

# **S.T. Hindu College, Nagercoil**

(Affiliated to Manonmaniam Sundaranar University)



## Vision and Mission

### **Vision**

“Material, Moral and Cultural Advancement”.

### **Mission**

- To strive continuously for excellent educational service to the nation.
- To serve as a valuable resources for society and community
- To increase the human values and sustain the heritage of the country
- To stimulate the academic environment for the promotion of quality of teaching-learning and research

Programme	Courses	Programme Outcomes
Bachelor of Science (B.Sc)	Mathematics Physics Chemistry Botany Zoology Computer Science	Students taking admission to this program of B.Sc. are expected to get equipped with following outcomes: a. Understand the basic scientific principles and methods. b. Instilling scientific thinking and awareness among the student. c. Ability to communicate with others effectively d. Develop decision making and problem solving skills e. Think innovatively and come out with novel ideas for the betterment of the society.
Bachelor of Arts (B.A)	Tamil English History Economics Sociology	Student seeking admission for B.A. programme are expected to imbue with following quality a. Realization of human values and ethics. b. Develop effective communication c. Involve in social service and work for the upliftment of the society d. Become responsible and dutiful citizen. d. Emotionally stable and develop positive attitude.
Bachelor of Commerce (B.Com)		Students who have taken admission to this program of B. Com are expected to concentrate upon the following outcomes. a. Commercial sense. b. Develop managerial skills. c. Entrepreneurial skill. d. Human Resources Management. e. Gain knowledge and application of accountancy, business law, economic principles, and taxation to complex commercial problems can be achieved

## **Department of Physics**

The department was started with B.Sc. degree course in Physics in 1972. The department was upgraded as a PG Department in 1983 and M.Phil. course was started in 1987. The department was recognized as a research centre in 2004. The Department of Physics now offers UG, PG courses and Ph.D research program. The Department of Physics of the college is a pioneer in many respects – the first affiliated college in the M.S. University area to start research in Physics. Around 50 staff members of various colleges and scholars are doing research under our department in various fields. The thrust areas of research include Crystal Growth and Nano Technology, Molecular Spectroscopy, Atmospheric and Environment Science.

### **B. Sc Physics**

#### **Programme Specific Outcomes**

On completion of B.Sc., Physics Programme, the students will be able to

- learn the basic concepts and principles of Physical sciences
- demonstrate a scientific knowledge of the core physics principles in Mechanics, Electromagnetism, Modern Physics, and Optics
- understand various concepts and apply it to solve problems in Physics
- build the ability to work in a group to solve Physics related problems
- demonstrate a purposeful knowledge of scientific literature and ethical issues related to physics.

Title of Subject/Course	Course Outcome
<p><b>Properties of Matter and Sound</b></p> <p><b>Objective:</b> To understand the basic concepts of elasticity and sound</p>	<ul style="list-style-type: none"> <li>➤ Able to understand the basics of elasticity and its importance in beams, girders, concepts of viscosity and surface tension and the various methods to determine the parameters experimentally.</li> <li>➤ Can demonstrate Free, damped and forced vibration and applications of sound.</li> </ul>
<p><b>Mechanics and Relativity</b></p> <p><b>Objective:</b> To understand the basic laws of mechanics and study the concepts of Relativity</p>	<ul style="list-style-type: none"> <li>➤ To be able to analyse and explain vector nature of force, acceleration, momentum, torque and able to apply Newton's laws to physical problems.</li> <li>➤ Can relate with motions with very high velocities comparable to the speed of light.</li> </ul>
<p><b>Optics</b></p> <p><b>Objective:</b> To understand the properties of light and study geometrical optics</p>	<ul style="list-style-type: none"> <li>➤ Able to explain the concepts of Dispersion of Light, interference, diffraction and polarization of light waves and their applications.</li> <li>➤ Acquire basic knowledge of the principles which govern optics is essential for any science graduate.</li> <li>.</li> </ul>
<p><b>Thermal and Statistical Physics</b></p> <p><b>Objective:</b> To know the relationships between heat, entropy and laws of thermodynamics</p>	<ul style="list-style-type: none"> <li>➤ Get clear understanding on heat, temperature, work, energy and entropy</li> <li>➤ Able to differentiate macroscopic thermodynamics to microscopic view through ideal gas, kinetic theory and natural extension to statistical thermodynamics.</li> </ul>
<p><b>Electricity &amp; Electromagnetism</b></p> <p><b>Objective:</b> To understand the fundamentals of Electricity and Electromagnetism</p>	<ul style="list-style-type: none"> <li>➤ Able to apply Gauss theorem and also understand principle and types of capacitors.</li> <li>➤ Capable of understanding the principle of Magnetostatics, magnetic effects of electric current and their applications.</li> <li>➤ To understand the principle of electromagnetic induction and AC circuits.</li> </ul>
<p><b>Basic Electronics</b></p> <p><b>Objective:</b> To study the characteristics of diodes, transistors and design of electronic circuits.</p>	<ul style="list-style-type: none"> <li>➤ Know the basic concepts of physics of semiconductors and basic principles of biasing and transistor amplifiers</li> <li>➤ It will enable the student to design simple electronic circuits</li> </ul>

<p><b>Digital Electronics</b>  <b>Objective:</b>  <b>To understand sequential and combinational digital circuits and their applications</b></p>	<ul style="list-style-type: none"> <li>➤ <b>Able to demonstrate various numbers systems</b></li> <li>➤ <b>Can Apply the knowledge in some simple combinational digital circuits</b></li> <li>➤ <b>To know about the principle and various types of registers and counters</b></li> </ul>
<p><b>Atomic Physics</b>  <b>Objective:</b>  <b>To study various atom models and acquire knowledge about atomic dimensions and effects.</b></p>	<ul style="list-style-type: none"> <li>➤ <b>Able to understand clearly about the atom model</b></li> <li>➤ <b>Know about the internal structure of the atom and the electronic configuration</b></li> <li>➤ <b>Acquire detailed knowledge about the photoelectric effect and X-rays.</b></li> </ul>
<p><b>Solid State Physics</b>  <b>Objective:</b>  <b>To study and classify crystal systems and study magnetism and bonding in solids</b></p>	<ul style="list-style-type: none"> <li>➤ <b>Able to demonstrate and understand solids and their properties.</b></li> <li>➤ <b>Can differentiate crystal systems</b></li> </ul>
<p><b>Nuclear Physics</b>  <b>Objective:</b>  <b>To study the characteristics of nucleus and elementary particles.</b></p>	<ul style="list-style-type: none"> <li>➤ <b>Able to know about radio activity, which has got industrial, medical, research application etc.</b></li> <li>➤ <b>This paper gives ideas about Elementary particles, which is the basis of High Energy Particle Physics.</b></li> </ul>

## **M.Sc. Physics**

### **Programme Specific Outcomes**

On completion of M.Sc., Physics Programme, the students will be able to

- Gain in-depth view of the fundamental theories which govern various aspects in Physics

- Acquire knowledge and gain confidence to communicate clearly the idea of subject topics
- Develop the ability to face and interact with diverse groups
- Apply ICT in physics concepts and arrive at solutions

Title of Subject/Course	Course Outcome
<p><b>Classical Mechanics</b></p> <p><b>Objective:</b> ➤ To study phase space, Lagrangian and Hamiltonian equations and to develop familiarity with the physical concepts and facility through methods of classical mechanics.</p>	<ul style="list-style-type: none"> <li>➤ Able to demonstrate concept and understanding of the following fundamental topics:               <ul style="list-style-type: none"> <li>• the dynamics of system of particles,</li> <li>• motion of rigid body,</li> <li>• Lagrangian and Hamiltonian formulation of mechanics</li> </ul> </li> <li>➤ Can derive the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulation of classical mechanics.</li> </ul>
<p><b>Mathematical Physics – I</b></p> <p><b>Objective:</b> To understand basic methods of solving problems in matrices, vectors and apply the concepts to physics</p>	<ul style="list-style-type: none"> <li>➤ Acquire basic techniques of mathematical Physics and able to solve physical problems.</li> <li>➤ Identify various types of matrices and explain how one type of matrix differs from another.</li> <li>➤ Develop expertise in vector differential calculus operators in order to learn Electro Magnetic Theory those are required in Physics.</li> </ul>
<p><b>Quantum Mechanics – I</b></p> <p><b>Objective:</b> To study wave equation and its applications to many systems</p>	<ul style="list-style-type: none"> <li>➤ Able to understand and explain the differences between classical and quantum mechanics</li> <li>➤ Procure the idea of wavefunction</li> <li>➤ understand the uncertainty relations</li> <li>➤ Able to solve Schrodinger equation for four simple problems.</li> </ul>

<p><b>Numerical Methods</b></p> <p>To derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation,</p>	<ul style="list-style-type: none"> <li>➤ Able to demonstrate the understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.</li> <li>➤ Apply numerical methods to obtain approximate solutions to mathematical problems.</li> </ul>
<p><b>Mathematical Physics – II</b></p> <p>To solve problems using complex analysis and group theory</p>	<ul style="list-style-type: none"> <li>➤ Understand the basic concepts of group theory</li> <li>➤ Solve partial differential equations with appropriate initial or boundary conditions with Green function techniques</li> <li>➤ Can use complex analysis in solving physical problems.</li> </ul>
<p><b>Quantum Mechanics – II</b></p> <p>To study the effects of perturbation to quantum mechanical systems</p>	<ul style="list-style-type: none"> <li>➤ Able to understand time dependent perturbation theory in quantum mechanics.</li> <li>➤ Able to apply perturbation theory to describe scattering</li> <li>➤ Understand the operator formulation of quantum mechanics.</li> </ul>
<p><b>Electromagnetic Theory</b></p> <p>To study the concepts of EMT and explore the field of dynamics</p>	<ul style="list-style-type: none"> <li>➤ To make the student understand the principles of electrostatics and magneto statics.</li> <li>➤ Knowledge of, physical interpretation, and ability to apply Maxwell's equations to determine field waves, potential waves, energy and charge conservation conditions</li> </ul>
<p><b>Microprocessors and Microcontrollers</b></p> <p>To develop an in-depth understanding of the architecture and working of microprocessors and micro controllers</p>	<ul style="list-style-type: none"> <li>➤ To study the Architecture of 8085 and 8086 microprocessors.</li> <li>➤ To learn the design aspects of I/O and Memory Interfacing circuits.</li> <li>➤ To study about communication and bus</li> </ul>
<p><b>Nuclear and Particle Physics</b></p> <p>To understand the theories of nuclear models and particle physics</p>	<ul style="list-style-type: none"> <li>➤ Able to know about the theories and models of nucleus.</li> <li>➤ To understand the concept of elementary particles</li> <li>➤ Understanding of various particle interactions and their interrelation</li> </ul>
<p><b>Spectroscopy</b></p> <p>To study different spectroscopic techniques and their instrumentation</p>	<p>Identify the basic components of spectroscopic instrumentation.</p> <p>Demonstrate a working knowledge of mass spectroscopy (MS), Ultraviolet Visible (UV-Vis) spectroscopy, Infrared (IR)</p>

## B.Sc (Zoology)

### Programme Specific Outcomes

At the end of the course the students will be able to

- Comprehend and appreciate the huge diversity of life animal forms existing on the earth ranging from the simplest to the largest aquatic or land vertebrates
- acquire knowledge on the diversity of animals in relation to their Phyla and its Classification
- learn the basics of systematics and understand hierarchy of different categories.
- identify the environmental issues recognize the relationship between animals and their physiological functions

Title of Subject/Course	Course Outcome
<b>INVERTEBRATA</b>  Objective: To outline the basic classification and body organization of selected invertebrates	<ul style="list-style-type: none"><li>➤ Able to reveal the importance of taxonomy,</li><li>➤ Understand phylogenetic relationships between the phyla covered</li><li>➤ know the methods of nomenclature, to realize the differences between Protozoa and Metazoa</li><li>➤ Can explain the structure, functional organization, adaptations and the economic importance of lower and higher Invertebrates.</li></ul>
<b>CHORDATA</b> Objective: To understand the concepts of biodiversity and classes under Chordates	<ul style="list-style-type: none"><li>➤ Able to demonstrate the intermediary position of Prochordates between invertebrates and vertebrates.</li><li>➤ Understand the knowledge of habits and habitats of vertebrates</li></ul>
<b>Developmental Zoology</b> Objective: To Know the cellular changes and developmental process of animals.	<ul style="list-style-type: none"><li>➤ understand the sequential changes from cellular grade of organization to organ grade of organization in the development of multicellular organisms.</li><li>➤ Able to explain developmental processes of animals</li></ul>

<p><b>ECOLOGY &amp; TOXICOLOGY</b></p> <p><b>Objective:</b> To study various types of eco systems and environmental factors and their interactions.</p>	<ul style="list-style-type: none"> <li>➤ Able to understand the interaction and interdependence among environmental factors and living organisms</li> <li>➤ Able of demonstrating different types of eco systems</li> </ul>
<p><b>CELL AND MOLECULAR BIOLOGY</b></p> <p><b>Objective:</b> To study the structural and functional aspects of cell organelles as well as mechanism of gene regulation and expression.</p>	<ul style="list-style-type: none"> <li>➤ Able to understand the ultrastructure and functions of various cell organelles.</li> <li>➤ Able to inculcate the techniques of cell and molecular biology.</li> </ul>
<p><b>GENETICS</b></p> <p><b>Objective:</b> To introduce and familiarize the basic aspects of genetics and study the role of chromosomes in determining characters</p>	<ul style="list-style-type: none"> <li>➤ Understand the inheritance of parental characters and hereditary diseases</li> <li>➤ Gain knowledge of Mendelian traits of human traits</li> </ul>
<p><b>ANIMAL PHYSIOLOGY</b></p> <p>To understand the various physiological systems, their interactions and various organs of animals.</p>	<ul style="list-style-type: none"> <li>➤ Students can demonstrate about various physiological systems</li> <li>➤ Able to understand various organs and organ system of animals.</li> </ul>
<p><b>ANIMAL BIOTECHNOLOGY</b></p>	<ul style="list-style-type: none"> <li>➤ Can understand the concepts of isolation, cloning and insertion of various genes into some prokaryotes</li> <li>➤ Describe the utilization of biotechnology in various biological fields</li> </ul>
<p><b>EVOLUTION</b></p> <p><b>Objective:</b> To study the different theories related to origin of life.</p>	<ul style="list-style-type: none"> <li>➤ Able to know how the life originated in our planet and related theories</li> <li>➤ Can understand relationships between abiotic and biotic factors</li> <li>➤ know the information about the natural selection and behavior</li> </ul>

<p><b>IMMUNOLOGY AND MICROBIOLOGY</b>  <b>Objective:</b>  <b>To understand immune system and their mechanisms in body and study the control measures of microorganism.</b></p>	<ul style="list-style-type: none"> <li>➤ <b>Understand the immune system and their role of our body.</b></li> <li>➤ <b>Able to know life cycle of microbes and their control measures.</b></li> </ul>
<p><b>BIO STATISTICS</b>  <b>Objective:</b>  <b>To understand the basic biostatistical methods and use of computer application to solve the common and scientific problems in science.</b></p>	<ul style="list-style-type: none"> <li>➤ <b>Able to reveal descriptive and non-descriptive methods of mathematics and their application in biology incorporating computer systems</b></li> <li>➤ <b>understand the mathematical principles of biological systems</b></li> </ul>

## B.Sc (Botany)

### Programme Specific Outcomes

At the end of the course the students will be able to

- Reveal holistic information on the various aspects of Plant Science
- Develop the aptitude to communicate commendably and articulately the notions relating the Botanical world.
- Apply the knowledge that he has learnt in the classes to solve the problems using critical thinking and analytical reasoning
- Improve their skills to apply scientific reasoning and phenomenon pertaining to plant sciences.

Title of Subject/Course	Course Outcome
Plant Anatomy and Micro technique	<ul style="list-style-type: none"><li>➤ To gain information of plant cells, tissues and their functions.</li><li>➤ To pinpoint and compare structural differences among different taxa of vascular plants.</li></ul>
Algae and Bryophytes	<ul style="list-style-type: none"><li>➤ Understand the diversity among Algae</li><li>➤ Understand the morphological diversity of Bryophytes.</li></ul>
Environmental Studies	<ul style="list-style-type: none"><li>➤ List down the ecosystem types and review its functions</li><li>➤ Assess the significance of natural resources</li></ul>
Pteridophytes, Gymnosperms	<ul style="list-style-type: none"><li>➤ Understand the evolutionary trends in plants</li><li>➤ Identify the anatomical modification in lower groups of plants.</li></ul>

<b>Organic Farming</b>	<ul style="list-style-type: none"> <li>➤ Illustrate the soil profile and relate the importance of organic farming.</li> <li>➤ Know about various fertilizers.</li> </ul>
<b>Mushroom Cultivation</b>	<ul style="list-style-type: none"> <li>➤ Gain basic knowledge about nutritional value, cultivation unit and storage methods of mushrooms</li> <li>➤ Understand the economic importance</li> </ul>
<b>Angiosperms</b>	<ul style="list-style-type: none"> <li>➤ Understand the morphological characters thereby identifying and solving the phylogeny of plants</li> <li>➤ Inspect the unique features of monocotyledons</li> <li>➤ .Ascribe names to unknown plants using numerical taxonomy</li> </ul>
<b>Bio Chemistry and Bio informatics</b>	<ul style="list-style-type: none"> <li>➤ Understand the importance of carbohydrate metabolism</li> <li>➤ Gain knowledge about lipids in living systems</li> </ul>
<b>Fungi Plant Pathology and Lichenology</b>	<ul style="list-style-type: none"> <li>➤ To understand the diversity of Lichen and fungi</li> <li>➤ Know about various plant diseases and their control measures</li> </ul>
<b>Cell Biology</b>	<ul style="list-style-type: none"> <li>➤ To explain the structure of Cell components and their functions.</li> <li>➤ To describe cell division in plants.</li> </ul>
<b>Microbiology</b>	<ul style="list-style-type: none"> <li>➤ understand the principles and applications of microscopy and methods of staining</li> <li>➤ know the classification of microorganisms, merits and demerits of microorganisms.</li> </ul>

<b>Plant Physiology</b>	<ul style="list-style-type: none"> <li>➤ Students will be able to comprehend the elementary ideologies related to the various physiological functions in plant life</li> </ul>
<b>Genetics</b>	<ul style="list-style-type: none"> <li>➤ Understand the ultrastructure and arrangement of chromatin and idea of cell partition.</li> <li>➤ Appreciate the notion of evolution as the basis of biodiversity</li> </ul>

## **M.SC Botany**

### **Programme Specific Outcomes**

- Understanding the classification of plants from cryptogams to Spermatophyte thereby Identifying the flora in field.
- To study plant pathology and apply the concepts to improve agriculture.
- Apply paleobotany for tracing the evolution of various plants.
- To understand the function of cell membranes, cell communications, genetics, anatomy, taxonomy, ecology and Physiology.
- To develop the knowledge of Genetic conditions responsible for stress tolerance of plants.

<b>Algology and Bryology</b>	<ul style="list-style-type: none"> <li>➤ Understand the diversity among Algae</li> <li>➤ Understand the morphological diversity of Bryophytes</li> </ul>
<b>Microbiology and Immunology</b>	<ul style="list-style-type: none"> <li>➤ Provide information on world of microbes and their role in environmental segments</li> <li>➤ To learn the microbial technology in human welfare</li> <li>➤ Provide basic ideas and awareness about immunology and health</li> </ul>
<b>Pteridophytes, Gymnosperms and Paleobotany</b>	<ul style="list-style-type: none"> <li>➤ Understand the evolutionary trends in higher and lower plants</li> <li>➤ Knowledge on cryptogams and phanerogams and their structural organization and reproduction</li> <li>➤ Make awareness of the preserved fossils of plant life of geological past</li> </ul>
<b>Fungi, Lichens and Plant Pathology</b>	<ul style="list-style-type: none"> <li>➤ To understand the diversity of Fungi and their economic importance</li> <li>➤ Lichens and their role in environmental aspects</li> <li>➤ To learn pathological concepts and gain knowledge to cure and protect plants</li> </ul>
<b>Taxonomy of Angiosperms</b>	<ul style="list-style-type: none"> <li>➤ Understand the morphological characters thereby identifying and solving the phylogeny of plants</li> <li>➤ Learn to easily identify common and economically important plants</li> <li>➤ Acquire the ideas about conservation of medical and economically important plants</li> </ul>
<b>BioChemistry, Biophysics and Research Methodology</b>	<ul style="list-style-type: none"> <li>➤ Gain knowledge about plant molecules and different metabolic pathways occurring in a cell</li> <li>➤ Provide advanced integral knowledge to understand the topics of biochemistry and biophysics</li> <li>➤ Acquire of analytical and presentation skills of current topics in biochemistry</li> </ul>

	<ul style="list-style-type: none"> <li>➤ To learn the analytical and statistical skills in research</li> </ul>
<b>Plant Physiology</b>	<ul style="list-style-type: none"> <li>➤ Gain knowledge in functioning of cells</li> <li>➤ Acquire knowledge in stress factors and their role in physiological processes</li> <li>➤ Acquire knowledge in the impact of environmental factors on plant physiology</li> </ul>
<b>Environmental Biology</b>	<ul style="list-style-type: none"> <li>➤ Learn the concept of environment and different types of ecosystem</li> <li>➤ Understand the role of man in environmental conservation, protection and maintenance</li> <li>➤ To understand the importance of biodiversity conservation and participation in conservation activities</li> </ul>
<b>Applied Biotechnology</b>	<ul style="list-style-type: none"> <li>➤ Gain knowledge in tissue culture and micropropagation in crop improvement program</li> <li>➤ To understand the impact of transgenic plants</li> <li>➤ Acquire knowledge in biomedical measures pollution control and biofuel production</li> </ul>
<b>Anatomy and Embryology of Angiosperms</b>	<ul style="list-style-type: none"> <li>➤ To gain knowledge about the anatomical structures of angiosperms</li> <li>➤ Learn the concepts of reproductive structure and pattern</li> </ul>
<b>Genetics and Molecular Biology</b>	<ul style="list-style-type: none"> <li>➤ Understand the ultrastructure of genes and their role in plant sciences</li> <li>➤ Molecular sequences and arrangements of amino acids in gene</li> <li>➤ Phylogeny and level of inheritance in characters determination</li> </ul>