

**KONGUNADU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)**

Re-accredited by NAAC with 'A+' Grade (4th Cycle)

College of Excellence (UGC)

Coimbatore – 641 029

DEPARTMENT OF PHYSICS (Aided)

COURSE OUTCOMES (CO)

B.Sc. PHYSICS

**For the students
admitted in the
Academic Year 2020-2021**

Sub Code: 20UPH101

Programme Code: 03	B.Sc. Physics			
Title of the Paper	Core Paper – 1: Properties of Matter and Sound			
Batch 2020-2021		Hours/Week 6	Total Hours 90	Credits 5

Course Objectives

To enable the learners to

1. Understand the basic concepts of gravitation.
2. Get exposure to the properties of liquids & solids.
3. Understand the properties of sound and applications.

Course Outcomes (CO)

K1 to K4	CO1	Understand the action of gravitational fields and potentials on different objects
	CO2	Gain knowledge on elastic behavior of beams, rods and wires through the bending and torsional behaviors of the objects
	CO3	Compare the properties of liquids by surface tension and viscosity experiments
	CO4	Production and application of ultrasonics and acoustics in different types of buildings.

Sub Code: 20UPH202

Programme Code: 03	B.Sc. Physics			
Title of the Paper	Core Paper – 2 : Heat and Thermodynamics			
Batch 2020-2021		Hours/Week 6	Total Hours 90	Credits 5

Course Objectives

To enable the learners to understand

1. Equation of states of a real gas, quantum theory of specific heat and basic theory of entropy.
2. Principle and different methods of production of low temperature and liquefaction of He.
3. Quantum theory of radiation and three types of thermodynamical statistics.

Course Outcomes (CO)

K1 to K4	CO1	Understand gas laws and its behavior. Understand the model system of an ideal gas and the principles of kinetic theory, Einstein's theory and Debye's theory.
	CO2	Gain knowledge on entropy of a system in reversible and irreversible process. Understand significance of thermodynamic properties and internal energy.
	CO3	Compare the various methods of production of low temperature and liquefaction of gases. Will understand radiative heat transfer and radiation laws.
	CO4	Analyze the concepts of microstate and macrostate of a model system. Understand the classical statistics and quantum mechanics.

ub Code: 20UPH2CL

Programme Code: 03		B.Sc. Physics		
Title of the Paper		Core Practical - I		
Batch 2020-2021	Semester I & II	Hours/Week 3	Total Hours 90	Credits 2

Course Objectives

To enable the learners to:

1. Understand the Physical Phenomena and fundamentals of general physics.
2. Perform experiments in the field of general physics and gaining understanding of the results.
3. Interpret the practical result to support the theory

Course Outcomes (CO)

K3,K4,K5	CO1	Provide hands on experiences in conducting scientific investigations and laboratory experiments.
	CO2	Develop the ability to analyse basic experiments and analyze the relationship between theory and experimental results. Take measurements to compare experimental results in the laboratory with the theoretical analysis.
	CO3	Will be familiar to conduct experimental investigations of simple mechanical, heat and optical physics.
	CO4	Practice record keeping of experimental work and data graphing

Sub Code: 20UPH303

Programme Code: 03		B.Sc. Physics		
Title of the Paper		Core Paper - 3: Mechanics		
Batch 2020-2021	Semester III	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

To enable the learners to

1. Understand the principles of rigid body dynamics
2. Understand the fundamental ideas of Projectile motions
3. Understand the statics, hydrostatics and hydrodynamics

Course Outcomes (CO)

K1 to K4	CO1	Rigid body dynamics will help the students to understand the behaviour of various bodies due to kinematic and dynamic forces acting on the body.
	CO2	The study of projectiles enables the students to apply the knowledge of mathematics, fundamental sciences to obtain solution of complex mechanical problems.
	CO3	Study of statics promotes analysis and interpretation of numerical problems.
	CO4	Students will gain knowledge on fundamental laws of floatation and hydrostatics.

Sub Code: 20UPH404

Programme Code: 03		B.Sc. Physics		
Title of the Paper		Core Paper 4 - Electricity and Magnetism		
Batch 2020-2021	Semester 4	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

To enable the learners to

1. Acquire basic knowledge of electrostatics and thermoelectricity
2. Study about magnetic properties of materials
3. Learn motion of charges and alternating current and its circuits

Course Outcomes (CO)

K1 to K5	CO1	Acquire knowledge about electrostatics
	CO2	Understand the magnetic properties of materials and magnetic effect of electric current
	CO3	Gain knowledge on thermo electricity
	CO4	Apply knowledge on fabrication of different types of capacitors, transformer, choke coil and thermoelectric power generators.
	CO5	Analyze the trouble shooting of ac circuits (LCR series and LCR parallel mode) and also analyze the thermoelectric diagrams

Sub Code: 20UPH4CM

Programme Code: 03		B.Sc. Physics		
Title of the Paper		Core Practical - II		
Batch 2020-2021	Semester III & IV	Hours/Week 3	Total Hours 90	Credits 2

Course Objectives

To enable the learners to:

1. Understand the Physical Phenomena and fundamentals of general physics.
2. Perform experiments in the field of general physics and gaining understanding of the results.
3. Interpret the practical result to support the theory

Course Outcomes (CO)

K3, K4, K5	CO1	Provide hands on experiences in conducting scientific investigations and laboratory experiments.
	CO2	Develop the ability to analyse basic experiments and analyze the relationship between theory and experimental results. Take measurements to compare experimental results in the laboratory with the theoretical analysis.
	CO3	Will be familiar to conduct experimental investigations of simple mechanical, heat and optical physics.
	CO4	Practice record keeping of experimental work and data graphing

Sub Code: 20UPH505

Programme code: 03		B.Sc. Physics		
Title of the Paper		Core Paper - 5 : Mathematical Physics		
Batch 2020-2021	Semester V	Hours/Week 4	Total Hours 60	Credits 4

Course Objectives

To enable the learners to

1. Know about applying Fourier series and vector analysis to physical problems
2. Know about differential operators in various coordinates systems
3. To apply Lagrangian formulation to physical bodies

Course Outcomes (CO)

K1 to K4	CO1	To understand physical examples of Fourier series
	CO2	To understand co-ordinates of operators in vectors
	CO3	To apply the vectors for physical examples
	CO4	To solve the problems in Classical Mechanics and Lagrange's Equations

Sub Code: 20UPH506

Programme code: 03		B.Sc. Physics		
Title of the Paper		Core Paper - 6: Optics		
Batch 2020-2021	Semester V	Hours/Week 4	Total Hours 60	Credits 4

Course Objectives

To enable the learners to

- i. Acquire knowledge in ray optics
- ii. Understand mechanism of energy transfer in the form of waves
- iii. Basic principles of optical instruments

Course Outcomes (CO)

K1 to K4	CO1	Learn to use geometric approximation, the ray equations, understand the aberrations with an emphasis on image forming systems and how they can be reduced
	CO2	To understand wave optics, interference, diffraction and polarization.
	CO3	Be acquainted with Fresnel and Fraunhofer diffraction.
	CO4	Be able to understand the principle, construction and working of optical instruments.

Sub Code: 20UPH507

Programme code: 03		B.Sc. Physics		
Title of the Paper		Core Paper - 7 Principles of Electronic Devices and Circuits		
Batch 2020-2021	Semester V	Hours/Week 4	Total Hours 60	Credits 4

Course Objectives

To enable the learners to

1. Understand the action of semiconductor devices and their applications.
2. Know the principle and working of oscillators.
3. Know the working of a FET, MOSFET and UJT

Course Outcomes (CO)

K1 to K4	CO1	Learn to use semiconductors and devices
	CO2	Be able to understand transistor biasing and stabilization
	CO3	Learned about the functioning of FET, MOSFET, UJT and SCR
	CO4	Have an understanding of the basic principles of Operational Amplifiers, Amplifiers and Oscillators

Sub Code: 20UPH508

Programme code: 03		B.Sc. Physics		
Title of the Paper		Core Paper – 8: Quantum Mechanics and Relativity		
Batch 2020-2021	Semester V	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

To enable the learners to

1. Know about DeBroglie concept and the uncertainty relation.
2. Know about the applications of Schrodinger's equation
3. Know about the postulates constancy of light as well as the mass-energy relationship

Course Outcomes (CO)

K1 to K4	CO1	Familiar with the main aspects of the historical development of Quantum Mechanics
	CO2	Discuss and interpret experimental results that reveal the wave properties of matter.
	CO3	Understand the basic principles in Quantum Mechanics such as the Schrodinger equation, the wave function, Uncertainty principle, elementary concepts in statistics such as expectation value.
	CO4	Understand the theory of relativity and to solve Schrodinger equation for simple systems in one to three dimensions

Sub Code: 20UPH609

Programme code: 03		B.Sc. Physics		
Title of the Paper		Core Paper - 9: Atomic and Solid State Physics		
Batch 2020-2021	Semester VI	Hours/Week 5	Total Hours 75	Credits 4

Course Objectives

To enable the learners to

1. Know about the X – rays, Photoelectric effect and their application
2. Know about different coupling schemes and the effect of magnetic and electric fields on the spectrum of an atom and molecule
3. Understand the different crystal structure and their bindings

Course Outcomes (CO)

K1 to K4	CO1	To get knowledge about atoms in materials.
	CO2	Understand the crystal structure.
	CO3	Gain the knowledge about the X-rays and its applications.
	CO4	Understand the concept of electron theory of solids and behavior of superconductors.

Sub Code: 20UPH610

Programme code: 03		B.Sc. Physics		
Title of the Paper		Core Paper - 10: Fundamentals of Digital Electronics		
Batch 2020-2021	Semester VI	Hours/Week 4	Total Hours 60	Credits 4

Course Objectives

To enable the learners to acquire knowledge about

1. Four different number systems & binary codes
2. Logic gates, Boolean algebra and Karnaugh map
3. Flip- flops, counters, arithmetic circuits, data processing circuits, shift registers, Semiconductor memories, D\A converters and A\D converters

Course Outcomes (CO)

K1 to K4	CO1	Have the knowledge about number systems, binary arithmetic operations and binary codes
	CO2	Have an understanding of logic gates, Demorgan's theorems and Karnaugh maps and simplification of Boolean expressions
	CO3	Have the ability to apply the knowledge of logic gates to design flip-flops, counters, shift registers, arithmetic and data processing circuits
	CO4	Be familiar to analyze the semiconductor memories and some of the A/D and D/A converters

Sub Code: 20UPH611

Programme code: 03		B.Sc. Physics		
Title of the Paper		Core Paper - 11: Nuclear Physics		
Batch 2020-2021	Semester VI	Hours/Week 5	Total Hours 75	Credits 5

Course Objectives

To enable the learner to know about

1. General properties of atomic nuclei, particle accelerators, Radioactivity,
2. Artificial transmutation of elements, nuclear transmutation,
3. Nuclear fission and fusion and Elementary particles.

Course Outcomes (CO)

K1 to K4	CO1	The learners will know about basic nuclear properties and particle accelerators.
	CO2	The learners will have knowledge about the differences between various decay modes and radioactive dating.
	CO3	The learners will have knowledge about basic concepts and relations to calculate Q – values for nuclear reactions, production of radioisotopes and their uses.
	CO4	The learners will know about the nuclear fission, fusion and detection of nuclear radiations.

Sub Code: 20UPH6CN

Programme code: 03		B.Sc. Physics		
Title of the Paper		Core Practical – III – General Experiments		
Batch 2020-2021	Semester V & VI	Hours/Week 3	Total Hours 90	Credits 2

Course Objectives

To enable the learners to:

1. Have a good foundation in the fundamentals and applications of general physics.
2. Acquire the skill of finding and developing practical scientific facts.
3. Employ the practical result to support the theory

Course Outcomes (CO)

K3,K4,K5	CO1	Develop the ability to analyse basic experiments. Work and coordinate effectively in a group to accomplish laboratory based tasks.
	CO2	Take measurements to compare experimental results in the laboratory with the theoretical analysis.
	CO3	Will be familiar to conduct experimental investigations of simple electric, magnetic and optical phenomena.
	CO4	Practice record keeping of experimental work and data graphing

Sub Code: 20UPH6CO

Programme code: 03		B.Sc. Physics		
Title of the Paper		Core Practical IV -Electronics		
Batch 2020-2021	Semester V & VI	Hours/Week 3	Total Hours 90	Credits 2

Course Objectives

To enable the learners to

1. To design and construct small electronic circuits
2. To develop experimental skills and understand relation between experimental data and theoretical analysis.
3. Have a good foundation in the fundamentals and applications of experimental physics

Course Outcomes (CO)

K3,K4,K5	CO1	Acquire a basic knowledge in solid state electronics.
	CO2	Develop the ability to analyse and design analog electronic circuits using discrete components.
	CO3	To acquire knowledge in basic electronics by constructing electronic circuits and devices.
	CO4	Take measurements to compare experimental results in the laboratory with the theoretical analysis

Sub Code: 20UPH6CP

Programme code: 03		B.Sc. Physics		
Title of the Paper		Core Practical - V : Digital Electronics &Microprocessor		
Batch 2020-2021	Semester V & VI	Hours/Week 2	Total Hours 60	Credits 2

Course objectives

To enable the learners to:

1. Have good foundations in the fundamentals of digital Electronics.
2. Acquire the skill of writing and executing assembly language programming using 8085 microprocessors
3. Employ the practical results for controlling mechanical and electrical and electronic devices.

Course Outcomes (CO)

K3,K4,K5	CO1	Develop the ability to construct basic logic gates and other digital electronics devices.
	CO2	Get familiarized for developing microprocessor based programming.
	CO3	Gain expertise and will be able to work in multi-disciplinary groups
	CO4	Coordinate effectively in a group to accomplish computer based tasks.

Programme Code: 03		B.Sc. Physics		
Title of the Paper		Major Elective Paper 1: Laser Physics and Fiber Optics		
Batch 2020-2021	Semester V / VI	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

To enable the learners to

1. Acquire basic knowledge about lasing action, types of lasers and the applications of lasers.
2. Understand about fabrication of optical fibers, fiber optic sensors and their applications in medical fields.
3. Understand about Fiber Communication

Course outcomes (CO)

K1 to K4	CO1	Will be able to understand the basic theory of laser action and apply them to classify and explain the fundamentals of laser.
	CO2	Will be able to explain the concept of Q-switching and illustrate the working of various advanced lasers available.
	CO3	Will be able to illustrate the application of lasers in various fields.
	CO4	Would have learnt the fabrication of different types of optical fibers, different types of loss, sensor types and applications of optical fibers.

Programme code: 03		B.Sc. Physics		
Title of the Paper		Major Elective Paper 2-Measurement and Instrumentation		
Batch 2020-2021	Semester V / VI	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

- i. To impart knowledge on various measurement parameters
- ii. To understand the working of electronic instruments
- iii. To impart knowledge on transducers

Course outcomes (CO)

K1 to K4	CO1	Able to identify the different type of measurement parameters
	CO2	Able to describe the working of analog instruments
	CO3	Able to design the circuits using Wattmeter
	CO4	Able to apply the knowledge of different electronic instruments using CRO and to demonstrate the types of transducers.

Programme code: 03		B.Sc. Physics		
Major Elective Paper 3 - Principles of Communication Systems				
Batch 2020-2021	Semester V / VI	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

To enable the learners

1. To understand the basics idea about Modulation, demodulation
2. To gain knowledge on transmission lines and antennas
3. To know about the functioning of Radio, cellular, fiber optic, television and satellite communications

Course Outcomes (CO)

K1 to K4	CO1	Get knowledge about wireless and fiber optic communication systems
	CO2	Understand the working principles of Radio, Cellular, Television and satellite communications
	CO3	Apply knowledge on manufacturing of Radio, TV and antennas
	CO4	Trouble shoot the different sections of a Radio, TV and transmission lines

Programme code: 03		B.Sc. Physics		
Major Elective Paper 4 - Renewable Energy Sources				
Batch 2020-2021	Semester V / VI	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

To enable the learner to

1. Know about the conventional energy sources and its impact on the environment.
2. Know about renewable energy sources, its availability, technology and advantages.

Course outcomes (CO)

K1 to K4	CO1	Will be able to understand the commercial energy sources, its availability, merits and demerits
	CO2	Study various renewable energy sources, its principle and applications
	CO3	Will be familiar with the various methods of production and storage of energy for nation development
	CO4	Develop the ability to analyze the effects of conventional energy sources in the environment and how to preserve the resources for future generation.

Programme code: 03		B.Sc. Physics		
Major Elective Paper 5 : Introduction to Biophysics				
Batch 2020-2021	Semester V / VI	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

To enable the learners

- 1.To understand the concept of physics principles and apply it to biological sciences
2. To know about audition of Human Ear and Physics of Vision
3. To know about Physics of Vision

Course Outcomes (CO)

K1 to K4	CO1	To enable the learners to apply key principles of Physics towards evaluating and analyzing the biological phenomenon.
	CO2	To enable the learners to explain the principles that governs biophysics.
	CO3	To enable the learners to apply their Physics knowledge to analyze biomechanics and biophysics concepts.
	CO4	To explain the techniques and underlying concept of Physics of audition and Physics of vision.

Programme code: 03		B.Sc. Physics		
Major Elective Paper 6 - Materials Science				
Batch 2020-2021	Semester V /VI	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

The aim of this course is to introduce the students to electron theory of solids and different types of materials based on their properties.

Course Outcomes (CO)

K1 to K4	CO1	List the basic concepts of conductors ,dielectric and Understand the basic laws of magnetism
	CO2	Provide the students with an idea of dielectric and magnetism which are essential tools in problem solving.
	CO3	Solve problems based on electron theory of solids and for different materials
	CO4	Find applications of the superconductors.

Sub Code: 20UPH4S2

Programme Code: 03		B.Sc. Physics		
Title of the Paper		Skill Based Subject- 2: Medical Instrumentation		
Batch 2020-2021	Semester IV	Hours/Week 2	Total Hours 30	Credits 3

Course Objectives

To enable the learners to

1. Understand about ECG, ERG etc
2. Understand the concepts of the pacemaker and the batteries used in it, kidney machine etc
3. Know the role of the LASER in the medical field
4. Know the determination of the frequency of interference

Course Outcomes (CO)

K1 to K4	CO1	Will get knowledge about the origin of biopotentials, electrical activity of excitable cells, action potentials, and membrane models.
	CO2	Will be able to understand the application of Laser and the origin of biopotentials: ECG, ERG, MEG, etc
	CO3	Will apply knowledge on measurement of blood flow and pressure.
	CO4	Will be able to analyze the Clinical laboratory systems, Bio control and Electrical safety

Sub Code: 20UPH6S3

Programme code: 03		B.Sc. Physics		
Title of the Paper		Skill Based Subject 3 - Introduction to Microprocessor		
Batch 2020-2021	Semester VI	Hours/Week 2	Total Hours 30	Credits 3

Course Objectives

To study about the

1. History, Origin and Development of Microprocessor
2. Architecture, instruction set and programming of 8085 microprocessors
3. Interfacing

Course Outcomes (CO)

K1 to K4	CO1	Able to know about introduction to microprocessor
	CO2	Able to understand architectural diagram
	CO3	acquire the knowledge about programming and interfacing
	CO4	Able to understand the concept of stack and subroutine in the programming

Sub Code: 20UPH5X1

Programme Code: 03		B.Sc. Physics		
Title of the Paper		EDC - Physics in Everyday life		
Batch 2020-2021	Semester V	Hours/Week 2	Total Hours 30	Credits 3

1. Know about the principles advancements and applications of physics in various fields.
2. Know about of physics principles involved in the operation of common household appliances

Course outcomes (CO)

K1 to K4	CO1	Will be able to understand various theories for origin of universe and study about planets.
	CO2	Study physics in Human anatomy.
	CO3	Will be familiar with the various physics principles behind the sports.
	CO4	Develop the ability to analyze the effects of physics in technology.

Sub Code: 20UPH63A1

ALLIED PHYSICS PAPER FOR B.Sc. MATHEMATICS / CHEMISTRY

Programme code: 03		For B.Sc. Mathematics and B.Sc. Chemistry		
Title of the Paper		Allied Subject I -Physics-I (MECHANICS, HEAT, SOUND, MAGNETISM AND ELECTRICITY)		
Batch 2020-2021	Semester III	Hours/Week 4	Total Hours 60	Credits 4

Course Objectives

To enable the learners to

1. To know about mechanics, properties of matter and sound
2. To understand thermal physics
3. To know about the light, electricity and electromagnetism

Course Outcomes (CO)

K1 to K4	CO1	Able to know about simple harmonic motion and projectile motion
	CO2	To understand about elasticity and propagation of sound waves
	CO3	To know about specific heat of solids and liquids
	CO4	To acquire the knowledge of Interference, Diffraction, current electricity and Electromagnetism.

Sub Code: 20UPH4A2

ALLIED PHYSICS PAPER FOR B.Sc. MATHEMATICS / CHEMISTRY

Programme code: 03		For B.Sc. Mathematics and B.Sc. Chemistry		
Title of the Paper		Allied Subject II -Physics–II (MODERN PHYSICS, ELECTRONICS AND DIGITAL ELECTRONICS)		
Batch 2020-2021	Semester IV	Hours/Week 4	Total Hours 60	Credits 4

Course Objectives

To enable the learners

1. To know about quantum Physics, nuclear & atomic Physics,
2. To understand the concept of relativity
3. To know the basics of electronics and communication Physics

Course Outcomes (CO)

K1 to K4	CO1	Will understand the central concepts and principles in quantum physics. At the end of the module, students will be able to describe the properties and structure of stable nuclei.
	CO2	Able to understand the theory of atomic structure, importance of periodic table and familiar with the fundamentals principles of the general theory of relativity and inertial frames.
	CO3	Will understand the principles and design considerations of various LASERs , modes of their operation and areas of their applications
	CO4	Acquire a basic knowledge in solid state electronics including diodes, FET, UJT. Will understand number system, amplification circuits and communication physics.

Sub Code: 20UPH4AL

ALLIED PHYSICS PRACTICALS FOR B.Sc. MATHEMATICS / CHEMISTRY

Programme code: 03		For B.Sc. Mathematics and B.Sc. Chemistry		
Title of the Paper		Allied Physics Practical		
Batch 2020-2021	Semester III& IV	Hours/Week 3	Total Hours 90	Credits 2

Course Objectives

To enable the learners to:

1. Understand the Physical Phenomena and fundamentals of general physics.
2. Perform experiments in the field of general physics and gaining physical understanding of the results.
3. Interpret the practical result to support the theory

Course Outcomes (CO)

K3,K4,K5	CO1	Provide hands on experiences in conducting scientific investigations and laboratory experiments.
	CO2	Develop the ability to analyse basic experiments and analyze the relationship between theory and experimental results. Take measurements to compare experimental results in the laboratory with the theoretical analysis.
	CO3	Will be familiar to conduct experimental investigations of simple mechanical, heat and optical physics.
	CO4	Practice record keeping of experimental work and data graphing