

FALL SEMESTER (12 classes)

- **Introduction to Scientific Method:** observations, data, hypothesis, experiment, conclusion.
- **Data and its presentation:** variables, tables and graphs.
- **Measurement:** the history of measurements (length, mass, volume); units; concept of measurement accuracy/precision/bias; Imperial/US customary Systems of Measurement; Metric System and International System of Units; scientific notation; conversion of units (dimensional analysis); orders of magnitude.
- **What is matter? Matter in Physics:** atoms; volume and density; states of matter (solid, liquid, gas, plasma); phases of matter.
- **Matter in Chemistry:** chemical elements, compounds, mixtures; molecules.
- **Change of matter:** phase transitions and chemical reactions.
- **Energy:** mechanical, heat, chemical, electromagnetic, nuclear; energy transfer.
- **What is atom?** Concept of a model in science; discovery of electron, nucleus, proton; atomic models; modern view of the atom.
- **(Time permitting☺) What is time?** History and methods of time measurement.

SPRING SEMESTER (18 classes)

- **Nuclear reactions:** isotopes, radioactivity, background radiation; nuclear fusion, nucleosynthesis; nuclear fission, nuclear chain reaction, Manhattan project, atomic bomb; nuclear power.
- **What is light?** Observed properties and behavior of light; famous experiments; modern concept; electromagnetic spectrum; light source and intensity; color of light; the Sun spectrum.
- **Light meets matter:** transmission, refraction, dispersion, reflection, absorption, scattering; apparent colors; vision.
- **What is life? The cell:** discovery, theory, diversity; microscopes; biomolecules; general cell types; organelles.
- **DNA:** gene, genome, genetic code; mutation.
- **Bacteria:** characteristics, types, reproduction; helpful and pathogenic bacteria; antibiotics.
- **Viruses:** discovery, general characteristics, replication; immune response; vaccination.