

# ST. STEPHEN'S COLLEGE UZHAVOOR

(Affiliated To Mahatma Gandhi University, Kottayam)



## PROGRAMME OUTCOMES

UZHAVOOR P. O, KOTTAYAM, KERALA – 686 634

Email: [info@ststephens.net.in](mailto:info@ststephens.net.in)

Website: [www.ststephens.net.in](http://www.ststephens.net.in)

## Postgraduate Programme Outcomes – MSc/MCom

Post Graduate Programmes offered by Mahatma University is Outcome-based, and the expected outcomes are as follows

<b>PO1</b>	Enhancing the horizon of knowledge so as to enable the learners to carry out qualitative research and pursue academic or professional careers.
<b>PO2</b>	Developing problem analysis skills and knowledge and applying the same in real life situation.
<b>PO3</b>	Using research knowledge and aptitude acquired in the course of study for solving socially relevant problems
<b>PO4</b>	Understanding the role and applicability of knowledge acquired in the context of society, environment and sustainable development sticking on to the ethics and values.
<b>PO5</b>	Developing effective communication skills and ability to work in teams by strengthening group dynamics
<b>PO6</b>	Fostering ability to engage in life long learning, demonstrating empathetic social concern, contributing to the development of nation, by making sure of awareness gained on various issues.

# ST. STEPHEN'S COLLEGE UZHAVOOR

(Affiliated To Mahatma Gandhi University, Kottayam)



## PROGRAMME SPECIFIC OUTCOMES M Sc Physics

UZHAVOOR P. O, KOTTAYAM, KERALA – 686 634

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Master of Science in Physics Programmes offered by Mahatma University is Outcome-based, and the expected PSOs are as follows

<b>PSO1</b>	Provide an in-depth theoretical understanding of the different areas of Physics together with the applied and current fields of research
<b>PSO2</b>	Achieve mastery, competence, and analytical skills in the subject.
<b>PSO3</b>	Learn to set up and carry out advanced experiments
<b>PSO4</b>	Develop logical and analytical reasoning that can be applied to diverse fields to solve real-world problems.
<b>PSO5</b>	Carry out a research project and Gain research experience within a specific field of physics
<b>PSO6</b>	Promote awareness amongst students for life-long learning and inculcate in them professional and ethical attitudes, good leadership qualities, and commitment to social responsibilities.

# ST. STEPHEN'S COLLEGE UZHAVOOR

(Affiliated To Mahatma Gandhi University, Kottayam)



## COURSE OUTCOMES M Sc Physics

UZHAVOOR P. O, KOTTAYAM, KERALA – 686 634

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Master of Science in Physics Programmes offered by Mahatma University is Outcome-based, and the expected COs are as follows

<b>Name of the Programme: MSc Physics</b>			
<b>Course Code</b>	<b>Course Title</b>	<b>Course Outcomes</b>	
<b>SEMESTER 1</b>			
PH010101	Mathematical methods in physics – I	CO1	Implement essential mathematical skills to solve problems in Physics.
		CO2	Describe various processes involved in understanding the behaviour of different systems through Mathematics.
		CO3	Achieve a sound knowledge of curvilinear coordinates, Tensor algebra, matrices and special functions and their various properties that are being extensively used in Physics.
PH010102	Classical mechanics	CO1	Provide elementary ideas on classical mechanics to write equations for real time problems using conventional techniques.
		CO2	Define basic mechanical concepts related to discrete and continuous mechanical systems, planar and spatial motion of a rigid body
		CO3	Study in detail on Lagrangian and Hamiltonian formalism, dynamics of rigid body, oscillations, canonical transformations and special relativity
PH010103	Electrodynamics	CO1	Acquire in-depth knowledge in electrostatics and familiarize theories of static and moving charges
		CO2	Give idea on the fundamentals of electromagnetic conduction and electromagnetic waves.
		CO3	Extend its applications to instruments involving electric and magnetic fields
PH010104	Electronics	CO1	Analyze components associated with digital and analog electronic/communication systems and apply basic mathematical and engineering concepts to technical problem solving
		CO2	Learn the structure of various semiconducting devices and their electronic properties along with underlying physics.
		CO3	Apply the knowledge to understand the working of amplifiers, oscillators, multivibrators and communication systems.

		CO4	Detailed study of operational amplifiers
<b>SEMESTER 2</b>			
PH010201	Mathematical methods in physics – II	CO1	Identify a range of mathematical methods that are essential for solving advanced problems in theoretical Physics and demonstrate the ability to apply mathematical concepts and techniques in to problems in that field
		CO2	Elaborate the understanding of basic concept of complex variables and group theory and integral transforms
		CO3	Describe various processes involved in understanding the behaviour of different systems through Mathematics and implement mathematical skills to solve problems in physics.
		CO4	Detailed study of special functions used in Physics
PH010202	Quantum mechanics – I	CO1	Identify and understand the kinds of experimental results which are incompatible with classical Physics and which required the development of a quantum theory of matter and light.
		CO2	Acquire sufficient knowledge on Operator formalism.
		CO3	Makes students familiar with performing calculations using angular momentum techniques.
		CO4	Detailed study on Quantum Dynamics
PH010203	Statistical Mechanics	CO1	Understand how statistics of the microscopic world can be used to explain the thermal features of the macroscopic world.
		CO2	Familiarize in depth about Maxwell –Boltzmann, Bose-Einstein and Fermi Dirac Statistics and their application
		CO3	Analyse different statistical ensembles and perform statistical calculation of different thermodynamic quantities
PH010204	Condensed matter Physics	CO1	Create a clear picture of crystal structures, x-ray diffraction, defects, magnetic and dielectric properties of solids etc.
		CO2	Develop a concept of the crystal classes and symmetries and to understand the relationship between the real and reciprocal space.
		CO3	Learn conduction mechanisms in insulators, semiconductors, conductors and superconductors and apply it in designing novel devices.
		CO4	Study about lattice properties and thermal vibrations
<b>SEMESTER 3</b>			

PH010301	Quantum mechanics – II	CO1	Impart knowledge of advanced quantum mechanics for solving relevant physical problems.
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		CO2	Acquire a working knowledge of non-relativistic and relativistic quantum mechanics including time-dependent perturbation theory, scattering theory, relativistic wave equations, and second quantization.
		CO3	Achieve the ability to critically understand and evaluate modern research utilizing quantum theory in Physics.

PH010302	Computational physics	CO1	Incorporate modern computation and visualization into the scientific problem-solving paradigm.
		CO2	Learn about numerical differentiation and integration, numerical solution of ODE and PDE.
		CO3	Understand how the knowledge levels can be advanced by the use of modern scientific computing skills and tools.

PH010303	Atomic and molecular Physics	CO1	Explain the origin of the atomic spectra and behaviour of atoms in external electric and magnetic fields.
		CO2	Become familiar with molecular spectroscopy and gain basic ideas regarding microwave, infrared and Raman Spectroscopy.
		CO3	Understanding the working principle and instrumentation of microwave, IR, Raman, NMR and UV-VIS spectrometers.

PH8003	Digital signal processing	CO1	To study about different types of signals
		CO2	To study the design techniques for FIR and IIR digital filters
		CO3	To study about discrete time systems and to learn about FFT algorithms

#### SEMESTER 4

PH010401	Nuclear and particle Physics	CO1	Know the properties of the nucleus like binding energy, magnetic dipole moment, electric quadrupole moment etc. and understand the concept of radioactivity
		CO2	Analyse Various aspects of nuclear reactions to give an idea of nuclear power generation.
		CO3	Familiarize different nuclear models and nuclear decay
		CO4	Analyse how nuclear and particle physics phenomena play a role in the description of the evolution of the universe from the Big Bang to present day processes in stars.



PH800403	Communication Systems	CO1	Study about digital communication
		CO2	Learn about mobile communication, satellite communication and fibre optics communications
		CO3	Familiarise with RADAR systems
PH800402	Microelectronics and Semiconductor devices	CO1	To expose the students to architecture and instruction sets of basic microprocessors
		CO2	Detailed study of fundamentals of semiconductor devices and their processing steps.
		CO3	Apply the knowledge of semiconductor fabrication processes to work in industry in the area of semiconductor devices.

## Name of the Programme: MSc Physics

Course Code	Course Title	Course Outcomes	
<b>SEMESTER 1</b>			
PH01010 1	Mathematical methods in physics – I	CO1	Implement essential mathematical skills to solve problems in Physics.
		CO2	Describe various processes involved in understanding the behaviour of different systems through Mathematics.
		CO3	Achieve a sound knowledge of curvilinear coordinates, Tensor algebra, matrices and special functions and their various properties that are being extensively used in Physics.
PH01010 2	Classical mechanics	CO1	Provide elementary ideas on classical mechanics to write equations for real time problems using conventional techniques.
		CO2	Define basic mechanical concepts related to discrete and continuous mechanical systems, planar and spatial motion of a rigid body
		CO3	Study in detail on Lagrangian and Hamiltonian formalism, dynamics of rigid body, oscillations, canonical transformations and special relativity
PH01010 3	Electrodynamics	CO1	Acquire in-depth knowledge in electrostatics and familiarize theories of static and moving charges
		CO2	Give idea on the fundamentals of electromagnetic conduction and electromagnetic waves.
		CO3	Extend its applications to instruments involving electric and magnetic fields
PH01010 4	Electronics	CO1	Analyze components associated with digital and analog electronic/communication systems and apply basic mathematical and engineering concepts to technical problem solving
		CO2	Learn the structure of various semiconducting devices and their electronic properties along with underlying physics.
		CO3	Apply the knowledge to understand the working of amplifiers, oscillators, multivibrators and communication systems.
		CO4	Detailed study of operational amplifiers
<b>SEMESTER 2</b>			

PH01020 1	Mathematical methods in physics – II	CO1	Identify a range of mathematical methods that are essential for solving advanced problems in theoretical Physics and demonstrate the ability to apply mathematical concepts and techniques in to problems in that field
		CO2	Elaborate the understanding of basic concept of complex variables and group theory and integral transforms
		CO3	Describe various processes involved in understanding the behaviour of different systems through Mathematics and implement mathematical skills to solve problems in physics.
		CO4	Detailed study of special functions used in Physics
PH01020 2	Quantum mechanics – I	CO1	Identify and understand the kinds of experimental results which are incompatible with classical Physics and which required the development of a quantum theory of matter and light.
		CO2	Acquire sufficient knowledge on Operator formalism.
		CO3	Makes students familiar with performing calculations using angular momentum techniques.
		CO4	Detailed study on Quantum Dynamics
PH01020 3	Statistical Mechanics	CO1	Understand how statistics of the microscopic world can be used to explain the thermal features of the macroscopic world.
		CO2	Familiarize in depth about Maxwell –Boltzmann, Bose-Einstein and Fermi Dirac Statistics and their application
		CO3	Analyse different statistical ensembles and perform statistical calculation of different thermodynamic quantities
PH01020 4	Condensed matter Physics	CO1	Create a clear picture of crystal structures, x-ray diffraction, defects, magnetic and dielectric properties of solids etc.
		CO2	Develop a concept of the crystal classes and symmetries and to understand the relationship between the real and reciprocal space.
		CO3	Learn conduction mechanisms in insulators, semiconductors, conductors and superconductors and apply it in designing novel devices.
		CO4	Study about lattice properties and thermal vibrations
<b>SEMESTER 3</b>			
PH01030 1	Quantum mechanics – II	CO1	Impart knowledge of advanced quantum mechanics for solving relevant physical problems.

		CO2	Acquire a working knowledge of non-relativistic and relativistic quantum mechanics including time-dependent perturbation theory, scattering theory, relativistic wave equations, and second quantization.
		CO3	Achieve the ability to critically understand and evaluate modern research utilizing quantum theory in Physics.
PH01030 2	Computational physics	CO1	Incorporate modern computation and visualization into the scientific problem-solving paradigm.
		CO2	Learn about numerical differentiation and integration, numerical solution of ODE and PDE.
		CO3	Understand how the knowledge levels can be advanced by the use of modern scientific computing skills and tools.
PH01030 3	Atomic and molecular Physics	CO1	Explain the origin of the atomic spectra and behaviour of atoms in external electric and magnetic fields.
		CO2	Become familiar with molecular spectroscopy and gain basic ideas regarding microwave, infrared and Raman Spectroscopy.
		CO3	Understanding the working principle and instrumentation of microwave, IR, Raman, NMR and UV-VIS spectrometers.
PH8003	Digital signal processing	CO1	To study about different types of signals
		CO2	To study the design techniques for FIR and IIR digital filters
		CO3	To study about discrete time systems and to learn about FFT algorithms
<b>SEMESTER 4</b>			
PH01040 1	Nuclear and particle Physics	CO1	Know the properties of the nucleus like binding energy, magnetic dipole moment, electric quadrupole moment etc. and understand the concept of radioactivity
		CO2	Analyse Various aspects of nuclear reactions to give an idea of nuclear power generation.
		CO3	Familiarize different nuclear models and nuclear decay
		CO4	Analyse how nuclear and particle physics phenomena play a role in the description of the evolution of the universe from the Big Bang to present day processes in stars.
PH80040 3	Communication Systems	CO1	Study about digital communication
		CO2	Learn about mobile communication, satellite communication and fibre optics communications
		CO3	Familiarise with RADAR systems

PH80040 2	Microelectronics and Semiconductor devices	CO1	To expose the students to architecture and instruction sets of basic microprocessors
		CO2	Detailed study of fundamentals of semiconductor devices and their processing steps.
		CO3	Apply the knowledge of semiconductor fabrication processes to work in industry in the area of semiconductor devices.