Physics

Course Learning Outcomes are measurable statements that are used to identify the specific knowledge and skills that a student should have at the end of a course.

PHYS 1100
L1- Demonstrate a fundamental comprehension of the Scientific Method.
L2- Demonstrate the ability to use Newtons laws describe the state of a mechanical system.
L3- Demonstrate the ability to describe the state of a fluidic system.
L4- Demonstrate the ability to predict the outcome of harmonic phenomena and wave interactions such as reflection.
L5- Interference.
L5- Refraction and interference.
L6- Demonstrate the ability to predict the future state of a thermodynamic system give its current state and information about changes to state variables.
L7- Demonstrate a fundamental comprehension of the Coulomb interaction.
L8- Demonstrate a fundamental comprehension of magnetism and magnetic forces.

PHYS 1101
L1- Demonstrate a fundamental comprehension of the Scientific Method.
L2- Demonstrate the ability to use Newtons laws describe the state of a mechanical system.
L3- Demonstrate the ability to describe the state of a fluidic system.
L4- Demonstrate the ability to predict the outcome of harmonic phenomena and wave interactions such as reflection, interference, refraction and interference.
L5- Demonstrate a fundamental comprehension of the Coulomb interaction.
L6- Demonstrate a fundamental comprehension of magnetism and magnetic forces.
L7- Demonstrate a comprehension of the electromagnetic spectrum.
L8- Demonstrate a fundamental understanding of optics and optical systems.

PHYS 1101L
L1- Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
L2- Demonstrate the ability to use experimental statistics to determine the precision of a series of measurements.
L3- Demonstrate the ability to measure properties of a variety of mechanical, optical and electrical systems.

PHYS 1111
L1- Demonstrate a fundamental comprehension of the Scientific Method.
L2- Demonstrate the ability to use Newtonian mechanics and conservation properties to predict the future state of a system.
L3- Demonstrate the ability to use Newton's theory of gravity to understand the interactions between celestial objects.
L4- Demonstrate the ability to predict the future state of a fluidic system based on its current state and changes in system parameters.
L5- Demonstrate the ability to predict the outcome of harmonic phenomena and wave interactions such as reflection, interference, refraction and interference.
L6- Demonstrate the ability to predict the future state of a thermodynamic system give its current state and information about changes to state variables.

PHYS 1112
L1- Demonstrate a fundamental comprehension of the Coulomb interaction.
L2- Demonstrate a fundamental comprehension of magnetism and magnetic forces.
L3- Demonstrate a comprehension of the electromagnetic spectrum.
L4- Demonstrate a fundamental understanding of optics and optical systems.

PHYS 1113
L1- Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
L2- Demonstrate the ability to use experimental statistics to determine the precision of a series of measurements.
L3- Demonstrate the ability to measure properties of a variety of mechanical systems.
L4- Demonstrate the ability to prepare a valid laboratory notebook.
L5- Demonstrate the ability to craft a well-written laboratory report (template provided).

PHYS 1114
L1- Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
L2- Demonstrate the ability to use experimental statistics to determine the precision of a series of measurements.
L3- Demonstrate the ability to measure properties of a variety of mechanical systems.
L4- Demonstrate the ability to prepare a valid laboratory notebook.
L5- Demonstrate the ability to craft a well-written laboratory report (template provided).

PHYS 1152
L1- Demonstrate a fundamental comprehension of the Scientific Method.
L2- Demonstrate a comprehension of the four historical periods of astronomy.
L3- Demonstrate the ability to use Newton's theory of gravity and Newtonian mechanics to understand the interactions between celestial objects.
L4- Demonstrate a fundamental understanding of the Earth-Moon system.
L5- Demonstrate a fundamental understanding of the Solar System.
L6- Demonstrate an understanding of the electromagnetic spectrum.
L7- Its importance in transferring energy in space and spectroscopy.
L- Demonstrate an understanding the Sun.
L9- Demonstrate an understanding Stars.

PHYS 1153
L1- Demonstrate an ability to use planispheres and star charts to locate objects in the night sky.
L2- Demonstrate the ability to describe the function of a telescope.
L3- Demonstrate the ability to measure properties of the moon's orbit.
L4- Build a correct scale model of the solar system.
L5- Demonstrate the ability to use spectral data to determine the properties of stars.
L6- Groups of stars and the age of the Universe.

PHYS 2211
L1- Demonstrate a fundamental comprehension of the Scientific Method.
L2- Demonstrate the ability to use calculus to derive basic kinematic and dynamic relationships.
L3- Demonstrate the ability to use Newtonian mechanics and conservation properties to predict the future state of a system.
L4- Demonstrate the ability to use Newton's theory of gravity to understand the interactions between celestial objects.
L5- Demonstrate the ability to describe the state of a fluidic system.
L6- Demonstrate the ability to describe harmonic phenomena and wave interactions such as reflection.
L7- Interference .
L8- Refraction and interference.

L9- Demonstrate the ability to describe a thermodynamic system give information about state variables.

PHYS 2212
L1- Demonstrate a fundamental comprehension of the Coulomb interaction.
L2- Demonstrate the ability to use calculus and analytic geometry to analyze electric fields and electric forces.
L3- Demonstrate a fundamental comprehension of magnetism and magnetic forces.
L4- Demonstrate a comprehension of the electromagnetic spectrum.
L5- Demonstrate a fundamental understanding of optics and optical systems.

PHYS 2213
L1- Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
L2- Demonstrate the ability to use experimental statistics to determine the precision of a series of measurements.
L3- Demonstrate the ability to measure properties of a variety of mechanical systems.
L4- Demonstrate the ability to prepare a valid laboratory notebook.
L5- Demonstrate the ability to craft a well-written laboratory report (template provided).
L6- Demonstrate the ability to analyze rates of change and perform integration with spreadsheets.

PHYS 2214
L1- Demonstrate an ability to make physical measurements and understand the limits of precision in measurements.
L2- Demonstrate the ability to use experimental statistics to determine the precision of a series of measurements.
L3- Demonstrate the ability to measure properties of a variety of electrical and optical systems.
L4- Demonstrate the ability to prepare a valid laboratory notebook.
L5- Demonstrate the ability to craft a well-written laboratory report (template provided).
L6- Demonstrate the ability to construct a variety of working electrical circuits.

PHYS 3301
L1- To acquire a strong working foundation in the Theory of Special Relativity.
L2- To systematically introduce the founding principles of Quantum Mechanics.
L3- To develop and apply Quantum Mechanics to various physical systems.

PHYS 4400
L1- Students will gain knowledge of physics education research and good teaching practices.
L2- Students will gain knowledge and experience in effective physics education methodologies and online resources.
L3- Students will learn and demonstrate accepted safety practices in science education.

PHYS 4403
L1- To acquire working knowledge of the Quantum Mechanics postulate on the physical systems.
L2- To acquire working knowledge of the Quantum Mechanics postulate on the measurements.
L3- To acquire working knowledge of the Quantum Mechanics postulate on the evolution of physical systems.
L4- To apply the postulates of Quantum Mechanics to simple physical systems.

PHYS 4404
L1- To apply the postulates of Quantum Mechanics to composite systems and/or motion in more than one dimension.
L2- To apply the postulates of Quantum Mechanics to rotational motion.
L3- To discuss technological applications of Quantum Mechanics.
L4- To apply Quantum Mechanics to cases where the Schrodinger equation cannot be solved exactly.

PHYS 4405
L1- Demonstrate an ability to perform an advanced experimental measurement.

PHYS 4406
L1- Demonstrate an ability to execute a professional caliber project.

PHYS 4408
L1- Students understand DC circuits.
L2- Students can understand ac circuits.
L3- Students understand diodes.
L4- Students understand transistors.
L5- Students understand operational amplifiers.

PHYS 4415
L1- To acquire working knowledge of the zero-th and first law of thermodynamics.
L2- To acquire working knowledge of the second law of thermodynamics.
L3- To apply the laws of thermodynamics.
L4- To link thermodynamics to the micro description used in classical Statistical Mechanics.
L5- To introduce advanced topics related to Quantum Statistical Mechanics.

PHYS 4421
L1- To understand Coulomb's law.
L2- To comprehend the properties of the solutions of the Laplace and Poisson equations.
L3- To recognize the applicability of conservation of electric charge, energy, momentum, and angular momentum in practical settings.

PHYS 4430
L1- To describe noninear beam dynamics in linear and circular accelerators.
L2- To describe design concepts of RF cavities and standing wave (SW) and traveling wave (TW) linear accelerator structures.
L3- To describe beam instabilities in linear and circular accelerators

PHYS 4442
L1- Students will gain knowledge of basic theories of solid-state structure.
L2- Students will gain knowledge of basic theories of the electronic structure of materials.
L3- Students will learn how solid-state theory is applied to describe physical behavior of solids and electronic devices.

PHYS 4453
L1- Demonstrate the ability to use Newton's theory of gravity and Newtonian mechanics to understand the interactions between celestial objects.
L2- Demonstrate a fundamental understanding of the Earth-Moon system.
L3- Demonstrate a fundamental understanding of the Solar System.
L4- Demonstrate an understanding of the electromagnetic spectrum and its importance in transferring energy in space and spectroscopy.
L5- Demonstrate an understanding the Sun.
L6- Demonstrate an understanding Stars.

PHYS 4461
L1- Students will gain knowledge of and practice in mathematical methods commonly applied to the study and practice of physics

PHYS 4462
L1- Students will gain knowledge of and practice in mathematical methods commonly applied to the study and practice of physics

PHYS 4470

L1- To comprehend the methods used for describing how electrons and photons interact with matter.

PHYS 4481
L1- Students will learn about physics through independent problems.

PHYS 4492
L1- Students will learn about current physics research