

Physics 2 program

1. Electricity.

- a) Static electricity
 - 1. Charges and ways to charge objects (contact and inductive). Static cling. Conservation of charge. **2 Hours**
 - 2. Electric force. Coulomb's law. **2 Hours**
 - 3. Electric field. **1 Hour**
 - 4. Electric potential energy (point charges). Potential. (special attention to signs, examples). **2 Hours**
- b) Electric current
 - 1. Insulators, conductors and semiconductors. **1 Hour**
 - 2. Why does the electric current flow? Voltage. **1 Hour**
 - 3. Resistivity, resistance and resistors. **1 Hour**
 - 4. Ohm's law. **1 Hour**
 - 5. Parallel and series connection of resistors. **1 Hour**
 - 6. Ideal and real voltage sources. Internal resistance. **1 Hour**
 - 7. Basic circuits. Kirchhoff rules. Nodal analysis. **3 Hours**
 - 8. Electrical capacitance and capacitors. **1 Hour**
 - 9. Parallel and series connection of capacitors. **1 Hour**
 - 10. Direct and alternating current. Why can capacitors pass alternating current? **1 Hour**
- c) Introduction to Magnetism
 - 1. Magnets. **1 Hour**
 - 2. Magnetic field. **1 Hour**
 - 3. Magnetic (Lorentz) force. **1 Hour**

2. Atomic structure of matter

- 1. Discovery of electron. J.J.Thomson's "plum pudding" model. **1 Hour**
- 2. Ernest Rutherford and Geiger-Marsden experiment. Planetary model of atom. **1 Hour**
- 3. Why don't the electrons fall to the nuclei? **1 Hour**
- 4. Protons and neutrons. What holds the protons together in an atomic nucleus? **1 Hour**
- 5. Mendeleev's periodic table of elements. Why it is "periodic"? **2 Hours**
- 6. What is chemical reaction? **1 Hour**
- 7. Radioactivity. **1 Hour**