Shri. Gopinath Mahadeo Vedak Pratishthan's

G. M. VEDAK COLLEGE OF SCIENCE, TALA, RAIGAD

DEPARTMENT OF PHYSICS

B.Sc. Physics Curriculum

PROGRAM OUTCOMES: B.Sc. Physics

Programme Outcomes (POs)	
PO1	Development of analytical and mathematical abilities towards day to day real world problems.
PO2	To get familiar with current and recent scientific and technological developments.
PO3	Enrichment of knowledge through problem solving hands on activities, study visits, projects, etc.
PO4	To know the fundamental laws and principles in a variety of areas of physics along with their applications

Programme Specific Outcomes (PSOs)	
At the end of the programme, the students will be able to:	
PSO1	Define the physics underlying various phenomena's
PSO2	Learn basic postulates of new physical principles
PSO3	To gain expertise in experimental physics through statistical error analysis and practice.
PSO4	Graduates from this programme will be eligible to continue M.Sc. Graduates will also have the necessary numerical and computer skills to allow them to move into a range of more general career choices such as accounting or computing.

Course Outcomes B.Sc. Physics Semester I	
At the end of the programme, the students will be able to:	
USPH101 Classical Physics	1. Apply Newton's laws for the calculations of the motion of simple systems. 2. Use Work and Energy equivalence and its applications through suitable numerical. 3. Use Elasticity, Viscosity and Fluid dynamics in daily life. 4. Understand Real gases and valid it of the laws of thermodynamics. 5. Demonstrate quantitative problem solving skills in all the topics covered
USPH102 Modern Physics	1. Understand nuclear properties, nuclear behavior and various types of nuclear reactions 2. Understand the concept of radioactivity, its applications and different types of equilibria in radioactive elements 3. Understand various types of nuclear detectors and their applications 4. Demonstrate and understand the quantum mechanical concepts. 5. Demonstrate quantitative problem solving skills in all the topics covered.

Course Outcomes B.Sc. Physics Semester II	
At the end of the programme, the students will be able to:	
USPH201 Optics I	1. Understand the concept of lens, lens defects and their minimization. 2. Significance of combination of lenses implied to eyepiece of optical instrument. 3. Understand interference of light with few well known daily life examples. 4. Understand Lasers and Optical fibers, their applications in day to day life.
USPH202 Electricity and Electronics	1. Understand the basic concepts of Alternating current theory, AC bridges and Circuit Theorems 2. Understand the basics of Analog and Digital Electronics and apply them in real life situations 3. Demonstrate quantitative problem solving skills in all the topics covered

Course Outcomes B.Sc. Physics Semester III	
At the end of the programme, the students will be able to:	
USPH301 Mechanics and thermodynamics	1. Understand the concepts of mechanics & properties of matter & to apply them to problems. 2. Comprehend the basic concepts of thermodynamics & its applications in physical situation. 3. Learn about situations in low temperature. 4. Demonstrate tentative problem solving skills in all above areas.
USPH302 Vector calculus ,Analog electronics	1) Understand the basic concepts of mathematical physics and their applications in physical situations. 2) Understand the basic laws of electrodynamics and be able to perform calculations using them. 3) Understand the basics of transistor biasing, operational amplifiers, their applications 4) Understand the basic concepts of oscillators and be able to perform calculations using them. 5) Demonstrate quantitative problem solving skill in all the topics covered.
USPH303 Applied Physics-I	1) Students will be exposed to contextual real life situations. 2) Students will appreciate the role of Physics in 'interdisciplinary areas related to Materials and Acoustics etc. 3) The learner will understand the scope of the subject in Industry & Research. 4) Experimental learning opportunities will faster creative thinking & a spirit of inquiry.

Course Outcomes B.Sc. Physics Semester IV	
At the end of the programme, the students will be able to:	
USPH401 Optics and Digital electronics	1) Understand the diffraction and polarization processes and applications of them in physical situations. 2) Understand the applications of interference in design and working of interferometers. 3) Understand the resolving power of different optical instruments. 4) Demonstrate quantitative problem solving skills in all the topics covered.
USPH402 Quantum Physics	1) Understand the postulates of quantum mechanics and to understand its importance in explaining significant phenomena in Physics. 2) Demonstrate quantitative problem solving skills in all the topics covered
USPH403 Applied Physics-II	1) Understand the concepts of Geophysics and Geology 2) Comprehend the basic concepts of Microprocessor 8085 3) Learn about Radio communication techniques 4) Demonstrate tentative problem solving skills in all above areas.

Course Outcomes B.Sc. Physics Semester V	
At the end of the programme, the students will be able to:	
USPH501 Mathematical Methods in Physics Thermal and Statistical Physics	Learning outcomes: From this course, the students are expected to learn some mathematical techniques required to understand the physical phenomena at the undergraduate level and get exposure to important ideas of statistical mechanics. The students are expected to be able to solve simple problems in probability, understand the concept of independent events and work with standard continuous distributions. The students will have idea of the functions of complex variables; solve nonhomogeneous differential equations and partial differential equations using simple methods. The units on statistical mechanics would introduce the students to the concept of microstates, Boltzmann distribution and statistical origins of entropy. It is also expected that the student will understand the difference between different statistics, classical as well as quantum.
USPH502 Solid State Physics	Learning Outcomes: On successful completion of this course students will be able to: 1. Understand the basics of crystallography, Electrical properties of metals, Band Theory of solids, demarcation among the types of materials, Semiconductor Physics and Superconductivity. 2. Understand the basic concepts of Fermi probability distribution function, Density of states, conduction in semiconductors and BCS theory of superconductivity. 3. Demonstrate quantitative problem solving skills in all the topics covered.
USPH503 Atomic and Molecular Physics	Learning Outcome: Upon successful completion of this course, the student will understand 1) the application of quantum mechanics in atomic physics

	2) the importance of electron spin, symmetric and antisymmetric wave functions and vector atom model 3) Effect of magnetic field on atoms and its application 4) Learn Molecular physics and its applications. 5) This course will be useful to get an insight into spectroscopy.
USPH504 Electrodynamics	Learning outcomes: On successful completion of this course students will be able to: 1) Understand the laws of electrodynamics and be able to perform calculations using them. 2) Understand Maxwell's electrodynamics and its relation to relativity 3) Understand how optical laws can be derived from electromagnetic principles. 4) Develop quantitative problem solving skills.
USPHP05 + USPHP06 Practical Course	1) Understanding relevant concepts. 2) Planning of the experiments 3) Layout and adjustments of the equipments 4) Recording of observations and plotting of graphs. 5) Calculation of results and estimation of possible errors in the observation of results.
USACCS501 Advanced Microprocessor, Microcontrollers & Python Programing	Expected learning outcomes 1) Develop a basic understanding of programming and the Python programming Language. 2) Students will use their problem solving abilities to implement programs in Python. 3) Familiarization about the basic constructs of programming such as data, operations, conditions, loops, functions etc. 4) Introduction to advanced topics in Python such as Exception Handling, Multithreaded programming, Graphical user interface & Database connectivity.

Course Outcomes B.Sc. Physics Semester VI	
At the end of the programme, the students will be able to:	
USPH601 Classical Mechanics	This course will introduce the students to different aspects of classical mechanics. They would understand the kinds of motions that can occur under a central potential and their applications to planetary orbits. The students should also appreciate the effect of moving coordinate system, rectilinear as well as rotating. The students are expected to learn the concepts needed for the important formalism of Lagrange's equations and derive the equations using D'Alembert's principle. They should also be able to solve simple examples using this formalism. The introduction to simple concepts from fluid mechanics and understanding of the dynamics of rigid bodies is also expected. Finally, they should appreciate the drastic effect of adding nonlinear corrections to usual problems of mechanics and nonlinear mechanics can help understand the irregularity we observe around us in nature.

USPH602 Electronics	1) Understand the basics of semiconductor devices and their applications. 2) Understand the basic concepts of operational amplifier: its prototype and applications as instrumentation amplifier, active filters, comparators and waveform generation. 3) Understand the basic concepts of timing pulse generation and regulated power supplies 4) Understand the basic electronic circuits for universal logic building blocks basic concepts of digital communication. 5) Develop quantitative problem solving skills in all the topics covered.
USPH603 Nuclear Physics	1) Upon successful completion of this course, the student will be able to understand the fundamental principles and concepts governing classical nuclear and particle physics and have a knowledge of their applications interactions of ionizing radiation with matter the key techniques for particle accelerators the physical processes involved in nuclear power generation. 2) Knowledge on elementary particles will help students to understand the fundamental constituents of matter and lay foundation for the understanding of unsolved questions about dark matter, antimatter and other research oriented topics.
USPH604 Special Theory of Relativity	1) Understand the significance of Michelson Morley experiment and failure of the existing theories to explain the null result 2) Understand the importance of postulates of special relativity, Lorentz transformation equations and how it changed the way we look at space and time, Absolutism and relativity, Common sense versus Einstein concept of Space and time. 3) Understand the transformation equations for: Space and time, velocity, frequency, mass, momentum, force, Energy, Charge and current density, electric and magnetic fields. 4) Solve problems based on length contraction, time dilation, velocity addition, Doppler effect, mass energy relation and resolve paradoxes in relativity like twin paradox etc.
USPHP07 + USPHP08 Practical Course	1) Understanding relevant concepts. 2) Planning of the experiments 3) Layout and adjustments of the equipments 4) Recording of observations and plotting of graphs. 5) Calculation of results and estimation of possible errors in the observation of results.
USACCS601 Microcontrollers & Python Programming (Version 3.x for Python)	Expected learning outcomes 1) Develop a basic understanding of programming and the Python programming Language. 2) Students will use their problem solving abilities to implement programs in Python. 3) Familiarization about the basic constructs of programming such as data, operations, conditions, loops, functions etc. 4) Introduction to advanced topics in Python such as Exception Handling, Multithreaded programming, Graphical user interface & Database connectivity.