

Chapter 1 : Branches of physics - Wikipedia

Quantum mechanics is the branch of physics treating atomic and subatomic systems and their interaction with radiation. It is based on the observation that all forms of energy are released in discrete units or bundles called " quanta " .

For example, atomic and nuclear physics studies matter on the smallest scale at which chemical elements can be identified. The physics of elementary particles is on an even smaller scale since it is concerned with the most basic units of matter; this branch of physics is also known as high-energy physics because of the extremely high energies necessary to produce many types of particles in particle accelerators. On this scale, ordinary, commonsense notions of space, time, matter, and energy are no longer valid. Classical mechanics approximates nature as continuous, while quantum theory is concerned with the discrete nature of many phenomena at the atomic and subatomic level and with the complementary aspects of particles and waves in the description of such phenomena. The theory of relativity is concerned with the description of phenomena that take place in a frame of reference that is in motion with respect to an observer; the special theory of relativity is concerned with relative uniform motion in a straight line and the general theory of relativity with accelerated motion and its connection with gravitation. Both quantum theory and the theory of relativity find applications in all areas of modern physics. Loosely speaking, the laws of classical physics accurately describe systems whose important length scales are greater than the atomic scale and whose motions are much slower than the speed of light. Outside of this domain, observations do not match predictions provided by classical mechanics. Albert Einstein contributed the framework of special relativity , which replaced notions of absolute time and space with spacetime and allowed an accurate description of systems whose components have speeds approaching the speed of light. Later, quantum field theory unified quantum mechanics and special relativity. General relativity allowed for a dynamical, curved spacetime , with which highly massive systems and the large-scale structure of the universe can be well-described. General relativity has not yet been unified with the other fundamental descriptions; several candidate theories of quantum gravity are being developed. Mathematics and ontology are used in physics. Physics is used in chemistry and cosmology. Prerequisites Mathematics provides a compact and exact language used to describe the order in nature. This was noted and advocated by Pythagoras , [48] Plato , [49] Galileo , [50] and Newton. Physics uses mathematics [51] to organise and formulate experimental results. From those results, precise or estimated solutions are obtained, quantitative results from which new predictions can be made and experimentally confirmed or negated. The results from physics experiments are numerical data, with their units of measure and estimates of the errors in the measurements. Technologies based on mathematics, like computation have made computational physics an active area of research. The distinction between mathematics and physics is clear-cut, but not always obvious, especially in mathematical physics. Ontology is a prerequisite for physics, but not for mathematics. It means physics is ultimately concerned with descriptions of the real world, while mathematics is concerned with abstract patterns, even beyond the real world. Thus physics statements are synthetic, while mathematical statements are analytic. Mathematics contains hypotheses, while physics contains theories. Mathematics statements have to be only logically true, while predictions of physics statements must match observed and experimental data. The distinction is clear-cut, but not always obvious. For example, mathematical physics is the application of mathematics in physics. Its methods are mathematical, but its subject is physical. Every mathematical statement used for solving has a hard-to-find physical meaning. The final mathematical solution has an easier-to-find meaning, because it is what the solver is looking for. Physics is also called "the fundamental science" because the subject of study of all branches of natural science like chemistry, astronomy, geology, and biology are constrained by laws of physics, [53] similar to how chemistry is often called the central science because of its role in linking the physical sciences. Structures are formed because particles exert electrical forces on each other, properties include physical characteristics of given substances, and reactions are bound by laws of physics, like conservation of energy, mass, and charge. Physics is applied in industries like engineering and medicine. An applied physics curriculum usually contains a few classes in an applied discipline, like geology or electrical engineering. It usually differs from engineering in that an

applied physicist may not be designing something in particular, but rather is using physics or conducting physics research with the aim of developing new technologies or solving a problem. The approach is similar to that of applied mathematics. Applied physicists use physics in scientific research. For instance, people working on accelerator physics might seek to build better particle detectors for research in theoretical physics. Physics is used heavily in engineering. For example, statics, a subfield of mechanics, is used in the building of bridges and other static structures. The understanding and use of acoustics results in sound control and better concert halls; similarly, the use of optics creates better optical devices. An understanding of physics makes for more realistic flight simulators, video games, and movies, and is often critical in forensic investigations. With the standard consensus that the laws of physics are universal and do not change with time, physics can be used to study things that would ordinarily be mired in uncertainty. It also allows for simulations in engineering which drastically speed up the development of a new technology. Research Scientific method Physicists use the scientific method to test the validity of a physical theory. By using a methodical approach to compare the implications of a theory with the conclusions drawn from its related experiments and observations, physicists are better able to test the validity of a theory in a logical, unbiased, and repeatable way. To that end, experiments are performed and observations are made in order to determine the validity or invalidity of the theory.

Chapter 2 : Branches of Science – The Complete List | Science Mirror

Astronomy, acoustics, astrophysics, biophysics, chaos theory, chemical physics, computational physics, cosmology, cryophysics (cryogenics), crystallography, electromagnetism, electronics, fluid dynamics, geophysics, high energy physics and high pressure physics are a few of the different branches in the field of physics.

Definition of Science -from Latin *scientia*, meaning "knowledge" is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about nature and the universe. In an older and closely related meaning, "science" also refers to a body of knowledge itself, of the type that can be rationally explained and reliably applied. A practitioner of science is known as a scientist. The Branches of Science and their Meaning

1. Natural Science Natural science is a branch of science that seeks to elucidate the rules that govern the natural world by applying an empirical and scientific method to the study of the universe. The term natural sciences is used to distinguish it from the social sciences, which apply the scientific method to study human behavior and social patterns; the humanities, which use a critical, or analytical approach to the study of the human condition; and the formal sciences.

Physical Science Physical Science is an encompassing term for the branches of natural science and science that study non-living systems, in contrast to the life sciences. However, the term "physical" creates an unintended, somewhat arbitrary distinction, since many branches of physical science also study biological phenomena. There is a difference between physical science and physics.

Physics Physics from Ancient Greek: More broadly, it is the general analysis of nature, conducted in order to understand how the universe behaves. Physics is one of the oldest academic disciplines, perhaps the oldest through its inclusion of astronomy. Over the last two millennia, physics was a part of philosophy along with chemistry, certain branches of mathematics, and biology, but during the Scientific Revolution in the 16th century, the natural sciences emerged as unique research programs in their own right. Certain research areas are interdisciplinary, such as biophysics and quantum chemistry, which means that the boundaries of physics are not rigidly defined. In the nineteenth and twentieth centuries physicalism emerged as a major unifying feature of the philosophy of science as physics provides fundamental explanations for every observed natural phenomenon. New ideas in physics often explain the fundamental mechanisms of other sciences, while opening to new research areas in mathematics and philosophy.

Chemistry Chemistry the etymology of the word has been much disputed is the science of matter and the changes it undergoes. The science of matter is also addressed by physics, but while physics takes a more general and fundamental approach, chemistry is more specialized, being concerned with the composition, behavior or reaction, structure, and properties of matter, as well as the changes it undergoes during chemical reactions. It is a physical science which studies various substances, atoms, molecules, and matter especially carbon based; biochemistry, the study of substances found in biological organisms; physical chemistry, the study of chemical processes using physical concepts such as thermodynamics and quantum mechanics; and analytical chemistry, the analysis of material samples to gain an understanding of their chemical composition and structure. Many more specialized disciplines have emerged in recent years, e.

Earth Science Earth science also known as geoscience, the geosciences or the Earth sciences is an all-embracing term for the sciences related to the planet Earth. It is arguably a special case in planetary science, the Earth being the only known life-bearing planet. There are both reductionist and holistic approaches to Earth sciences. The formal discipline of Earth sciences may include the study of the atmosphere, hydrosphere, oceans and biosphere, as well as the solid earth. Typically Earth scientists will use tools from physics, chemistry, biology, geography, chronology and mathematics to build a quantitative understanding of how the Earth system works, and how it evolved to its current state.

Ecology Ecology is the scientific study of the relationships that living organisms have with each other and with their abiotic environment. Topics of interest to ecologists include the composition, distribution, amount biomass, number, and changing states of organisms within and among ecosystems.

Oceanography Oceanology, or marine science, is the branch of Earth science that studies the ocean. It covers a wide range of topics, including marine organisms and ecosystem dynamics; ocean currents, waves, and geophysical fluid dynamics; plate tectonics and the geology of the sea floor; and fluxes of various chemical substances and

physical properties within the ocean and across its boundaries. These diverse topics reflect multiple disciplines that oceanographers blend to further knowledge of the world ocean and understanding of processes within it:

Geology Geology is the science comprising the study of solid Earth, the rocks of which it is composed, and the processes by which they change. Geology can also refer generally to the study of the solid features of any celestial body such as the geology of the Moon or geology of Mars. Geology gives insight into the history of the Earth, as it provides the primary evidence for plate tectonics, the evolutionary history of life, and past climates. In modern times, geology is commercially important for mineral and hydrocarbon exploration and exploitation and for evaluating water resources. It is publicly important for the prediction and understanding of natural hazards, the remediation of environmental problems, and for providing insights into past climate change. Geology plays a role in geotechnical engineering and is a major academic discipline.

Meteorology Meteorology is the interdisciplinary scientific study of the atmosphere. Studies in the field stretch back millennia, though significant progress in meteorology did not occur until the 18th century. The 19th century saw breakthroughs occur after observing networks developed across several countries. After the development of the computer in the latter half of the 20th century, breakthroughs in weather forecasting were achieved.

Life Science Life science comprises the branches of science that involve the scientific study of living organisms, like plants, animals, and human beings. However, the study of behavior of organisms, such as practiced in ethology and psychology, is only included in as much as it involves a clearly biological aspect. While biology remains the centerpiece of life science, technological advances in molecular biology and biotechnology have led to a burgeoning of specializations and new, often interdisciplinary, fields.

Biology Biology is the branch of natural science concerned with the study of life and living organisms, including their structure, function, growth, origin, evolution, distribution, and taxonomy.

Human Biology Human biology is an interdisciplinary academic field of biology, biological anthropology, nutrition and medicine which focuses on humans; it is closely related to primate biology, and a number of other fields.

Botany Botany, plant science s , or plant biology is a branch of biology that involves the scientific study of plant life. Botany covers a wide range of scientific disciplines including structure, growth, reproduction, metabolism, development, diseases, chemical properties, and evolutionary relationships among taxonomic groups. Botany began with early human efforts to identify edible, medicinal and poisonous plants, making it one of the oldest sciences. Today botanists study over , species of living organisms.

Foreign Scientists and their Contributions

1. **Jonas Edward Salk** October 28, 1914 – June 23, 2013, was an American medical researcher and virologist. He discovered and developed the first successful inactivated polio vaccine. Born in New York City to Jewish parents, he attended New York University School of Medicine, later choosing to do medical research instead of becoming a practicing physician. She was the first woman to win a Nobel Prize, the first person and only woman to win twice, the only person to win twice in multiple sciences, and was part of the Curie family legacy of five Nobel Prizes.

Paul Adrien Maurice Dirac 8 August 1902 – 20 October 1984 was an English theoretical physicist who made fundamental contributions to the early development of both quantum mechanics and quantum electrodynamics. Among other discoveries, he formulated the Dirac equation, which describes the behavior of fermions and predicted the existence of antimatter. He also did work that forms the basis of modern attempts to reconcile general relativity with quantum mechanics.

Robert Heinrich Herman Koch 11 December 1843 – 27 May 1935 was a celebrated German physician and pioneering microbiologist. The founder of modern bacteriology, he is known for his role in identifying the specific causative agents of tuberculosis, cholera, and anthrax and for giving experimental support for the concept of infectious disease. In addition to his trail-blazing studies on these diseases, Koch created and improved laboratory technologies and techniques in the field of microbiology, and made key discoveries in public health. As a result of his groundbreaking research on tuberculosis, Koch received the Nobel Prize in Physiology or Medicine in 1905.

Christiaan Huygens 14 April 1629 – 8 July 1695 was a prominent Dutch mathematician and scientist. He is known particularly as an astronomer, physicist, probabilist and horologist. Huygens was a leading scientist of his time. His work included early telescopic studies of the rings of Saturn and the discovery of its moon Titan, the invention of the pendulum clock and other investigations in timekeeping. He published major studies of mechanics and optics, and a pioneer work on games of chance. He formulated the Periodic Law, created his own version of the periodic table of

elements, and used it to correct the properties of some already discovered elements and also to predict the properties of eight elements yet to be discovered. Murray Gell-Mann Born September 15, is an American physicist who received the Nobel Prize in physics for his work on the theory of elementary particles. He introduced, independently of George Zweig, the quark - constituents of all hadrons - having first identified the SU 3 flavor symmetry of hadrons. This symmetry is now understood to underlie the light quarks, extending isospin to include strangeness, a quantum number which he also discovered. Ernst Heinrich Philipp August Haeckel 16 February – 9 August was a German biologist, naturalist, philosopher, physician, professor, and artist who discovered, described and named thousands of new species, mapped a genealogical tree relating all life forms, and coined many terms in biology, including anthropogeny, ecology, phylum, phylogeny, stem cell, and the kingdom Protista. His most notable achievement was to formulate the classical theory of electromagnetic radiation, bringing together for the first time electricity, magnetism, and light as manifestations of the same phenomenon. Archimedes of Syracuse BC – c. Although few details of his life are known, he is regarded as one of the leading scientists in classical antiquity. Generally considered the greatest mathematician of antiquity and one of the greatest of all time, Archimedes anticipated modern calculus and analysis by applying concepts of infinitesimals and the method of exhaustion to derive and rigorously prove a range of geometrical theorems, including the area of a circle, the surface area and volume of a sphere, and the area under a parabola. Other mathematical achievements include deriving an accurate approximation of pi, defining and investigating the spiral bearing his name, and creating a system using exponentiation for expressing very large numbers. He was also one of the first to apply mathematics to physical phenomena, founding hydrostatics and statics, including an explanation of the principle of the lever. He is credited with designing innovative machines, such as his screw pump, compound pulleys, and defensive war machines to protect his native Syracuse from invasion. Local Scientists and their Contributions 1. Zara 8 March – 15 October was a Filipino engineer and physicist. He was the inventor of the first two-way videophone. Engineer turned soldier, General Alfredo M. Santos is one of the most notable "Freedom Fighters" of the Philippines with a heroic war record. His outstanding achievements proved his selfless dedication to the service of his country and people, thereby bringing distinct honor to the Armed Forces of the Philippines. He is well known for his physical and moral courage, and keen sense of fairness, justice, honesty and integrity. He spearheaded programs for reserved officers and integrates to gain merits and recognition in their military service. Kapauan July 4, – October 12, was a chemist and researcher. He obtained his doctorate from the University of Southern California in In the Ateneo de Manila University Department of Chemistry, he worked on inorganic and physical chemistry, particularly on radioactive bromine. With other colleagues, he initiated investigations in the s on heavy metals analysis in our environment. He was among the first to look into the problem of mercury in the environment, and he designed the appropriate equipment for mercury analysis in water, fish and soil. Hilario Lara has been recognized as the pioneer in Philippine public health research. He devoted over five decades of his life to the study and application of knowledge regarding the epidemiology, prevention, and control of epidemics such as cholera, typhoid, fever, dysentery, measles, and diphtheria in the country. As acclaimed medical man, Dr. He also organized the first medical library in the country and established Community Health Demonstration Centers all over the country. Ramon Cabanos Barba born August 31, , San Nicolas, Ilocos Norte is a Filipino inventor and horticulturist best known for inventing a way to induce more flowers in mango trees using ethrel and potassium nitrate. Barba was proclaimed a National Scientist of the Philippines in June Campos July 7, – June 2, was a Filipino physician and educator noted for his promotion of wider community health care and his achievements in the field of nuclear medicine for which he was dubbed as "The Father of Nuclear Medicine in the Philippines". Angel Alcal has more than thirty years of experience in tropical marine resource conservation.

Chapter 3 : Branches of Physics

Physics is a sub branch of science which fundamentally applies to all forms of physical science studies. Physics acts as a root to myriad studies in the scientific community as it provides the knowledge of how matter and energy work which are essential to the fundamental principles of biology and chemistry.

Continue reading to explore each of these branches in depth. This branch of physics deals mostly with matter and energy. Often, physics which date before are considered classical physics, whereas physics which date after are considered modern physics. In classical physics, energy and matter are considered separate entities. Acoustics, optics, classical mechanics, and electromagnetics are traditionally branches within classical physics. Moreover, any theory of physics that is considered null and void in modern physics automatically falls under the realm of classical physics. What Are the Three Laws of Physics? They are considered the basis of classical mechanics. When we speak of bodies, we are not speaking of actual human bodies although human bodies can be included in this definition, but of any piece of matter upon which a force may act. A body remains at rest or in uniform motion in a straight line unless acted upon by a force. When a force acts on a body due to another body, then an equal and opposite force acts simultaneously on that body. Modern Physics Modern physics is a branch of physics that is mainly concerned with the theory of relativity and quantum mechanics. Albert Einstein and Max Plank were the pioneers of modern physics as the first scientists to introduce the theory of relativity and quantum mechanics, respectively. In modern physics, energy and matter are not considered as separate entities. Rather, they are considered different forms of each other. The two pillars of modern physics are as follows. What Is the Theory of Relativity? As a result of this discovery, Einstein was able to confirm that space and time are interwoven in a single continuum known as space-time. As such, events that occur at the same time for one observer could occur at different times for another. Discovered by Max Plank in , quantum theory is the theoretical basis of modern physics that explains the nature and behaviour of matter and energy on the atomic and subatomic level. The nature and behaviour of matter and energy at that level is sometimes referred to as quantum physics and quantum mechanics. Plank discovered that energy exists in individual units in the same way that matter does, rather than just as a constant electromagnetic wave. Thus, energy was quantifiable. Nuclear Physics Nuclear physics is a branch of physics that deals with the constituents, structure, behaviour and interactions of atomic nuclei. This branch of physics should not be confused with atomic physics, which studies the atom as a whole, including its electrons. According to the Microsoft Encarta encyclopedia, nuclear physics is defined as: It is used in power generation, nuclear weapons, medicines, magnetic resonance, imaging, industrial and agricultural isotopes, and more. Who Discovered Nuclear Physics? The history of nuclear physics as a distinct field from atomic physics begins with the discovery of radioactivity by Henri Becquerel in . The discovery of the electron one year later indicated that the atom had an internal structure. With this, studies began on the nuclei of atoms, thus nuclear physics was born. Nuclear physicists examine only the nucleus, not the atom as a whole. Atomic Physics Atomic physics is a branch of physics that deals with the composition of the atom apart from the nucleus. It is mainly concerned with the arrangement and behaviour of electrons in the shells around the nucleus. Thus, atomic physics mostly examines electrons, ions, and neutral atoms. One of the earliest steps towards atomic physics was recognizing that all matter is comprised of atoms. The true beginning of atomic physics is marked by the discovery of spectral lines and the attempt to explain them. This resulted in an entirely new understanding of the structure of atoms and how they behave. Geophysics Geophysics is a branch of physics that deals with the study of the Earth. It is mainly concerned with the shape, structure and composition of the Earth, but geophysicists also study gravitational force, magnetic fields, earthquakes, magma, and more. Geophysics was only recognized as a separate discipline in the 19th century, but its origins date back to ancient times. The first magnetic compasses were made from All of these discoveries can be included in the field of geophysics, which is defined as: Biophysics According to the Microsoft Encarta encyclopedia, biophysics is defined as: Poll Physics is the study of:

Chapter 4 : What is Physics, Branches of Physics, Distance learning physics

Physics and Mathematics deal with a wide variety of systems, about which theories have been developed for each. Physics can be 'split' into 9 main branches.

The subject physics can be defined as the branch of science which deals with the study of properties of matter and energy along with the interaction between them is undertaken. Physicists have divided the subject into various branches and each branch has acquired a title of a full subject in modern days. Physics is one of the most important subjects of all science, therefore the branches of science have evolved to understand each and every underlying aspect of the physical world. Physics can be classified into various branches but classical physics is mainly concerned with energy and matter. The traditional branches of classical physics are Optics, Acoustics, Electromagnetics, and Classical mechanics. With the rapid development of physics, the scope of the subject is growing so large that it is not possible to cover physics under the above branches. A number of main branches of physics are discussed below.

Mechanics Mechanics is the branch of physics which deals with the motion of an object without or with the reference of force. Mechanics can be further divided into two branches namely quantum mechanics and classical mechanics. Quantum mechanics deals with the behavior of smallest particles like neutrons, protons, and electrons, while classical mechanics is the branch that deals with laws of motion of forces and physical objects.

Optics This branch of physics deals with the behavior, propagation, and properties of light. It can be simply described as the study of the behavior of infrared light, visible light, and ultraviolet.

Thermodynamics Thermodynamics deals with the study of heat and its relation with work and energy. Thermodynamics also deals with the transmission of heat energy by means of convection, conduction, and radiation.

Electromagnetism Electromagnetism deals with the study of electromagnetic force like electric fields, light, magnetic fields, etc.

Relativity This branch of physics deals with the theorem that was formulated by Albert Einstein. The theory of relativity states that space and time are relative and all the motion must be relative to a frame of reference.

Acoustic Acoustic deals with the study of sound and its transmission, production, and effects. It mainly involves the mechanical waves in gases, liquids, and solids which includes vibration, sound, ultrasound, and infrasound.

Practise This Question The distance between an object and the screen is cm. A lens produces an image on the screen when placed at either of the positions 40 cm apart. The power of the lens is 3D.

Chapter 5 : Different Branches Of Physics

The main branches of physics are astrophysics, classical mechanics, electromagnetism, optics, quantum mechanics, relativity and thermodynamics. Physics is the branch of science concerning the study of the nature and properties of matter and energy, and the relationship between them.

Check new design of our homepage! Branches of Physics Physics is the most fundamental of all sciences and therefore, its branches have evolved to understand every underlying aspect of the physical world. From particle physics to biophysics, the branches of this subject offer exciting research opportunities for anybody willing to persevere. ScienceStruck Staff Last Updated: The universe, the totality of space, time, matter, and energy, knows no divisions; it just operates according to a set of coherent laws, creating evermore beautiful complex works of art. Everything is related to everything else in the universe and therefore, no actual division is possible. It needs to be understood that this segregation of the entire body of knowledge into compartments, is a matter of human convenience. Like the blind men interpreting the elephant, we create our own theories about the universe, based on what we know. Never restrict yourself to these artificial divisions of the known fields of human knowledge. Passionately explore whatever catches your curiosity and wonder. Physics, in its beginning was known as Natural Philosophy. So in a way, you could still call it natural philosophy, but it is a science of the most precise kind. As physicists went on exploring nature at a deeper and deeper level, various physics branches evolved, with a coherent theoretical structure. To describe and provide rationale, for all that happens, from scales lesser than size of a nucleus, to scales larger than galaxies, a different branch was created, at every level. That is because, every branch is based on a set of principles or approximations, that best describe the phenomena at that level. As illustrated in the accompanying graphic, overall, physics as a field can be divided into four domains, on the basis of the energy and size scale of the entities involved. Physics at the size scale of footballs and planets, and at velocities amounting to a few kilometers per hour, can be explained by classical mechanics. At low speeds but size scales of an atom, the best description of the bizarre phenomena involved, is provided by quantum mechanics. The branches of physics can also be broadly divided into two types, which are Theoretical and Experimental physics. The reason for this is best understood in the words of the great physicist, Prof. I quote him from the Feynman Lectures on Physics: The principle of science, the definition almost, is the following: And then to experiment to check again, whether we have made the right guess. This imagination process is so difficult, that there is a division of labor in physics: I think this adequately explains why there is a division of labor in physics into the two branches. The fields are complementary to each other. Every branch has a theoretical and an experimental discipline. Theory cannot be validated without experiment and experiments cannot be performed without theoretical basis and direction. So here is a quick tour of the entire physics domain. Not only will you be introduced to the nature of knowledge and work in each branch, but you will also be provided with information about the notable discoveries in each domain and the best introductory books. Physics Branches Here is a list of the main physics branches, along with a summary of what is studied in each. Every branch is further divided into smaller sub-branches. As explained before, every one of these branches except mathematical physics, has an experimental and theoretical sub-division. The classification of these branches is artificial and they overlap onto each other, to create further specialized fields. Classical Mechanics This is the oldest branch of physics, that analytically describes motion of all objects on macroscopic scales. It describes everything from how large objects like balls bounce, why pendulums swing, to how planets revolve around the Sun. The kind of problem, which classical mechanics tries to solve is this. If such are the forces acting on bodies with specific masses, placed at such relative distances, what will the motion of the objects be? Specifically, it provides a theoretical framework to build deterministic equations of motion, for bodies that are under influence of forces. Three of the primary divisions of the field, according to the type of mathematical formalism used, are Newtonian mechanics Problems are solved through resolution of force vectors, acting on bodies , Hamiltonian mechanics The equation of motion is derived from the sum of kinetic and potential energies of the system, known as the Hamiltonian , and Lagrangian mechanics The equation of motion is derived from the difference between

kinetic and potential energies of a system, known as the Lagrangian, using the principle of least action. The third formalism, based on Lagrangian equations of motion, finds applications in the entirety of physics, including quantum mechanics, relativistic mechanics, and quantum field theory. Traditionally, the field can be divided into the following sub-divisions, which are Statics the study of systems in equilibrium, Dynamics Study of motion, in relation to forces, and Kinematics Study of motion, without reference to its causative agents. Today, the entire field is classified as a part of mechanics. Halliday, Mathematical methods of classical mechanics by V. Arnold, Mechanics Volume 1 by L. Walter Lewin Fluid Mechanics Fluid mechanics is a specialized sub-branch of classical mechanics, which describes the physics of all types of fluids, including gases, liquids, and plasma. All matter in this field is modeled as a continuum, without taking the individual properties of constituent elements like atoms into consideration. It can describe the behavior of fluids and their properties under various conditions, including their flow through pipes. It can describe real life phenomena like the rise of water from the roots of plants to the top, the flow of rivers, help in the design of airplane wings, hydraulic presses and pumps, help predict weather, and can be applicable in just about every situation where fluids are involved. Aerodynamics study of fluids like air in particular and the dynamics of flight and computational fluid dynamics CFD Computationally simulated numerical solutions to fluid mechanics problems are some of its prime branches. The subject can also be divided into fluid statics and dynamics, describing fluids at rest and in motion. Aksel, Fluid Mechanics by Frank. Mathematics is the language that nature speaks. To know how she functions on a deeper level, one must master this language and its every dialect completely. The field is an overlap between physics and mathematics. It provides a rigorous logical base and a complete toolbox, required for the use of sophisticated mathematical machinery in theoretical physics. Just like a workman must use the right kind of tools to get his job done, so must a physicist use the right mathematical tools to solve a problem. The more and more deeply we explore nature, every new law discovered can only be expressed in a new form of mathematics. It provides the theoretical basis for optics, telecommunication, and many other sub-fields. Its domain extends over all of nature, as the electromagnetic force is all pervading. From the designing of communication antennas to the making of electrical circuits, the field has truly wide applicability. Jackson, Berkeley Physics Series Vol. Panofsky and Melba Phillips Quantum Mechanics This branch describes a new kind of mechanics, which can explain phenomena at the sub-atomic level, where classical mechanics fails. From the accurate description of the Hydrogen spectra, prediction of the photoelectric effect, explanation of black body radiation, to describing the structure of molecules, this science, based on the calculation of wave functions that provide the particle probabilities, is one of the most enigmatic physical theories. It is based on the uncertainty principle which states that the momentum and position of any particle, cannot be known simultaneously, with arbitrary precision and builds a world picture where everything behaves as both waves and particles. Electromagnetic waves show the properties of particles, acting as quanta of energy, known as photons, while electrons are now known to behave as waves. In the quantum world, particles tunnel through walls, have the probability of existing in multiple locations at the same time, and may be linked with other physically disconnected particles through a mysterious property called quantum entanglement. From the building of efficient semiconductors, lasers, quantum computers, to the study of material properties, quantum mechanics is truly vast in its range of applications. Griffiths, Principles of Quantum Mechanics by R. Shankar Thermodynamics and Statistical Mechanics Thermodynamics and statistical physics are core branches, which provide a theoretical mechanism to describe the motion of phenomena in multi-particle systems. Even though single particle motion can be analyzed by quantum mechanics, it cannot describe multi-particle systems analytically, as the variables of calculation are too many. So, a statistical approach is needed, that describes motion of matter in bulk. Thermodynamics is a predecessor of statistical mechanics. It describes the macroscopic properties of particles in bulk. The principles of this statistical science find application in finance and economics. The basic theory finds applications in almost any situation where you are thinking about aggregates of particles. Pathria and Paul D. A Set Of Lectures by Richard Feynman Condensed Matter Physics Condensed Matter Physics is a sub-branch of quantum physics and statistical mechanics, which describes all phenomena that occur in matter, existing in condensed form, which includes metals, semiconductors, and all types of materials that exist as

congregations of matter. This includes everything from liquids, solids, to gases. The physics of semiconductor devices that power information technology, is a result of research developments in condensed matter physics. It describes all phenomena in bulk matter like ferromagnetism, superfluidity, and superconductivity. Notable Discoveries Density Functional Theory, BCS theory of Superconductivity, Kondo effect scattering of electrons induced by magnetic impurities in metals , Electronic theory of solids, Hubbard Model, Bose-Einstein condensate, Superfluidity Nuclear Physics Nuclear physics describes all the phenomena that occur at the level of the atomic nucleus. It deals with and explains phenomena like radioactivity, nuclear fission, and fusion. Developments in nuclear physics led to the production of nuclear weapons like the atom bomb, the Hydrogen bomb, and made nuclear energy source available to mankind. Research regarding the building, maintenance, and deployment of nuclear reactors forms a major part of research, besides the development of nuclear fusion reactors, that may provide completely clean energy at very low cost. Notable Discoveries and Inventions Radioactive decay Alpha, Beta, Gamma , Nuclear fission, Mass energy equivalence relation, Thermonuclear fusion reactions were discovered to be powering stars like our Sun , Controlled nuclear fusion reactors, Inertial confinement fusion, Nuclear bomb, Artificial transmutation of elements Best Introductory Books Introductory Nuclear Physics by Kenneth S. Krane, Nuclear Physics by Kaplan Relativistic Quantum Mechanics and the Quantum Field theory This is the physics which describes subatomic particles, that are very small and very fast. It is also known as particle physics. The field is based on the three theoretical foundations of quantum mechanics, special theory of relativity, and the concept of fields. It emerged out of the unification of all these three basic ideas and describes the physics of fundamental particles of matter. It describes all the fundamental interactions of nature Strong nuclear force, Weak nuclear force, Electromagnetic force , except gravity, through what is known as the Standard Model. Notable Discoveries Dirac Equation, Quantum Chromodynamics describes the interactions of quarks and the strong force, which is mediated by bosons called gluons , Quantum Electrodynamics Describes the electromagnetic interaction to be a force mediated through photons between charged particles , Quantum Flavordynamics Describes the weak nuclear interaction as a force mediated through W and Z bosons , Electroweak theory Theory that unifies electromagnetic interaction, with the weak nuclear force , Discovery of the Higgs Boson at LHC, the experimental confirmation of the existence of quarks and gluons, Renormalization A technique that eliminates the infinities that arise in field theory calculations , Path Integral formulation of quantum field theory, Feynman diagrams. Peskin and Dan V. The Strange Theory of Light and Matter by Richard Feynman Astronomy and Astrophysics Astronomy is the observational study of the universe in all its manifestations and astrophysics a confluence of all other branches , is the theoretical basis, which can explain all those phenomena. It is the most all-encompassing of all the physics branches, which has that singular goal of explaining every phenomenon that occurs in the universe. From the explanation of what powers stars, the cataloging of galaxies across the universe using terrestrial and space-based telescopes, to the search for extraterrestrial planets, the field encompasses a diverse range of interesting subjects. It interprets gravity, not as a force, but as a consequence of the curvature of space-time. Space around massive objects actually gets warped and bent. Gravity is the result of this warping of spacetime.

Chapter 6 : Branches Of Physics - Learn all about various Physics Branches

Physics is one of the most important subjects of all science, therefore the branches of science have evolved to understand each and every underlying aspect of the physical world. Physics can be classified into various branches but classical physics is mainly concerned with energy and matter.

Mechanics Mechanics is generally taken to mean the study of the motion of objects or their lack of motion under the action of given forces. Classical mechanics is sometimes considered a branch of applied mathematics. It consists of kinematics, the description of motion, and dynamics, the study of the action of forces in producing either motion or static equilibrium the latter constituting the science of statics. The 20th-century subjects of quantum mechanics, crucial to treating the structure of matter, subatomic particles, superfluidity, superconductivity, neutron stars, and other major phenomena, and relativistic mechanics, important when speeds approach that of light, are forms of mechanics that will be discussed later in this section. Thus in the first approximation even objects as large as the Earth and the Sun are treated as pointlike. In rigid-body dynamics, the extension of bodies and their mass distributions are considered as well, but they are imagined to be incapable of deformation. The mechanics of deformable solids is elasticity; hydrostatics and hydrodynamics treat, respectively, fluids at rest and in motion. The three laws of motion set forth by Isaac Newton form the foundation of classical mechanics, together with the recognition that forces are directed quantities vectors and combine accordingly. The first law, also called the law of inertia, states that, unless acted upon by an external force, an object at rest remains at rest, or if in motion, it continues to move in a straight line with constant speed. Uniform motion therefore does not require a cause. Accordingly, mechanics concentrates not on motion as such but on the change in the state of motion of an object that results from the net force acting upon it. Taken together, these mechanical laws in principle permit the determination of the future motions of a set of particles, providing their state of motion is known at some instant, as well as the forces that act between them and upon them from the outside. From this deterministic character of the laws of classical mechanics, profound and probably incorrect philosophical conclusions have been drawn in the past and even applied to human history. Lying at the most basic level of physics, the laws of mechanics are characterized by certain symmetry properties, as exemplified in the aforementioned symmetry between action and reaction forces. Other symmetries, such as the invariance. The symmetry properties of the theory can be shown to have as mathematical consequences basic principles known as conservation laws, which assert the constancy in time of the values of certain physical quantities under prescribed conditions. The conserved quantities are the most important ones in physics; included among them are mass and energy in relativity theory, mass and energy are equivalent and are conserved together, momentum, angular momentum, and electric charge. The study of gravitation This field of inquiry has in the past been placed within classical mechanics for historical reasons, because both fields were brought to a high state of perfection by Newton and also because of its universal character. No further principles are required to understand the principal aspects of rocketry and space flight although, of course, a formidable technology is needed to carry them out. By measuring the transmission of laser signals between the spacecraft essentially a giant Michelson interferometer in space, scientists hope to detect and accurately measure gravity waves. The modern theory of gravitation was formulated by Albert Einstein and is called the general theory of relativity. Completed in, the theory was valued for many years mainly for its mathematical beauty and for correctly predicting a small number of phenomena, such as the gravitational bending of light around a massive object. Only in recent years, however, has it become a vital subject for both theoretical and experimental research. Curved space-time The four dimensional space-time continuum itself is distorted in the vicinity of any mass, with the amount of distortion depending on the mass and the distance from the mass. The study of heat, thermodynamics, and statistical mechanics Heat is a form of internal energy associated with the random motion of the molecular constituents of matter or with radiation. Temperature is an average of a part of the internal energy present in a body it does not include the energy of molecular binding or of molecular rotation. An isolated body eventually reaches uniform temperature, a state known as thermal equilibrium, as do two or more bodies placed in contact. The

formal study of states of matter at or near thermal equilibrium is called thermodynamics ; it is capable of analyzing a large variety of thermal systems without considering their detailed microstructures. First law The first law of thermodynamics is the energy conservation principle of mechanics i. Second law The second law of thermodynamics asserts that heat will not flow from a place of lower temperature to one where it is higher without the intervention of an external device e. The concept of entropy involves the measurement of the state of disorder of the particles making up a system. For example, if tossing a coin many times results in a random-appearing sequence of heads and tails, the result has a higher entropy than if heads and tails tend to appear in clusters. Another formulation of the second law is that the entropy of an isolated system never decreases with time. Third law The third law of thermodynamics states that the entropy at the absolute zero of temperature is zero, corresponding to the most ordered possible state. Statistical mechanics The science of statistical mechanics derives bulk properties of systems from the mechanical properties of their molecular constituents, assuming molecular chaos and applying the laws of probability. Regarding each possible configuration of the particles as equally likely, the chaotic state the state of maximum entropy is so enormously more likely than ordered states that an isolated system will evolve to it, as stated in the second law of thermodynamics. Such reasoning, placed in mathematically precise form, is typical of statistical mechanics , which is capable of deriving the laws of thermodynamics but goes beyond them in describing fluctuations i. An example of a fluctuation phenomenon is the random motion of small particles suspended in a fluid , known as Brownian motion. Left Random motion of a Brownian particle; right random discrepancy between the molecular pressures on different surfaces of the particle that cause motion. Quantum statistical mechanics plays a major role in many other modern fields of science, as, for example, in plasma physics the study of fully ionized gases , in solid-state physics, and in the study of stellar structure. Particles with electric charge interact by an electric force , while charged particles in motion produce and respond to magnetic forces as well. Many subatomic particles, including the electrically charged electron and proton and the electrically neutral neutron, behave like elementary magnets. On the other hand, in spite of systematic searches undertaken, no magnetic monopoles, which would be the magnetic analogues of electric charges, have ever been found. The field concept plays a central role in the classical formulation of electromagnetism, as well as in many other areas of classical and contemporary physics. The field describing the electric force between a pair of charged particles works in the following manner: Classical electromagnetism is summarized by the laws of action of electric and magnetic fields upon electric charges and upon magnets and by four remarkable equations formulated in the latter part of the 19th century by the Scottish physicist James Clerk Maxwell. The latter equations describe the manner in which electric charges and currents produce electric and magnetic fields, as well as the manner in which changing magnetic fields produce electric fields, and vice versa. The light to which the human eye is sensitive is but one small segment of an electromagnetic spectrum that extends from long-wavelength radio waves to short-wavelength gamma rays and includes X-rays , microwaves , and infrared or heat radiation. Radio waves, infrared rays, visible light, ultraviolet rays, X-rays, and gamma rays are all types of electromagnetic radiation. Radio waves have the longest wavelength, and gamma rays have the shortest wavelength. Optics Because light consists of electromagnetic waves, the propagation of light can be regarded as merely a branch of electromagnetism. However, it is usually dealt with as a separate subject called optics: More recently, there has developed a new and vital branch, quantum optics , which is concerned with the theory and application of the laser , a device that produces an intense coherent beam of unidirectional radiation useful for many applications. Spectrum of white light by a diffraction grating. With a prism, the red end of the spectrum is more compressed than the violet end. The formation of images by lenses , microscopes , telescopes , and other optical devices is described by ray optics, which assumes that the passage of light can be represented by straight lines, that is, rays. The subtler effects attributable to the wave property of visible light, however, require the explanations of physical optics. One basic wave effect is interference , whereby two waves present in a region of space combine at certain points to yield an enhanced resultant effect e. Another wave effect is diffraction , which causes light to spread into regions of the geometric shadow and causes the image produced by any optical device to be fuzzy to a degree dependent on the wavelength of the light. Optical instruments such as the interferometer and the diffraction grating can be used for measuring the

wavelength of light precisely about micrometres and for measuring distances to a small fraction of that length.

Atomic and chemical physics One of the great achievements of the 20th century was the establishment of the validity of the atomic hypothesis, first proposed in ancient times, that matter is made up of relatively few kinds of small, identical parts—namely, atoms. However, unlike the indivisible atom of Democritus and other ancients, the atom, as it is conceived today, can be separated into constituent electrons and nucleus. Atoms combine to form molecules, whose structure is studied by chemistry and physical chemistry; they also form other types of compounds, such as crystals, studied in the field of condensed-matter physics. Such disciplines study the most important attributes of matter not excluding biologic matter that are encountered in normal experience—namely, those that depend almost entirely on the outer parts of the electronic structure of atoms. Only the mass of the atomic nucleus and its charge, which is equal to the total charge of the electrons in the neutral atom, affect the chemical and physical properties of matter.

Millikan oil-drop experiment Between and the American physicist Robert Millikan conducted a series of oil-drop experiments. By comparing applied electric force with changes in the motion of the oil drops, he was able to determine the electric charge on each drop. He found that all of the drops had charges that were simple multiples of a single number, the fundamental charge of the electron. Although there are some analogies between the solar system and the atom due to the fact that the strengths of gravitational and electrostatic forces both fall off as the inverse square of the distance, the classical forms of electromagnetism and mechanics fail when applied to tiny, rapidly moving atomic constituents. Atomic structure is comprehensible only on the basis of quantum mechanics, and its finer details require as well the use of quantum electrodynamics QED. Atomic properties are inferred mostly by the use of indirect experiments. Of greatest importance has been spectroscopy, which is concerned with the measurement and interpretation of the electromagnetic radiations either emitted or absorbed by materials. These radiations have a distinctive character, which quantum mechanics relates quantitatively to the structures that produce and absorb them. It is truly remarkable that these structures are in principle, and often in practice, amenable to precise calculation in terms of a few basic physical constants:

Condensed-matter physics This field, which treats the thermal, elastic, electrical, magnetic, and optical properties of solid and liquid substances, grew at an explosive rate in the second half of the 20th century and scored numerous important scientific and technical achievements, including the transistor. Among solid materials, the greatest theoretical advances have been in the study of crystalline materials whose simple repetitive geometric arrays of atoms are multiple-particle systems that allow treatment by quantum mechanics. Because the atoms in a solid are coordinated with each other over large distances, the theory must go beyond that appropriate for atoms and molecules. Thus conductors, such as metals, contain some so-called free electrons, or valence electrons, which are responsible for the electrical and most of the thermal conductivity of the material and which belong collectively to the whole solid rather than to individual atoms. Semiconductors and insulators, either crystalline or amorphous, are other materials studied in this field of physics. Brattain, and William B. Other aspects of condensed matter involve the properties of the ordinary liquid state, of liquid crystals, and, at temperatures near absolute zero, of the so-called quantum liquids. The latter exhibit a property known as superfluidity completely frictionless flow, which is an example of macroscopic quantum phenomena. Such phenomena are also exemplified by superconductivity completely resistance-less flow of electricity, a low-temperature property of certain metallic and ceramic materials. Besides their significance to technology, macroscopic liquid and solid quantum states are important in astrophysical theories of stellar structure in, for example, neutron stars.

Nuclear physics This branch of physics deals with the structure of the atomic nucleus and the radiation from unstable nuclei. About 10,000 times smaller than the atom, the constituent particles of the nucleus, protons and neutrons, attract one another so strongly by the nuclear forces that nuclear energies are approximately 10⁷ times larger than typical atomic energies. Quantum theory is needed for understanding nuclear structure. Particle tracks from the collision of an accelerated nucleus of a niobium atom with another niobium nucleus. The single line on the left is the track of the incoming projectile nucleus, and the other tracks are fragments from the collision. Courtesy of the Department of Physics and Astronomy, Michigan State University

Like excited atoms, unstable radioactive nuclei either naturally occurring or artificially produced can emit electromagnetic radiation. The energetic nuclear photons are called gamma rays. Radioactive nuclei

also emit other particles: A principal research tool of nuclear physics involves the use of beams of particles e . Recoiling particles and any resultant nuclear fragments are detected, and their directions and energies are analyzed to reveal details of nuclear structure and to learn more about the strong force. A much weaker nuclear force, the so-called weak interaction, is responsible for the emission of beta rays. Nuclear collision experiments use beams of higher-energy particles, including those of unstable particles called mesons produced by primary nuclear collisions in accelerators dubbed meson factories. Exchange of mesons between protons and neutrons is directly responsible for the strong force. For the mechanism underlying mesons, see below Fundamental forces and fields. In radioactivity and in collisions leading to nuclear breakup, the chemical identity of the nuclear target is altered whenever there is a change in the nuclear charge.

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The main branches of science Main Branches of Science Mainly Science is divided into four main branches. They are, Natural Sciences Formal Sciences Applied Sciences Each of these branch have sub braches according to the nature of the subject. And also there are overlapping science subjects. These subjects build with two sub branches of above main subject areas. The Formal Sciences act as a tools for both Natural and Social Sciences for build the applied science area. As I mention above all of this areas are bound with each other. If you are a student you may study about biology , Chemistry and Physics under the name of science subject. So, Sometime you may say these three subjects are the main branches of science. But these three study areas are only sub branches of the natural sciences. But when we consider about the all of studies, it can be identify these major four categories. If you are going to talk about only about the chemistry, biology and physics. You have to divide these three gems under Life science and Physical science, sub branches of natural sciences. What are The Natural Sciences? Do you want to learn about the universe? Then, this is your major study area. Explain the various rules of the nature by using the scientific method known as the natural sciences. Scientists observe their environment and identify a specific problem or get a problem from the day to day that bonded with the nature. Then they are apply the scientific method to find the solution or explain the problem. The scientific method is the main procedure for do a standard research. The Physical Science is an important branch of science. If we consider all branches of Science the physical science can introduce as the platinum subject area. Subject areas of physical sciences, This valuable science subject area has four sub subject areas they are, Physics Space Science Earth Science All science lovers know the value about these subjects. Actually the modern technical world totally depends on the explanation of the Physics. The transistors are invented through the theories of the physics. What the electricians are do, they combine this transistors with logics and make a useful application for the human. Like this we can explain the importance of these subjects. The Science of matter, Chemistry. The chemistry is the study of matter and its changes with different conditions. But some one can Argive the physics also say about the matter. But chemistry study deeply about the matter. The matters that found on earth can be categorized into organic and inorganic materials. And also all matters are made up of atoms. For study these matters there are three main branches of chemistry, Organic Chemistry Nuclear Chemistry In organic chemistry chemists study about the carbon based matters and make affordable applications to the world. Other all matters on the earth study through the inorganic chemistry. The nuclear chemistry subject provides you the knowledge of the atom. Such as structure, energy changes and other all physical phenomenons combines with the atomic level. This main chemistry subjects also includes overlapping sub branches, for example the organometallic chemistry is the study area of the matters that made up of carbon and transition metals. The science of systems, Physics The physics can be used to describe about the all non-living and living systems. It is able to describe how the system is place on the space, the motion of the system and other physical properties. There are two types of study area of physics. The classical physics and the quantum physics. The classical physics also known as the Newtonian Physics. The study area of the nano level of matter is known as nanoscience. Nanoscience is study under both of chemistry and physics. The science of space, Space Science. Even a child also like to know about the space. Specially planets, stars, black holes etc. Under astronomy in briefly we can say its study about the visible space. The study area about the whole universe known as cosmology. Another interesting and endless subject area. The science of our living planet, Earth Science. There are lot of curious things in the earth to study. The study are about the lithosphere is known as the geology. And the study area of hydrosphere atmosphere and biosphere includes under the ecology subject area. I think all of physical things that we know can be include to one of above section discussed under the physical science. Also it is important to distinguish different between physics and physical science. What is Life Science? Scientists gives only the characteristics when describe the life. So, there are lot of things to study in the living word. All living things are study under

the life science or known as biology. Then zoology is your subject. In zoology it is study about the large kingdom of animals deeply Or Love plants? Then you are a Botanist. Study deeply about the kingdom of plant known as the Botany. The tool of the life science known as molecular biology. In molecular biology study about the molecular level of all living things. Likes biomolecules, metabolism pathways etc. What are the Formal Sciences? The difference between natural science and formal science is, in formal science all theories are not going to prove with the real word like natural sciences. All theories in the formal science comes with the human imaginations. Mathematics Statistics Decisions All of above sciences are need to be study under care and according to a system. For this the mathematics can be used as a tool. There for this subject area is used for computer science as a tool. All scientific researches need the statistics as a tool for organize and analyze the data and results of the research. Subjects likes economics, philosophy study under the decisions. What are the Social Sciences? Want to study about law, History, relationship among human, languages like subjects? Then you have to collect knowledge under the social sciences. After development of the technology the study through the social science is getting easier due to social networks. What are The Applied Sciences? All other three science branches study about the theory of the particular subjects. Therefor the applied science area came in to the science subjects. Actually this is very important branch of science. Becorse, we want application from science rather than knowing the theories. All of industrial applications come with the applied sciences studies. Also all of science subjects have an applied science area for example, applied physics, applied mathematics, Applied Biology etc. Overlapping Science Subject areas. When we consider the all of different science subject areas. It can be introduce new study area by combining two of these science subjects. Biochemistry The combination of Biology and Chemistry make a new study area known as the Biochemistry. Geophysics The Combination of the Gelogogy and Physices sub subjects areas makes the geophysics subject Biostatistics. The biology from natural sciences and statistics as a tool from formal sciences can be combined and then known as bio statistics. Study the life of outer the earth known as the astrobiology. Astronomy comes from space sciences and biology come from the natural sciences. Like this Human can make lot of studying areas by combining science subjects. Branches Of Science Complete Summary The Board area of science can be categorized according to the following table with four main branches.

Chapter 8 : Definition of Science The Branches of Science and their Meaning | CM CS - blog.quintoapp.co

Distance learning physics clears all basics and advanced college physics concepts in easy language. A brief view of the branches of physics is presented.

Physics Concepts Distance Learning Physics We have introduced distance learning physics, which explains all concepts of physics in a very easy language for beginners and physics lovers. Learn physics online and clear your concepts. Thanks Physics is defined as "The branch of science in which the study of the properties of matter and energy along with the interaction between them is undertaken. Main Branches of physics Subjects studied within the scope of physics are called branches of physics. The conventional branches of physics are: With the rapid development in physics, its scope grew so large that it is not possible to cover physics under the above branches. A number of new branches have been introduced. A brief view of the branches of physics are: It is concerned with the motion of material objects or particles under the action of forces. It deals with heat, as a form of energy as well as with the transmission of heat energy by means of conduction, convection and radiation. It deals with the nature of light and with the propagation, reflection, refraction, dispersion and the wave properties of light. Optical instruments are also discussed in this branch of physics. It is concerned with the study of static as well as moving charges and the physical phenomena that occur due to the effects of the charges. Matter is composed of atoms. Atomic physics is concerned with the structure and characteristic properties of individual atoms. The physics of the nucleus of an atom is called nuclear physics. Solids have some special properties. The study of the physical properties of solids is called solid state physics. Besides protons, neutrons and electrons, a good number of other fundamental particles have been observed. The study of the fundamental particles and the search for finding a relation between them is called elementary particle physics. When gaseous matter is raised to very high temperature, its atoms lose all their electrons. Such ionized state of matter is called plasma. Some scientists consider plasma, bare nuclei and free electrons as the fourth state of matter. The physics of plasma is known as plasma physics. The study of the physical properties of heavenly bodies, the interaction of matter and energy going on within these bodies and the study of the space between them is called as astrophysics. The study of biology based on the principles of physics is called biophysics. The study of earth, its structure and its atmosphere on the principles of the physics is called geophysics. This branch of physics is concerned with the effects of radioactive rays on living bodies as well as with the methods of safeguarding against the harmful effects of radioactivity. Role of Physics In the modern world the electric power we use in our homes and industries generated at the power stations is produced on the principle of induced emf due to the changing flux of a magnetic field. Lasers, which are widely used in medical science, metallurgy, astronomy and defense derive their principles from atomic physics. Nuclear energy is used on a large scale to produce electric power. Electronic appliances, which are in common use owe their existence to the research in solid-state physics. Automobile technology is based on the principle of thermodynamics. Radar technology is indebted to the principle of reflection and detection of electromagnetic waves. We see that from a small household appliance to a space exploring problem everywhere principles and laws of physics are being exploited. Thus, physics is playing a vital role in shaping our life style and influencing our way of thinking. Physics page "Newton 2nd law of motion and units for force" added About Fulllibrary.

Chapter 9 : Physics - Wikipedia

Modern physics is a branch of physics that is mainly concerned with the theory of relativity and quantum mechanics. Albert Einstein and Max Plank were the pioneers of modern of physics as the first scientists to introduce the theory of relativity and quantum mechanics, respectively.