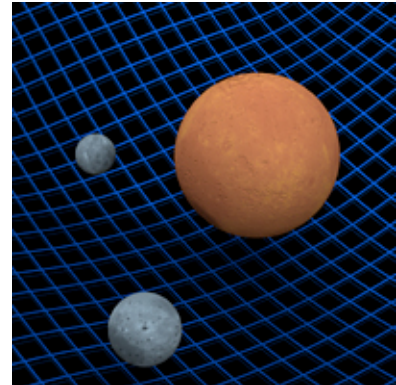


Space, Time and Motion

Throughout history, people have grappled with fundamental questions about the physical origin, workings, and behavior of the universe. This course explores our changing comprehension of motion, time, space, and matter through the ideas of the ancient Greek philosophers, Galileo, Newton, and Einstein. You'll learn how physicists measure mass, weight, and the speed of light, and how these basic measures relate to the nature of time, thermodynamics, Einstein's theories, and the wider social sphere.



Key Science Concepts:

- **Great thinkers** such as Galileo Galilei, Isaac Newton, James Clerk Maxwell, and others **provided a foundation** for Albert Einstein's revolutionary theories.
- $E=mc^2$ —Einstein's famous equation—shows that mass and energy are manifestations of the same thing.
- According to Einstein's **Special Theory of Relativity**, our common-sense notions of space, time and motion must be radically revised at speeds approaching the speed of light.
- **Einstein's conception of the photon as a "particle of light" that behaves like a wave** paved the way for the development of quantum mechanics and modern electronics.
- Einstein's **General Theory of Relativity**, the modern theory of gravitation, shows that mass bends space and space determines how mass moves. It explains many astrophysical phenomena, such as the curvature of space and the existence of black holes.
- Physicists are working on a **unifying theory** that would resolve apparent contradictions between the two main pillars of modern physics—general relativity and quantum mechanics.
- Einstein's work on the relationship between mass and energy and the subsequent development of nuclear power and nuclear weapons is a potent example of the **social and political implications of scientific research**.

Authoring Scientists:

Dr. Orsola De Marco, a research fellow at the American Museum of Natural History, says Albert Einstein is the reason she became an astrophysicist. "Many people had telescopes when they were young, and then they became astronomers. I had Einstein. He was my childhood love," explains Orsola. She also has other responsibilities at the Museum: teaching a course on stellar death and advising on the Museum's weekly astrophysics news bulletin.



Dr. Charles Liu, an astrophysicist at the American Museum of Natural History, clearly takes great delight in his work. As he explains the intricacies of what happens when galaxies collide, a smile spreads across his face. "Astronomy is just really fun," he says. In addition to his research, Charles shares his passion for astronomy by giving public lectures, teaching university-level astronomy classes, and writing popular science books and articles.

