogeneous  
Linear ODE, Method of  
Undetermined

Coefficients, Lecture

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10: Non-homogeneous  
Linear ODE, Method of  
Variation of Parameters  
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## **Lecture Notes : ODE**

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Recitations ... Lecture

9: Solving Second-  
order Linear ODE's with  
Constant Coefficients.

Lecture 10:

Continuation: Complex  
Characteristic Roots.

Lecture 11: Theory of  
General Second-order  
Linear Homogeneous

ODEs ... There's no

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signup, and no start or  
end dates.

**Video Lectures |  
Differential  
Equations |  
Mathematics ...**

Here is a set of notes  
used by Paul Dawkins  
to teach his Differential  
Equations course at  
Lamar University.

Included are most of  
the standard topics in  
1st and 2nd order  
differential equations,  
Laplace transforms,

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systems of differential equations, series solutions as well as a brief introduction to boundary value problems, Fourier series and partial differential equations.

## **Differential Equations - Pauls Online Math Notes**

- 1.1 Ordinary Differential Equation (ODE) 1
- 1.2 Solution 1
- 1.3 Order  $n$  of the DE 2
- 1.4 Linear Equation: 2

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1.5 Homogeneous  
Linear Equation: 3 1.6  
Partial Differential  
Equation (PDE) 3 1.7  
General Solution of a  
Linear Differential  
Equation 3 1.8 A  
System of ODE's 4 2  
The Approaches of  
Finding Solutions of  
ODE 5 2.1 Analytical  
Approaches 5

**ORDINARY  
DIFFERENTIAL  
EQUATIONS FOR  
ENGINEERS | THE ...**

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These lecture notes were written during the two semesters I have taught at the Georgia Institute of Technology, Atlanta, GA between fall of 2005 and spring of 2006. ... ential equations, or shortly ODE, when only one variable appears (as in equations

## **Ordinary Differential Equations-Lecture Notes**

Lecture 01 -  
*Page 18/28*

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Introduction to  
Ordinary Differential  
Equations (ODE)  
Lecture 02 - Methods  
for First Order ODE's -  
Homogeneous  
Equations; Lecture 03 -  
Methods for First order  
ODE's - Exact  
Equations; Lecture 04 -  
Methods for First Order  
ODE's - Exact  
Equations ( Continued )  
Lecture 05 - Methods  
for First order ODE's -  
Reducible to Exact  
Equations

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## **NPTEL :: College Mathematics - NOC: Differential equations for ...**

The letter “s” in the name of some of the ode functions indicates a stiff solver. These methods solve a matrix equation at each step, so they do more work per step than the nonstiff methods. But they can take much larger steps for problems where

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numerical stability  
limits the step size, so  
they can be more  
efficient overall.

## **Chapter 15 Ordinary Differential Equations**

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from thousands of MIT  
courses, covering the  
entire MIT curriculum..  
No enrollment or  
registration.

## **Lecture Notes | Differential Equations | Mathematics | MIT ...**

What follows are my  
lecture notes for a first  
course in differential  
equations, taught at  
the Hong Kong  
University of Science

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Included in these notes are links to short tutorial videos posted on YouTube. Much of the material of Chapters 2-6 and 8 has been adapted from the widely

## **Differential Equations**

The course is composed of 56 short lecture videos, with a few simple problems to solve following each

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lecture. And after each substantial topic, there is a short practice quiz. Solutions to the problems and practice quizzes can be found in instructor-provided lecture notes. There are a total of six weeks in the course, and at the end of each ...

## **Systems of Homogeneous Linear First-order ODEs | Lecture ...**

R.Rand Lecture Notes  
*Page 24/28*

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Lecture Notes  
on PDE's 8 5 Euler's  
Differential Equation

The simplest case of a  
linear variable

coefficient second  
order ODE is Euler's  
equation:  $ax^2 \frac{d^2y}{dx^2} + bx \frac{dy}{dx} + cy = 0$  (44)

We look for a solution  
with the ansatz:  $y = x^r$   
(45) Substitution of  
(45) into (44) gives  $ar(r-1) + br + c = 0$  that is,  
 $ar^2 + (b-a)r + c = 0$   
(46)

**Lecture Notes on**  
*Page 25/28*

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## **PDE's: Separation of Variables and ...**

Clairaut's form of differential equation and Lagrange's form of differential equations.

Definition 1.1.

Differential equation is an equation which involves differentials or differential coefficients.

For example, 1.

$$dy/dx = x^2 - 2y.$$

$$2. r^2 \frac{d^2 \mu}{dr^2} = a.$$

$$3. L \frac{d^2 q}{dt^2}$$

$$= R \frac{dq}{dt} - 1 - c q = E$$

$$\sin \omega t.$$

Definition 1.2.

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**Lecture Notes On  
Differential Equation**

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