



Yogoda Satsanga Mahavidyalaya

JAGANNATHPUR, DHURWA, RANCHI – 834004

Email address: ysmranchi4@gmail.com

(NAAC Accredited, Grade: B++, CGPA: 2.89)

COURSEPLAN

NAME OF THE DEPARTMENT	: MATHEMATICS
NAME OF THE FACULTY	: Dr. R.C.L Das Prof Shekhar Suman Dr. Kandarp Vidyasagar
ACADEMIC SESSION	: 2023-2027
YEAR	: 2024
PROGRAMME	: B.Sc.
SEMESTER	: 3
COURSE TYPE	: Major
COURSE	: Ordinary Differential Equation-1
COURSE CODE	: MJ-4
TOTAL CREDIT	: 4



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PROGRAMME OUTCOMES (POs):

Student will be able:

PO1: Develop in-depth knowledge of algebra, analysis, calculus, geometry, differential equations and several other branches of mathematics. This also leads to study of related areas like computer science and statistics.

PO2: Analyze intrinsic beauty which can be utilized for solving real life problems through the use of mathematical modeling, cryptography and coding.

PO3: Apply knowledge of mathematical science in understanding and skills to identify the difficult/unsolved problems in mathematics. Realize the given scientific data critically and systematically and to do research so that to get the ability to draw the objective conclusions.

PO4: Understand logically question assertions, to recognize patterns and to distinguish between essential and irrelevant aspects of problems. They also share ideas and insights while seeking and benefitting from knowledge and insight of others. This helps them to learn behave responsibly in a rapidly changing interdependent society.

PO5: This programme will also help students to enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

PO6: Design solutions for complex scientific problems and design processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, legal, constitutional and environmental considerations.

PO7: Demonstrate fundamental systematic knowledge of mathematics and its applications in engineering, science, technology and mathematical sciences. It should also enhance the subject specific knowledge and help in creating jobs in various sectors.

PO8: Demonstrate knowledge and understanding of the scientific principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO9: Communicate effectively on complex science activities with the science community and the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.



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PO10: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of scientific development, technological advancement and global changes.

PO11: Use research-based knowledge and research-based methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO12: To value and foster physical, physiological and psychological well-being by staying committed through personal practice and conduct. Apply the learning for life-long committing to ethics, to fulfill professional and social obligations.

PO13: Apply academic learning for a sustainable living, initiation of entrepreneurial adventures through innovation to create opportunities and wealth for self and society.

PO14: Value and support social causes and rural development through service and philanthropic activities.

PROGRAMME SPECIFIC OUTCOMES (PSO):

PSO1: Understand the requirements in mathematics, drawing from a range of contemporary research works and their applications in diverse areas of mathematical sciences and demonstrate educational skills in the areas of analysis, geometry, algebra, mechanics, differential equations etc.

PSO2: Apply skills and knowledge through on-the-job training, research projects and internships to use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion and creating Mathematical models, algorithms, etc. to facilitate application of mathematics in different professions and knowledge domains.

PSO3: Analyze the applications of Mathematics and computing methods using MATLAB, PYTHON, MATHEMATICA etc. to solve the problems of Science in general and Mathematics in particular.

COURSE OUTCOMES (COs):

Semester-3

Paper : **Ordinary Differential Equation-1 (MJ-4)**

This course will enable the students to:

CO1: Remember - Define and recall fundamental concepts and types of differential equations, including first-order, second-order, and higher-order linear differential equations.

CO2: Understand - Explain the methods for solving first-order differential equations, including separable, homogeneous, exact equations, and linear differential equations.



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CO3: Apply - Utilize techniques such as variation of parameters, method of undetermined coefficients, and transformations to solve second-order and higher-order linear differential equations.

CO4: Analyze - Differentiate and integrate solutions of linear differential equations, determine the properties of the Wronskian, and analyze the behavior of orthogonal trajectories and growth/decay models.

CO5: Create - Develop and construct mathematical models using differential equations to solve real-world problems, such as population dynamics, radioactive decay, and acceleration-velocity models, and communicate findings effectively through reports and presentations.

1. CORRELATION BETWEEN POs AND COs

POs Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PSO1	PSO2	PSO3
CO1	3	2	2	-	2	2	2	1	-	-	2	2	2	-	3	3	3
CO2	3	2	2	-	2	3	3	2	-	2	3	3	3	3	3	3	3
CO3	3	2	2	2	-	2	2	-	1	-	2	2	2	2	3	-	2
CO4	3	-	-	2	-	-	2	1	-	1	2	2	-	-	3	3	2
CO5	3	2	1	-	2	-	2	-	1	-	2	2	2	-	2	3	-

COURSE TEACHING AND LEARNING ACTIVITIES

A. PEDAGOGY

- i. Whiteboard
- ii. PPT
- iii. Zoom, Google meet

B. COURSE COMPLETION PLAN

UNIT	NO. OF LECTURES		TEST	QUIZ	ASSIGNMENT
	Lectures	Tutorial Lectures			
1	12	1	1	1	1
2	10	1	1	1	1
3	15	2	2	1	1
4	18	1	1	1	1



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A. COURSE DELIVERY PLAN:

UNIT	TOPIC/SUBTOPIC	LECTURE REQUIRED	CO ADDRESSED
1	Basic concepts and genesis of ordinary differential equations, Order and degree of a differential equation, Differential equations of first order and first degree	5	CO1
2	Equations in which variables are separable, Homogeneous equations, Linear differential equations and equations reducible to linear form,	5	CO1
3	Exact differential equations, Integrating factor, First order higher degree equations solvable for x, y and p. Clairaut's form and singular solutions	5	CO2, CO1
4	Statement of Picard's theorem for the existence and uniqueness of the solutions of the first order differential equations.	6	CO2
5	Statement of existence and uniqueness theorem for linear differential equations, General theory of linear differential equations of second order with variable coefficients	7	CO2, CO3
6	Solutions of homogeneous linear ordinary differential equations of second order with constant coefficients	5	CO3, CO4
7	Transformations of the equation by changing the dependent /independent variable, Method of variation of parameters and method of undetermined coefficients.	5	CO4
8	Linearly dependent and linearly independent solutions on an interval, Wronskian and its properties, Concept of a general solution of a linear differential equation	5	CO4
9	Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler-Cauchy equation, Method of variation of parameters and method of undetermined coefficients	5	CO5



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10	Orthogonal trajectories, Acceleration-velocity model, Minimum velocity of escape from Earth's gravitational field, Growth and decay models, Malthusian and logistic population models	6	CO5
11	Radioactive decay, Drug assimilation into the blood of using lecold pill.	6	CO5

B. COURSE OUTCOME ASSESSMENT PLAN

a. DIRECT ASSESSMENT

(Please tick the appropriate column)

COURSE OUTCOME	ASSESSMENT				REMARKS
	QUIZ	TEST	MID SEMESTER	Term Exam	
CO1	1	1	1	1	
CO2	1	1	1	1	
CO3	1	1	1	1	
CO4	1	1	1	1	
CO5	1	1	1	1	

b. INDIRECT ASSESSMENT (STUDENT SURVEY)

Name of the Student:
University Roll no/ Class roll no.:
Name of the Programme:
Semester and Session:
Course and Course Code:

Rate the following aspects of course outcomes. Use the scale 1-3

S. No	Course Outcome	1	2	3
1.	CO1			
2.	CO2			
3.	CO3			
4.	CO4			
5.	CO5			
6.	CO6			

1. Average
2. Good



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3. Very Good

B. SUGGESTED READINGS

a. TEXT BOOKS:

1. Erwin Kreyszig(2011). *Advanced Engineering Mathematics*(10th edition). Wiley.
2. M.D. Raisinghania(2013) .*Ordinary and Partial Differential Equations* (15th edition). S.Chand.

b. REFERENCE BOOKS

1. B. Rai, D. P. Choudhury & H. I. Freedman (2013). *A Course in Ordinary Differential Equations* (2nd edition). Narosa.

c. VIDEO RESOURCE

1. <https://nptel.ac.in/courses/111106113>
 2. <https://archive.nptel.ac.in/courses/111/106/111106100/>
- a. **WEB RESOURCES:-** 1. <https://ocw.mit.edu/courses/18-03-differential-equations-spring-2010/>

b. E-RESOURCES

1. <https://pages.mtu.edu/~kreher/ABOUTME/syllabus/GTN.pdf>