

# The Kelkar Education Trust's Vinayak Ganesh Vaze College of Arts, Science & Commerce (Autonomous)

Mithaghar Road, Mulund East, Mumbai-400081, India

College with Potential for Excellence Phones :022-21631421, 221631423, 221631004 Fax : 022-221634262, email: vazecollege@gmail.com

# Syllabus for F.Y.B.A. / F.Y.B.Com. Programme Physics Open Elective [ OE ]

Syllabus as per Choice Based Credit System (NEP-2020)

(June 2025 Onwards)

# Submitted by

Department of PhysicsVinayak Ganesh Vaze College of Arts, Science and Commerce (Autonomous)Mithagar Road, Mulund (East) Mumbai-400081. Maharashtra, India.<br/>Tel: 022-21631004, Fax: 022-21634262E-mail:vazecollege@gmail.comWebsite :www.vazecollege.net

## The Kelkar Education Trust's

Vinayak Ganesh Vaze College of Arts, Science & Commerce (Autonomous)

# Syllabus as per Choice Based Credit System (NEP 2020) Syllabus for Approval

	Sub	ject:	<b>Physics</b>	Open	Elective
--	-----	-------	----------------	------	----------

Sr. No.	Heading	Particulars
1	Title of Programme	First Year B.Sc. Physics: Semester I and II
2	Eligibility for Admission	H.S.C Passed
3	Passing marks	Minimum D Grade or equivalent minimum marks for passing at the Graduation level.
4	Ordinances/Regulations (if any)	
5	No. of Years/Semesters	One year/ Two semester
6	Level	U.G. Part-I : Level- 4.5
7	Pattern	Semester
8	Status	Revised
9	To be implemented from Academic year	2025-2026

Date: .....

Signature:

BOS Chairperson: .....

# The Framework of the Choice-Based Credit System

## • Major Subject:

A single subject course of study pursued by a student as a mandatory requirement of the programme of study. Indian Knowledge System (IKS) to be included in the core courses.

## • Elective Course:

An elective course could be a project designed to acquire skills to supplement the major study.

## • Minor Subject:

A second subject of study pursued by a student as an additional requirement of the programme of study.

## • OE: Open Elective

An elective course chosen generally from an unrelated discipline/subject, to seek multidisciplinary exposure.

## • AEC: Ability Enhancement Course

Mandatory Courses on content related to Language, and Literature (i) Compulsory – English communication (ii) Elective – any Indian language other than English.

## • IKS: Indian Knowledge System (Generic)

Mandatory course - an overview of the contribution of India towards multidisciplinary research and development.

#### • VSC: Vocational Skill Course

Courses aimed at imparting practical skills, hands-on training, and soft skills to increase the employability of students. Specific or supporting the major subject is to be chosen from a basket/pool offered by the college.

#### • SEC: Skill Enhancement Course

Courses aimed at imparting practical skills, hands-on training, and soft skills to increase students' employability. It could be chosen from a basket/pool offered by the college or a MOOC on Swayam or NPTEL platforms.

• On-Job Training (OJT)/Internship/Field Project (FP)/Community Engagement Programme (CEP)/Research Project (RP)

Application of knowledge/concepts in solving or analysing a real-life problem. All these are related to the major subject.

#### • CC: Co-curricular Course

For the holistic development of students through Cultural activities such as performing art, visual art, NCC, NSS, Yoga, etc.

# • VEC: Value Education Course

Compulsory courses on

- (i) The Constitution of India
- (ii) Environmental Education

# Programme Educational Objectives

PEO1	Introduce basic concepts of physics in a relatable manner to students from non-science backgrounds.
PEO2	Enable learners to appreciate the scientific basis of everyday experiences and common technologies.
PEO3	Equip students with practical skills for measuring physical quantities using basic instruments.
PEO4	Encourage scientific thinking in analyzing personal health, environment, and household decisions.
PEO5	Foster social and ethical responsibility by understanding the implications of using physical technologies.
PEO6	Promote interdisciplinary interest and further curiosity about science in arts, commerce, and life contexts.

## **Programme Outcomes**

Upon successful completion of the B.Sc. (Physics) course from Vaze College affiliated to Mumbai University, graduates can expect the following outcomes:

P01	Understand and explain fundamental physical concepts and their relevance to everyday life and health.
PO2	Apply physics principles to observe, describe, and interpret real-life situations and technological devices.
PO3	Perform basic physical measurements using common instruments and interpret the outcomes appropriately.
P04	Communicate physics-related observations and ideas effectively using simple scientific language.
PO5	Demonstrate awareness of the impact of physics-based technologies on health, environment, and safety.
P06	Develop curiosity, critical thinking, and a habit of lifelong learning through interdisciplinary exploration.

# **Programme Specific Outcomes**

PSO1	Explain the scientific basis behind basic electrical systems, measurements, and household appliances.
PSO2	Identify and use instruments to measure physical quantities like length, mass, time, temperature, and current.
PSO3	Interpret how physics concepts apply to healthcare tools (e.g., thermometer, oximeter, hearing aid).
PSO4	Recognize physical principles such as energy, sound, optics, and radiation in daily routines and technologies.
PSO5	Evaluate safety, efficiency, and health impacts of physics-based tools and domestic or environmental practices.
PSO6	Demonstrate confidence in using physics knowledge to support informed decision- making in real-life scenarios.

# The Detailed Semester and Course Wise Syllabus as follows:

		SEMESTER I				
	Code	Course of Study	Cr.	L	Τ	Р
	Physics in Everyday Life	3	3	-	-	
UE	VSFIII00	Practical based on Physics in Everyday Life	1	-	-	1
	Total 4 3 - 1					

		SEMESTER II				
	Code	Course of Study	Cr.	L	Τ	Р
	Physics of Human Health	3	3	-	-	
UE	V3F11150	Practical based on Physics of Human Health	1	-	-	1
		Total	4	3	-	1

 $\mathbf{L} =$ Lecture hours per week

 $\mathbf{T}$  = Tutorial hours per week

 $\mathbf{P}$  = Practical hours per week

- 1 Credit = 15 Hours Lecture
- 1 Credit = 30 Hours Practical

# Semester – I

## Open Elective [ For Arts & Commerce Students ] Course Code: VSPH106 Credits: 3

## **Physics in Everyday Life**

#### **Course Learning Objective**

Upon Completion of the course the student will be able to

LO 1	Understand fundamental electrical concepts including charge, current, voltage,
	power, and differentiate between DC and AC systems.
LO 2	Recall and apply SI units for basic physical quantities and explain the importance of
	accuracy, precision, and error in measurement
LO 3	Develop practical skills to measure fundamental quantities like length, mass, time,
	temperature, and current using appropriate instruments.
LO 4	Explore and compare the methods for measuring derived physical quantities such as
	force, speed, pressure, and frequency, and their interconversions.

Course Code VSPH106		Physics in Everyday Life	Credits 3	Lectures
Course Out	tcomes	s : Upon Completion of the course the student will be able to		
CO 1	Expla powe	in the basic principles of electricity and analyze simpler usage, and household safety measures.	e DC and A	C circuits,
CO 2	<b>CO 2</b> Use appropriate measuring instruments to accurately determine fu quantities and understand the role of errors in measurement.		termine fui	ndamental
CO 3	Conv curre	ert between units of measurement for length, mass, times and mease and we	me, tempera eight.	ature, and
<b>CO 4</b> Perform and interpret measurements of derived quantities such as speed volume, radiation, and sound using basic tools.		ch as speed	, pressure,	
Unit	Content			
Unit 1	<b>Chap</b> 1.1 In 1.2 El 1.3 Co 1.4 El 1.5 Co	<b>ter -1 : Basics of Electricity</b> atroduction lectron theory onductor, Insulator and semiconductor lectric charges urrent: D.C current; A.C current		15
	1.6 V 1.7 Si 1.8 D 1.9 In	oltage : D.C voltage; A.C voltage mple electric circuit .C circuits: series and Parallel (I, V, P) atroduction to A.C : Current and voltage		

	1.10 Power, Household power consumption and calculation	
	1.11 Safety measures	
	<b>Chapter-2 : Measurements of Fundamental quantities</b> <b>2.1</b> Introduction to International system of units	
	2.2 Accuracy, precision of instruments and error in measurements	
	2.2 Measurements of length and their inter conversions	
Unit 2	2.3 Measurements of mass and their inter conversions; difference	15
	between mass and weight	
	2.4 Measurements of time and their inter conversions	
	2.5 Measurements of temperature and their inter conversions	
	2.6 Measurement of current	
Unit 3	Chapter-3 : Measurements Derived quantities 3.1 Measurement of Force 3.2 Measurement of speed 3.3 Measurement of volume and their interconversion 3.4 Measurement of Sound 3.5 Measurement of pressure 3.6 Measurement of radiation 3.7 Measurement of frequency	15
	3.7 Measurement of frequency	

# **Reference Books :**

- 1. Concepts of Physics By H.C. Varma Volume -2
- 2. Concepts of Physics By H.C. Varma Volume -1
- 3. Measurements and instrumentation By Sohoni
- 4. Measurements and instrumentation By Kalsi

# Open Elective Course Code: VSPH106 Credits: 1 Practical based on Physics in Everyday Life

Course Code VSPH106		Practical based on Physics in Everyday Life	Credits 1	Lectures 30
1.	Find the thickness of glass slab/thin wire/ bob using screw gauge			
2.	Find the inner and outer diameter of cylinder using Vernier caliper			
3.	Find the radius of capillary bore using Travelling microscope			
4.	Find the volume of water using measuring cylinder			
5.	Use of digital multimeter to measure AC and DC Current and voltage			
6.	Use of digi	tal multimeter to find Resistance		

**Note:** All experiments should be recorded **neatly in a certified journal**. Submission of the certified journal is **compulsory to be eligible** for the semester-end practical examination.

# Semester – II

# Open Elective [ For Arts & Commerce Students ] Course Code: VSPH156 Credits: 3

## **Physics of Human Health**

#### **Course Learning Objective**

Upon Completion of the course the student will be able to

LO 1	Understand and explain how basic physical concepts like force, balance, energy, and friction relate to the human body and daily movement.
LO 2	Identify the principles of waves, sound, and optics in the functioning of hearing and vision aids, and diagnostic tools like stethoscopes and ultrasounds.
LO 3	Recognize how radiation, lasers, and electromagnetic waves are used in medical imaging and everyday health-related technologies.
LO 4	Apply concepts of heat, pressure, and energy transfer to understand technologies used in cooking, food preservation, and wellness.

Course Code VSPH156		Physics of Human Health	Credits 3	Lectures 45	
Course Outcomes : Upon Completion of the course the student will be able to					
CO 1	Explain how physical principles such as force, pressure, and energy apply to human movement, posture, and balance.				
CO 2	Describe the basic working principles of diagnostic tools such as thermometers, stethoscopes, ultrasounds, and X-ray machines.				
CO 3	Apply concepts of heat transfer, waves, and radiation to understand everyday technologies like cooking appliances, lasers, and vision aids.				
CO 4	Demonstrate an informed perspective on the use of physics-based technologies in healthcare, food safety, and personal wellness				
Unit	Content			No. of Lectures	
		<b>Motion, Mechanics &amp; Everyday Physics</b>			
	Chapter 1: Forces and Balance in the Human Body				
Unit 1	1.1 1.2	Centre of gravity, stability, walking, posture Lifting techniques and levers in limbs			
	Chapter 2: Work, Power & Energy in Daily Life			15	
	2.2 2.3	Energy in motion, calories and physical activity Power used during walking, running, and lifting objects		10	
	Chapter 3: Friction and Tools				
	3.1 3.2	Friction in joints, shoes, and supports Physics behind aids like crutches, wheelchairs			

	Chapter 4: Heat and Thermometers		
	1.1 Temperature scales, thermal expansion		
	1.2 How mercury and digital thermometers work		
	Waves, Light, Sound & Basic Diagnostics		
	Chapter 5: Sound Waves and Hearing		
	<ul><li>5.1 Pitch, loudness, resonance</li><li>5.2 Hearing aids and stethoscope working principles</li></ul>		
	Chapter 6: Light and Vision		
	<ul><li>6.1 Reflection, refraction, lenses</li><li>6.2 How glasses, magnifiers, and eye tests work</li></ul>	15	
Unit 2	Chapter 7: Ultrasound and Echolocation		
	<ul><li>7.1 Principles of ultrasound, echo imaging</li><li>7.2 Use in fetal imaging and body scans</li></ul>		
	Chapter 8: ECG, EEG, and Pulse Oximetry		
	<ul><li>8.1 Basics of electrical signals in the body</li><li>8.2 Light-based measurement of blood oxygen</li></ul>		
	Radiation, Lasers & Physics of Food		
	Chanter Q. Y. Pays and MPI (Introductory Concents)		
	9.1 Absorption-based imaging (X-rays)		
	9.2 Magnetic resonance and radio waves (MRI – simplified		
	explanation)		
	Chapter 10: Radiation in Daily Life		
	10.1 Types: ionizing vs. non-ionizing		
Unit 3	10.2 Mobile phones, sun exposure, medical scans	15	
	Chapter 11: Lasers in Medicine		
	11.1 Laser in eye surgery, dentistry, cosmetic uses		
	11.2 Barcode scanning in pharmacies		
	Chapter 12: Physics of Cooking & Preservation		
	12.1 Heat transfer methods (boiling, frying, microwaves)		
	12.2 Pressure cooking and boiling point		
	12.3 Refrigeration and food safety basics		

**Reference Books :** 

- 1. Physics for the Life Sciences Martin Zinke-Allmang & Richard T. Glaser
- 2. Physics of the Human Body Richard P. McCall
- 3. The Physics of Everyday Things James Kakalios
- 4. Physics for Future Presidents Richard A. Muller
- 5. Conceptual Physics Paul G. Hewitt

Supporting Resources

- 1. NCERT Physics (Class IX & X)
- 2. OpenStax: College Physics
- 3. WHO & CDC Health Technology Booklets
- 4. TED-Ed / YouTube Channels: Veritasium, Physics Girl, SciShow, and MinutePhysics

## Open Elective Course Code: VSPH156 Credits: 1

## **Practical Based on Physics of Human Health**

Course Code		Practical based on Physics of Human Health	Credits	Lectures			
V3PH150			L	30			
1.	To locate the center of gravity of various objects						
2.	Friction based experiment: Measure static friction by determining the angle at which an object begins to slide						
	Build a simple water thermometer using a plastic bottle, straw, and coloured water						
	Or						
3.	Thermometer based experiment						
	Or						
	Temperature survey in the locality						
4.	Experiment related to sound (Resonance tube)						
	Experiment related to light (To find the resolving Power of a prism, understand the						
5.	resolving power of Human eye)						
	Experiment	related to Oximeter principle					
6.	Or						
_	Oximeter based survey in the locality						
7.	Compare heat transfer rates in water using metal, plastic, and wooden spoons						
8.	Newton's La	aw of Cooling					
	LASER based experiment (To study the penetration of LASER using a stack of						
9.	papers representing skin)						

**Note:** All experiments should be recorded **neatly in a certified journal**. Submission of the certified journal is **compulsory to be eligible** for the semester-end practical examination.

# Theory / Practical Examination Pattern for

# (Open Elective)

# > External Assessment – Semester End Theory Paper (Total: 60 Marks)

Paper Name			
Duration : 2 Hours M		arks : 60	
Q. 1	Questions Based on Unit 1	15	
Q. 2	Questions Based on Unit 2	15	
Q. 3	Questions Based on Unit 3	15	
Q. 4	Questions Based on Unit 1, 2, 3	15	

# > Internal Assessment – Semester End Practical Examination (Total: 40 Marks)

- > Every student must maintain and complete a practical journal as per the prescribed syllabus.
- The journal must be duly checked and certified by the subject teacher and Head of the Department (HOD).
- Students without a completed and certified journal will not be permitted to appear for the practical examination.

Component	Marks
Experiment	20
Activity	10
Viva Voce	5
Journal Evaluation	5
Total Marks	40