



FIRST-YEAR BACHELOR OF SCIENCE MAJOR AND MINOR PHYSICS REVISED SYLLABUS ACCORDING TO CBCS NEP2020

COURSE TITLE: MATHEMATICAL METHODS, MECHANICS,
THERMODYNAMICS AND OPTICS
SEMESTER-I
W.E.F. 2023-2024

**RECOMMENDED BY THE BOARD OF STUDIES IN PHYSICS
AND
APPROVED BY THE ACADEMIC COUNCIL**

Devrukh Shikshan Prasarak Mandal's

Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and
Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal. Sanameshwar, Dist. Ratnagiri-415804, Maharashtra, India

Academic Council Item No: **03 dated 8 July 2023**

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangmeshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Bachelor of Science
Name of the Department	:	Physics
Name of the Class	:	First Year
Semester	:	First
Paper	:	I
No. of Credits	:	02
Title of the Course	:	Mathematical Methods, Mechanics, Thermodynamics & Optics
Course Code	:	S101PHT
Name of the Vertical in adherence to NEP 2020	:	Major and Minor
Eligibility for Admission	:	Any 12 th Pass seeking Admission to Degree Programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	UG
Pattern of Marks Distribution for SEE and CIA	:	60:40
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2023-2024
Ordinances /Regulations (if any)		

Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce and Vid. Dadasaheb Pitre Science College, Devrukh (An Autonomous College Affiliated with University of Mumbai)

Syllabus for First Year of Bachelor of Science in Physics

(With effect from the academic year 2023-2024)

SEMESTER-I

Paper No.– Physics Paper – I

Course Title: Mathematical Methods, Mechanics,

No. of Credits - 02

Thermodynamics & Optics

Type of Vertical: Major and Minor

COURSE CODE: S101PHT

Learning Outcomes Based on BLOOM's Taxonomy:

After completing the course, the learner will be able to...		
Course Learning Outcome No.	Blooms Taxonomy	Course Learning Outcome
CLO-01	Remember	Revise the basic physical quantities, basics of determinants and their properties
CLO-02	Understand	Explain fundamentals of functions, graphs & complex numbers
CLO-03	Understand	Understand simple principles of fluid flow and the equations governing fluid dynamics
CLO-04	Understand	Understand the concepts of lens system, diffraction and interference.
CLO-05	Apply	Apply the laws of thermodynamics to formulate the relations necessary to analyse a thermodynamic process
CLO-06	Analyze	Explain the phenomena of simple harmonic motion and the properties of systems executing such motions

Syllabus for First Year of Bachelor of Science in Physics**(With effect from the academic year 2023-2024)****SEMESTER-I****Paper No.– Physics Paper – I****Course Title: Mathematical Methods, Mechanics,****No. of Credits - 02****Thermodynamics & Optics****Type of Vertical: Major and Minor****COURSE CODE: S101PHT**

COURSE CONTENT			
Module	Content	Credits	No. of Lectures
1	1. Physical quantities –Definitions and units 2. Functions and graphs -Graphs of linear, sin, cosine, tan, and values for important angles, exponential, power, logarithmic, inverse functions, shifting of graph, using scientific calculator. 3. Determinants –evaluation, important properties. 4. Complex Numbers -Basics, conjugate, Euler Identity, polar representation, Division of complex numbers 5. Derivative & Integration techniques –Table of formulae for derivative & integration with significance, Derivative rules – $u \pm v$, uv , u/v , Composite function, chain rule, simple integration, integration by parts, integration by substitution, integral of \sin^2x , \cos^2x , $\log x$.	01	15
2	1. Newton's Laws of motion. Newton's Laws of motion, concept of inertia, momentum, moment of inertia, torque, linear Kinematical Equations and problems. 2. Fluid Dynamics: Equation of continuity, Bernoulli's Equation, Applications of Bernoulli's equation, streamline & turbulent flow, Concept of viscosity & coefficient of viscosity, Poiseuille's equation (without derivation) 3. Thermodynamics: Thermodynamic systems, zeroth law, concept of heat, first law of thermodynamics, concept of ideal gas and ideal gas equation, internal energy, thermodynamic processes –relations between P, V, and T, work done, specific heats. 4. Optics: Concepts of Reflection, Refraction, Refractive Index, Deviation, Dispersion, Dispersive Power, Interference, Diffraction, Polarization, Spherical Aberration and Chromatic Aberration, Interference, Division of wave-front and division of amplitude, Ramsden eyepiece	01	15
	Total	02	30

References:

Unit-I

1. D.W. Jordan and P. Smith –Mathematical techniques, (4th Ed.) Oxford University Press.

Unit-II

1. H. C. Verma, Concepts of Physics – (Part-I), 2002 Ed. BharatiBhavan Publishers.
2. Brijlal,Subramanyam and Avadhanulu A Textbook of Optics, 25th revised ed.(2012) S. Chand
3. Brijlal, Subramanyam and Hemne, Heat Thermodynamics and Statistical Physics, S Chand, Revised, Multi-coloured,2007 Ed.
4. Jenkins and White, Fundamentals of Optics by (4th Ed.), McGraw Hill International.
5. D S Mathur, Element of Properties of Matter, S Chand & Co.
6. C L Arora, Optics, S Chand.
7. Hans and Puri, Mechanics –, 2nd Ed. Tata McGraw Hill

Access to the Course

The course is available for all the students admitted for Bachelor of Science.

Methods of Assessment

The assessment pattern would be 60:40, 60% for Semester End Examination (SEE) and 40% for Continuous Internal Assessment (CIA). The structure of the SEE and CIA would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

Pattern of Evaluation

The Examination/Evaluation pattern shall be framed by the Board of Examination with its final approval from the Academic Council of the College.