

# Physics Around Us

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*Lifelong Learning Program, Fall 2021*

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## Course Summary

Physics is an experimental science based on observation of the world around us. I will use everyday examples to illustrate principles of physics, in a non-mathematical, descriptive fashion.

### 1 Physics of Motion

What is the physics involved when we drive a car, fly or walk? How do we describe various forms of motion? What happens when we throw an object? Observing and describing motion goes back a long way in history with a range of characters from Aristotle, Galileo and his father, to Newton and Einstein involved in the development of this topic.

### 2 Energy, Power, and Temperature

We will look at the interesting concepts of energy and power and show how they can be used to model everyday processes. We will also introduce temperature, a way of quantifying average energy of solids, liquids and gases.

### 3 Electricity and Magnetism

We are familiar with electricity in the house – we use it for lighting, heating and many other household tasks. Many of us also have fridge magnets. We will explore what electricity actually is, how it powers things, and how electricity and magnetism are intertwined.

### 4 Light and Sight

Light and sight are very important for the human species. We will look at lenses, optical instruments such as cameras, microscopes, telescopes, as well as the marvel of biological engineering, the human eye.

### 5 Sound and Hearing

We will cover waves, and combinations of waves, and various observable phenomena such as the Doppler Effect. We will draw examples from music, ultrasound medical imaging and musical instruments in describing these topics.

### 6 Lightbulbs, Quantum Physics and Cooking

We will explore the physics of lighting our homes and cooking. Both of these basic necessities require application of quantum physics.

## Recommended Reading

There is no one set book for this course, but here are a few suggestions which will be of interest.

*“A Short History of Nearly Everything”, by Bill Bryson.*

This is a light-hearted look at science from the well-known author. It’s surprisingly good on the big picture of science, and Bryson does come up with some amusing anecdotes about science, and scientists.

*“A Brief History of Time”, by Stephen Hawking.*

This is probably the best known science book by one of the most eminent and best known physicists of the present day. It’s not a textbook, but nevertheless is quite a demanding read. It also looks good on your coffee-table.

*“Cosmos” by Carl Sagan (original version) or “Cosmos: A Spacetime Odyssey” by Neil deGrasse Tyson*

The late Carl Sagan was a tireless populariser of science, and this is still one of the finest books on science and the universe. It’s beautifully illustrated too. Twenty years later, the astrophysicist Neil deGrasse Tyson produced a follow-up series, with some updated science. This too, is a classic TV series.

*“The Science Book: Everything You Need to Know About the World, and How It Works” by National Geographic magazine, with a foreword by the splendidly named Marshall Brain.*

A wonderfully illustrated book, as you would expect from National Geographic. It’s overambitious, so the depth of the science is not that great, but it does give a good overview of things.