



**ST. THOMAS COLLEGE (AUTONOMOUS)**  
THRISSUR, KERALA - 680 001

College with Potential for Excellence  
NIRF INDIA Ranking 2021 : 64<sup>th</sup>

[www.stthomas.ac.in](http://www.stthomas.ac.in)

**PROGRAMME OUTCOMES**  
**PROGRAMME SPECIFIC OUTCOMES**  
**COURSE OUTCOMES**

**B.Sc Physics**

## OUTCOMES:

At the end of Under Graduate Program at St. Thomas College (Autonomous), a student will have obtained:

PO1	Critical Thinking: Ability to take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives
PO2	Effective Communication: Ability to speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology
PO3	Effective Citizenship: Ability to demonstrate empathetic social concern and equity-centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering
PO4	Environment and Sustainability: Ability to understand the issues of environmental contexts and sustainable development
PO5	Ethical Living: Ability to recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them
PO6	Social Interaction: Ability to elicit views of others, mediate disagreements and help reach conclusions in group settings
PO7	Problem Solving and Analytical Skills: Ability to think rationally, analyze situations and solve problems adequately

## Program Specific Outcomes:

At the end of B.Sc Physics at St. Thomas College (Autonomous), Thrissur, a student will have developed:

PSO1	Understand the basic concepts of methodology of science and the fundamentals of mechanics, properties of matter and electrodynamics
PSO2	Understand the theoretical basis of quantum mechanics, relativistic physics, nuclear physics, optics, spectroscopy, solid state physics, astrophysics, statistical physics, photonics and thermodynamics
PSO3	Understand and apply the concepts of electronics in the designing of different analog and digital circuits.
PSO4	Understand the basics of computer programming and numerical analysis
PSO5	Apply and verify theoretical concepts through laboratory experiments

## Course Outcomes:

### **B.Sc. Physics**

#### **PHY1B01: METHODOLOGY OF SCIENCE AND BASIC MECHANICS**

At the end of this course, a student will have developed ability to:

CO1	Understand the features, methods and limitations of science
CO2	Understand and apply the basic concepts of Newtonian Mechanics to physical systems
CO3	Understand and apply the basic idea of work-energy theorem to physical systems
CO4	Understand and apply the rotational dynamics of rigid bodies
CO5	Understand the basic ideas of elasticity

## **B.Sc. Physics**

### **PHY2B02: MECHANICS**

At the end of this course, a student will have developed ability to:

CO1	Understand the features of non-inertial systems and fictitious forces
CO2	Understand and analyze the features of central forces with respect to planetary Motion
CO3	Understand the basics ideas of harmonic Oscillations
CO4	Understand and analyze the basics concepts of wave motion

## B.Sc. Physics

### PHY2B02: MECHANICS

At the end of this course, a student will have developed ability to:

CO1	Understand and apply the fundamentals of vector calculus
CO2	Understand and analyze the electrostatic properties of physical systems
CO3	Understand the mechanism of electric field in matter
CO4	Understand and analyze the magnetic properties of physical systems
CO5	Understand the mechanism of magnetic field in matter.

## **B.Sc. Physics**

### **PHY4B04: ELECTRODYNAMICS II**

At the end of this course, a student will have developed ability to:

CO1	Understand the basic concepts of Electrodynamics
CO2	Understand and analyze the properties of electromagnetic waves
CO3	Understand the behavior of transient Currents
CO4	Understand the basic aspects of ac circuits
CO5	Understand and apply electrical network Theorems

## **B.Sc. Physics**

### **PHY5B06: COMPUTATIONAL PHYSICS**

At the end of this course, a student will have developed ability to:

CO1	Understand the basics of computer, Python coding and debugging of programs to solve a variety of problems
CO2	Understand the applications of Python Modules
CO3	Understand the basic techniques of numerical analysis
CO4	Understand and apply computational techniques to physical problems



## **B.Sc. Physics**

### **PHY5B07: QUANTUM MECHANICS**

At the end of this course, a student will have developed ability to:

CO1	Understand the particle properties of electromagnetic radiation
CO2	Describe Rutherford – Bohr model of the Atom
CO3	Understand the wavelike properties of Particles
CO4	Understand and apply the Schrödinger equation to simple physical systems
CO5	Apply the principles of wave mechanics to the Hydrogen atom

## B.Sc. Physics

### PH5B08: OPTICS

At the end of this course, a student will have developed ability to:

CO1	Understand the fundamentals of Fermat's principles and geometrical optics
CO2	Understand and apply the basic ideas of interference of light
CO3	Understand and apply the basic ideas of diffraction of light
CO4	Understand the basics ideas of polarization of light
CO5	Describe the basic principles of holography and fibre optics

## **B.Sc. Physics**

### **PHY5B09: ELECTRONICS (ANALOG & DIGITAL)**

At the end of this course, a student will have developed ability to:

CO1	Understand the basic principles of photodiodes, pn junction solar cells, rectifiers and dc power supplies
CO2	Understand the principles of transistor
CO3	Understand the working and designing of transistor amplifiers and oscillators
CO4	Understand the basic operation of Op – Amp and its various applications
CO5	Understand the basics of digital electronics and Computer Organization

## **B.Sc. Physics**

### **PHY6B10: THERMODYNAMICS**

At the end of this course, a student will have developed ability to:

CO1	Understand the zero and first laws of Thermodynamics
CO2	Understand the thermodynamics description of the ideal gas
CO3	Understand the second law of thermodynamics and its applications
CO4	Understand the basic ideas of entropy
CO5	Understand the concepts of thermodynamic potentials and phase Transitions

## **B.Sc. Physics**

### **PHY6B11: STATISTICAL PHYSICS, SOLID STATE PHYSICS, SPECTROSCOPY & PHOTONICS**

At the end of this course, a student will have developed ability to:

CO1	Understand the basic principles of statistical physics and its applications
CO2	Understand the basic aspects of crystallography in solid state physics
CO3	Understand the basic elements of Spectroscopy
CO4	Understand the basics ideas of microwave and infra red spectroscopy
CO5	Understand the fundamental ideas of Photonics

## B.Sc. Physics

### PHY6B12: NUCLEAR PHYSICS AND PARTICLE PHYSICS

At the end of this course, a student will have developed ability to:

CO1	Understand the basic aspects of nuclear structure and fundamentals of radioactivity
CO2	Describe the different types of nuclear reactions and their applications
CO3	Understand the principle and working of particle detectors
CO4	Describe the principle and working of particle accelerators
CO5	Understand the basic principles of elementary particle physics

## **B.Sc. Physics**

### **PHY6B13: RELATIVISTIC MECHANICS AND ASTROPHYSICS**

At the end of this course, a student will have developed ability to:

CO1	Understand the fundamental ideas of special relativity
CO2	Understand the basic concepts of general relativity and cosmology
CO3	Understand the basic techniques used in astronomy and concepts of interstellar medium
CO4	Describe the evolution and death of stars
CO5	Describe the structure and classification of galaxies

## **B.Sc. Physics**

### **PHY6B14 (EL1): BIOMEDICAL PHYSICS**

At the end of this course, a student will have developed ability to:

CO1	Understand the basic principles of Biophysics
CO2	Understand the fundamentals of medical Instrumentation
CO3	Understand the principles of ultrasound and x-ray imaging
CO4	Understand the basic principles of NMR
CO5	Describe the applications of lasers in Medicine



## **B.Sc. Physics**

### **PHY6B14 (EL2): NANOSCIENCE AND TECHNOLOGY**

At the end of this course, a student will have developed ability to:

CO1	Understand the elementary concepts of Nanoscience
CO2	Understand the electrical transport mechanisms in nanostructures
CO3	Understand the applications of quantum mechanics in nanoscienc
CO4	Understand the fabrication and characterization techniques of nanomaterials
CO5	Enumerate the different applications of nanotechnology

## **B.Sc. Physics**

### **PHY6B14 (EL3): MATERIALS SCIENCE**

At the end of this course, a student will have developed ability to:

CO1	Understand the basic ideas of bonding in materials
CO2	Describe crystalline and non crystalline materials
CO3	Understand the types of imperfections and diffusion mechanisms in solids
CO4	Describe the different properties of ceramics and polymers
CO5	Describe the different types of material analysis techniques

## **B.Sc. Physics**

### **PHY4B05: PRACTICAL I**

At the end of this course, a student will have developed ability to:

CO1	Apply and illustrate the concepts of properties of matter through experiments
CO2	Apply and illustrate the concepts of electricity and magnetism through experiments
CO3	Apply and illustrate the concepts of optics through experiments
CO4	Apply and illustrate the principles of electronics through experiments

## **B.Sc. Physics**

### **PHY6B15: PRACTICAL II**

At the end of this course, a student will have developed ability to:

CO1	Apply and illustrate the concepts of properties of matter through experiments
CO2	Apply and illustrate the concepts of electricity and magnetism through experiments
CO3	Apply and illustrate the concepts of optics and spectroscopy through experiments
CO4	Apply and illustrate the principles of heat through experiments

## **B.Sc. Physics**

### **PHY6B16: PRACTICAL III**

At the end of this course, a student will have developed ability to:

CO1	Apply and illustrate the principles of semiconductor diode and transistor through Experiments
CO2	Apply and illustrate the principles of transistor amplifier and oscillator through Experiments
CO3	Apply and illustrate the principles of digital electronics through experiments
CO4	Analyze and apply computational techniques in Python programming

## **B.Sc. Physics**

### **PHY6B17(P) – PROJECT**

At the end of this course, a student will have developed ability to:

CO1	Understand research methodology
CO2	Understand and formulate a research\project
CO3	Design and implement a research project
CO4	Identify and enumerate the scope and limitations of a research projec

## **B.Sc. Physics**

### **PHY6B17(R): RESEARCH METHODOLOGY (In lieu of Project)**

At the end of this course, a student will have developed ability to:

CO1	Understand research methodology
CO2	Understand the concept of measurement in research
CO3	Understand the significance and limitations of experimentation in research
CO4	Understand and formulate a research project, ethics and responsibility of scientific research

## **B.Sc. Physics**

### **PHY5D01(1): NON CONVENTIONAL ENERGY SOURCES**

At the end of this course, a student will have developed ability to:

CO1	Understand the importance of non conventional energy sources
CO2	Understand basic aspects of solar energy
CO3	Understand basic principles of wind energy conversion
CO4	Understand the basic ideas of geothermal and biomass energy and recognize their merits and demerits
CO5	Understand the basic ideas of oceans and chemical energy resources and recognize their merits and demerits



## **B.Sc. Physics**

### **PHY5D01(2): AMATEUR ASTRONOMY AND ASTROPHYSICS**

At the end of this course, a student will have developed ability to:

CO1	Describe the history and nature of astronomy as a science
CO2	Understand the motion of earth in space and the cause of seasons
CO3	Understand the basic elements of solar system
CO4	Understand the elementary concepts of solar system

## **B.Sc. Physics**

### **PHY5D01(3): ELEMENTARY MEDICAL PHYSICS**

At the end of this course, a student will have developed ability to:

CO1	Understand the basic aspects of physics of nuclear medicine
CO2	Recognize different bioelectric signals and their instrumentation
CO3	Understand the basic elements of X-ray imaging
CO4	Understand the basic elements of ultrasound imaging and its advantages and disadvantages

## **B.Sc. Physics**

### **PHY5D01(3): ELEMENTARY MEDICAL PHYSICS**

At the end of this course, a student will have developed ability to:

CO1	Understand the basic principles of Elasticity
CO2	Understand the concepts of surface tension
CO3	Understand the aspects of viscosity
CO4	Understand the basic principles of thermodynamics

## **B.Sc. Physics**

### **PHY2C02: Optics, Laser & Electronics**

At the end of this course, a student will have developed ability to:

CO1	Understand the basic concepts of interference and diffraction
CO2	Understand the concepts of polarization
CO3	Understand the fundamentals of electronics
CO4	Understand the important principles of laser physics

## **B.Sc. Physics**

### **PHY3C03: Mechanics, Relativity, Waves and Oscillations**

At the end of this course, a student will have developed ability to:

CO1	Understand the basic ideas of frames of reference and the principles of conservation of energy and momentum
CO2	Understand the concepts of relativity
CO3	Understand the basic ideas of oscillations and waves
CO4	Understand the basic ideas of modern physics

## **B.Sc. Physics**

### **IV PHY4C04: Electricity, Magnetism and Nuclear physics**

At the end of this course, a student will have developed ability to:

CO1	Understand the basic ideas of static and current electricity
CO2	Understand the concepts of magnetism
CO3	Describe the fundamental concepts of nuclear physics
CO4	Understand the basic ideas of cosmic rays and elementary particles

## **B.Sc. Physics**

### **PHY4C05: PHYSICS PRACTICAL I**

At the end of this course, a student will have developed ability to:

CO1	Apply and illustrate the concepts of properties of matter through experiments
CO2	Apply and illustrate the concepts of electricity and magnetism through experiments
CO3	Apply and illustrate the concepts of optics through experiments
CO4	Apply and illustrate the principles of electronics through experiments