



SRM MADURAI COLLEGE FOR ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai)
Pottapalayam, Sivagangai District - 630 612



COLLEGE CODE : 9111

COUNSELLING CODE: 5842

DEPARTMENT OF MATHEMATICS ASSOCIATED WITH ARYABHATTA MATH CLUB
ORGANIZES

A ONE WEEK ONLINE FACULTY DEVELOPMENT PROGRAMME

On

APPLICATION OF DIFFERENTIAL EQUATIONS

Date: 10/07/2024 to 15/07/2024

10.07.2024



Dr. M. Kirthiga

AP/Department of Mathematics
Dayananda Sagar College of
Engineering (DSCE) Bengaluru
Topic: Application of mathematical
modeling in biotechnology using
programming tool

11.07.2024



Dr. K. Lakshmi Narayanan

Professor/Department of Mathematics
Sethu Institute of Technology
Kariapatti
Topic: Evocations on Mathematics

12.07.2024



Dr. L. Rajendran

Professor/Department of Mathematics
AMET University, Chennai
Topic: Mathematical Modelling in
chemical and physical sciences

13.07.2024



Dr. S. Loghambal

AP/Department of Mathematics
The M.D.T.Hindu College, Pettai, Tirunelveli
Topic: Mathematical epidemiology

15.07.2024



Dr. M. Pitchaimani

Chairperson - School of Mathematics
Director and Head i/c
Ramanujan Institute for Advanced Study in Mathematics
University of Madras, Chennai.
Topic: Mathematical Modelling and Methods with ODE

Registration Free

Registration link: <https://forms.gle/9wxRq9yfx6zsRajC7>



10.30 AM -12.00PM

Coordinator(s)

Dr.S.Anitha

Dr.T.Dhivya

AP/Mathematics Dept

Co-Convener

Dr.A.N.Balaji

HoD /S&H Dept

Convener

Dr. S. DURAIRAJ

PRINCIPAL



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Day I - 10th July 2024 (Wednesday)

The slide titled "Application of the differential model" discusses the simple differential equation for exponential growth, $\frac{d}{dt}p = ap$, and its generalization $\frac{d}{dt}q = aq + c$. It includes mathematical formulas for $p(t) = p(0)e^{at}$ and $q(t) = \left[q(0) + \frac{c}{a} \right] e^{at} - \frac{c}{a}$. A graph shows population growth over time, and a diagram illustrates the differential model of a fermentation process with variables like substrate (S), biomass (X), and product (P).

The screenshot shows a MATLAB script for solving a differential equation. The script defines parameters like $\mu = 0.1$ and $K = 100$, and uses the `ode45` function to solve the equation $\frac{dy}{dt} = \mu y - \frac{y^2}{K}$. The resulting plot shows the population y over time, which follows a logistic growth curve, starting at $y(0) = 10$ and approaching the carrying capacity $K = 100$.

Day II - 11th July 2024 (Thursday)

The slide is titled "EVOCATIONS IN MATHEMATICS" and is presented by Dr. K. Lakshmi Narayanan from Sethu Institute of Technology. The slide content is partially obscured by a large blue box.

The slide contains a word problem: "Suppose that a corpse was discovered in hotel room at midnight and its temperature was 80 F. The temperature of the room is kept constant at 60 F. Two hours the temperatures of the corpse dropped to 75 F. Find the time of death". The slide is part of a presentation titled "Evocations in Mathematics".

Day III - 12th July 2024 (Friday)

The screenshot shows a Microsoft Teams meeting interface. The main content is a slide titled "Solving Reaction-Diffusion Equations". The slide text reads: "The reaction kinetics are described by an expression of the Michaelis-Menten form. The governing reaction/diffusion equation is expressed in the following non-dimensional form:" followed by the equation
$$\frac{d^2 u(x)}{dx^2} + \alpha \frac{u(x)}{1 + u(x)} - \gamma u(x) = 0 \quad (I)$$
 where $u(x)$ - dimensionless concentration, x - distance parameters, α - saturation parameter, γ - Diffusion parameter, n - Shape factor. The boundary conditions are: At $x = 0$: $u'(x) = 0$ (II) and At $x = 1$: $u(x) = 1$ (III). The slide number 15 is visible in the bottom right corner. The Teams interface shows three participants: arunahub@gmail.com, I.DHVM@tverstedt, and Dr. I. Rajendran. The system tray at the bottom shows the date as 12-07-2024 and time as 11:05.

Day IV - 13th July 2024 (Saturday)

The screenshot shows a Microsoft Teams meeting interface. The main content is a PowerPoint presentation titled "MATHEMATICAL EPIDEMIOLOGY". The slide features a blue background with a bar chart, a line graph, and a circular diagram. The Teams interface shows a list of participants: Dr. R. Senthama, K Pitchaim..., R POONG..., Dr. T. RAME..., Dr. R. Kav..., Iswarya M..., Nagaraj Dh..., and View all. The system tray at the bottom shows the date as 13-07-2024 and time as 11:43.

01:08:44

Basic Reproduction Number

The average number of people that one person with a virus infects, based on the R0 scale

AR = 40%
RO = 2

AR = 100%
RO = 5

Disease	R0 Range	Infectious Person	Average People Infected
H1N1	1.2–1.6	1 person	2 people
Ebola	1.6–2	1 person	2 people
SARS	2–4	1 person	3 people
MERS	2.5–7.2**	1 person	5 people

*As of February 28, 2020 **R0 calculated solely during the 2015 outbreak in South Korea
Sources: ScienceMag; WHO; Journal of the ISIRV BUSINESS INSIDER

Day V - 15th July 2024 (Monday)

33:17

Recording has started.
This meeting was set to be recorded automatically. [Privacy policy](#)

Suppose that we want to solve the following initial value problem which may model certain population:

$$\frac{dy}{dt} = f(t, y), \quad y(0) = b,$$

where $f, \frac{\partial f}{\partial y}$ are defined and continuous on a closed rectangle R in which $(0, b)$ is an interior point. So, here knowing the rate of change and the initial value of y , we want to find $y(t), t \geq 0$.

By Picard's theorem

- the above problem has a unique solution
- the solution is obtained as a limit of sequence of functions.

In fact, there are only very few problems that have a closed form solutions. So it is important to study the convergence of sequence of functions. First we look at the definition of convergence.

Dr. M. Pitchaima (Guest)