About this course

General Physics, PHY 141, 142

These introductory courses present a survey of the description of nature given by physics. With few exceptions, the description given is that of "classical" physics, which is what physicists understood reasonably well in the 1890s, before the revolutionary discoveries of quantum theory and relativity.

> The impact of those discoveries mainly involves the very small and the very fast, which require special instruments to explore them experimentally, so what these courses cover is a description of nature as we observe it with our own senses.

The physicist's description of nature

The goal of physics is to develop a general and comprehensive quantitative description of nature as revealed by experimental observation. Anything in the natural universe that is susceptible to reliable quantitative measurement is within the purview of physics, from sub-nuclear phenomena to the evolution of galaxies. It is assumed that nature is rational, in the sense that there are principles one can discover that are obeyed unfailingly by natural phenomena. So far there has been found no reason to doubt this.

Classical physics

These courses present a scientific framework that has been developing since ancient times, but especially since the time of Galileo and Newton. It describes with high accuracy the behavior of objects large compared to atoms and moving slowly compared to light. We now know that this description is an approximation to a more comprehensive account — which is still being developed. But it is an excellent approximation in most respects, and worth knowing in its own right.

The first course concerns the laws of mechanics, of how things move and why. It begins with the description of a single very small object called a particle. The laws governing its behavior are then generalized to systems of particles, including solid objects, fluids and gases. Special attention is given to the fundamental interaction called gravity, and to the collective motion called waves.

The second course is concerned mainly with electromagnetic phenomena, including light. The emphasis is less on particles than on fields and their properties.

Why study physics?

Why study anything? Presumably to learn what those before us have found important. Physics has developed the most sweeping and accurate description yet given to anything by anybody. It has immediate practical use: it underlies a large part of engineering practice, among other applications. And it allows us to understand things we have seen but never really understood, from the twice daily tides to the varied colors at sunset. Surely it is worth study — even if nobody required you to do it.