



Yogoda Satsanga Mahavidyalaya

(Established in 1967)

NAAC Accredited B++ (CGPA 2.89)

Affiliated to Ranchi University & registered under 2 (F) & 12 (B) of UGC Act



COURSE PLAN

NAME OF THE DEPARTMENT: PHYSICS

NAME OF THE FACULTY: PROF. SANTOSH KUMAR SINGH

ACADEMIC SESSION: 2023-2024

YEAR: 2024

PROGRAMME: B.Sc.

SEMESTER: I

COURSE TYPE: MAJOR

COURSE: Mathematical Physics and Mechanics

COURSE CODE: MJ-1

TOTAL CREDIT: 6

Prepared by:

HoD:



PROGRAMME OUTCOME (POs)

Student should be able to,

PO1: Apply the knowledge of physical laws and to design a scientific and computational model that illustrates and explains the different laws.

PO2: Learn, design and perform experiments in the labs to demonstrate the concepts, principles and theories learned in the classroom

PO3: Develop scientific temperament, an ability to merge, interconnect and extrapolate information and knowledge across various streams.

PO4: 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 consideration.

PO5: Realize the given scientific data critically and systematically and the ability to draw the objective conclusions.

PO6: Communicate effectively on complex scientific activities with the science community and at society at large, such as, being able to comprehend and write effective reports and design documents, make effective presentations, and give and receive clear instructions.

PO7: Demonstrate knowledge and understanding of the scientific principle and apply these to one's own work, as a member and leader in a team, to manage projects and multidisciplinary environments.

PO8: Recognise 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.

PO9: Use research based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

PO10: Value and foster physical physiological and physiological wellbeing by staying committed through personal practice and conduct. Apply the learning for life-long commitment to ethics to fulfilment of professional and social obligations.

PO11: Apply academic to promote higher studies, sustainable living through employment and initiation of entrepreneurial advents to create opportunities and wealth for self and society.

PO12: Value and Support social causes and rural development through service and philanthropic activities.



Program Specific Outcomes

Student should be able to,

PSO 01: Apply the rigorous understanding of the core theories & principles of Physics, which includes Classical Physics, Mathematical Physics, Quantum Physics, Statistical Physics, Electrodynamics, and Relativity while pursuing higher education or in real life situations e.g., knowledge of Electronics and Instrumentation shall be helpful to design and develop several devices and sensors etc.

PSO 02: Analyse the applications of interdisciplinary learning especially Mathematics and computational methods using MATLAB, PYTHON, SCILAB etc. to solve the problems in Physics & develop suitable mathematical and computational methods for new formulation of Physical theories.

PSO 03: Demonstrate a solid foundation about the fundamental interactions of nature (gravity, electromagnetic, weak, strong) and develop a solid foundation of atomic and nuclear structure, i.e., understand the fundamental theories to unravel nature at atomic and sub-atomic level as well as at large astrophysical length scale.

COURSE OUTCOMES (COs):

On successful completion of this course the student should develop skills and abilities:

1. Apply the knowledge of calculus. These basic mathematical structures are essential in solving problems in various branches of Physics.
2. Comprehend about curvilinear coordinates, laws of motion and their application to various dynamical situations, notion of inertial frames and concept of Galilean invariance.
3. Apply conservation of energy, momentum, angular momentum principles and theory of elasticity on different body.
4. Apply basic laws govern the fluid surface tension phenomenon, kinematics and Dynamics of fluid flow.
5. Apply Kepler's law to describe the motion of planets and satellite in circular orbit, through the study of law of Gravitation.
6. Explain the phenomena of simple harmonic motion, fictitious forces arise in a non-inertial frame and the properties of systems executing such motions.
7. Describe special relativistic effects and their effects on the mass and energy of a moving object.



A. 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	PSO 1	PSO 2	PSO 3
CO1	3	-	3	-	-	-	3	-	-	-	-	-	3	3	-
CO2	-	-	3	-	-	3	3	-	-	-	-	-	3	-	-
CO3	3	-	3	-	-	-	3	-	-	-	-	-	3	-	3
CO4	3	-	3	-	-	-	3	-	-	-	-	-	3	-	3
CO5	3	-	3	-	-	-	3	-	-	-	-	-	3	-	3
CO6	-	-	-	3	3	3	-	-	-	-	-	-	-	-	3
CO7	-	-	-	3	3	3	-	-	-	-	-	-	-	-	3

1. Weak

2. Moderate

3. Strong

COURSE TEACHING AND LEARNING ACTIVITIES

A. PEDAGOGY

- i. Whiteboard
- ii. Flipped Class
- iii. PPT

B. COURSE COMPLETION PLAN

UNIT	NO. OF LECTURES		TEST	QUIZ	ASSIGNMENT
	Lectures	Tutorial Lectures			
1	10		}	01	1
2	10				
3	06				
4	04				
5	02		}	01	
6	03				
7	02				
8	05				
9	07				
10	15				
			01	1	



C. COURSE OUTCOME ASSESSMENT PLAN

a. DIRECT ASSESSMENT

(Please tick the appropriate column)

COURSE OUTCOME	ASSESSMENT				REMARKS
	QUIZ	TEST	MID SEMESTER	Term Exam	
CO1		2	2		
CO2		3	3		
CO3		3	3		
CO4		3	3		
CO5		2	2		
CO6		2	2		
CO7		3	3		

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

S. No	Course Outcome	1	2	3
1.	CO1		2	
2.	CO2			3
3.	CO3			3
4.	CO4			3
5.	CO5		2	
6.	CO6		2	
7.	CO7			3

1. Average 2. Good 3. Very Good

D. SUGGESTED READINGS

a. TEXT BOOKS:

1. **Mathematical Physics, H.K. Dass and R. Verma, S. Chand & Company.**
2. **Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.**

b. REFERENCE BOOKS:

1. **Advanced Engineering Mathematics, R.K. Jain and Iyengar**

c. VIDEO-RESOURCE:

- <https://egyankosh.ac.in/handle/123456789/64830>
<https://egyankosh.ac.in/handle/123456789/64839>

d. WEB-RESOURCES:

- <https://www.coursera.org/learn/einstein-relativity>



Yogoda Satsanga Mahavidyalaya

(Established in 1967)

NAAC Accredited B++ (CGPA 2.89)

Affiliated to Ranchi University & registered under 2 (F) & 12 (B) of UGC Act



<https://physicscatalyst.com/graduation/central-forces/>

e. E-RESOURCES:

<https://www.uou.ac.in/sites/default/files/slm/BSCPH-101.pdf>

[https://physics.uwo.ca/~mhoude2/courses/PDF%20files/physics350/Central force.pdf](https://physics.uwo.ca/~mhoude2/courses/PDF%20files/physics350/Central%20force.pdf)