Syllabus:

All Handouts and Lectures for this unit:

Labs:

**Atomic and Nuclear:**

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|  Objectives     |  Chin Wag     |  Other Stuff |
|  Review electromagnetic waves and spectrum             |   |   |
|  Understand black body radiation, and Planck's equation. |   |   |
|  Do calculations with photons. |   |   |
|  Understand the difference between wave and photon descriptions of light, and what is meant by complementarity. |   |   |
|  Understand and solve problems with the photo-electric effect |   |   |
|  Understand de Broglie's matter wave hypothesis, and solve calculations with matter waves. |   |   |
|  Describe early atomic models of Thomson and Rutherford. |   |   |
|  Solve problems of closest approach. |   |   |
|  Understand the Bohr atom and make energy level calculations. |   |   |
|  Understand and do calculations with the Heisenberg uncertainty principle. |   |   |
|  Understand the Copenhagen Interpretation. |   |   |
|  Understand the issues behind the Einstein-Bohr debate. |   |   |
|  Introduction to Nuclear Physics - atomic notation, neutrons, isotopes, and the chart of the nuclides. |   |   |
|  Calculating the binding energy of a nucleus, and what it means. |   |   |
|  Understand radioactivity, and know what the types of radiation are. |   |   |
|  Predict the effects of a particular decay on the nucleus. |   |   |
|  Understand what a decay series is. |   |   |
|  Calculate the energy of an alpha decay. |   |   |
|  Understand what is meant by "tunneling" |   |   |
|  Understand what Beta decay is |   |   |
|  Understand Gamma decay, and do calculations with Gamma decay. |   |   |
|  Do calculations with activity. |   |   |
|  Do calculations with decay rate, activity and half life. |   |   |
|  Understand how radiometric dating works |   |   |
|  Understand the stability of a nucleus |   |   |
|  Be able to use nuclear reaction notation and balance nuclear reactions. |   |   |
|  Calculate the energy released or required for a nuclear reaction.  |   |   |
| Understand a what a nuclear fission reaction is. |   |   |
|  Understand the events leading up to the dropping of the bomb on Hiroshima. |   |   |
|  Understand what a nuclear fusion reaction is. |   |   |
|  Understand the curve of binding energy and how to predict fusion vs fission. |   |   |
|  Understand basic issues surrounding nuclear power. |   |   |

**Digital Information Storage: (Where do we put this??)**

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| --- | --- | --- |
|  Convert binary to base ten. |   |   |
|  Convert base ten to binary. |   |   |
|  Understand the advantages of digital storage. |   |   |
|  Understand what is meant by sample rate, and bit depth. |   |   |
|  Understand how data is stored on a CD.     |   |   |
|  Do calculations with pit depth and wavelength. |   |   |
|  Do resolution calculations using the Rayleigh Criterion. |   |   |
|  Know about other media for storage of digital information. |   |   |
|  Solve basic problems with capacitance |   |   |
|  Understand what a CCD device is, and how it works. |   |   |
|  Do capacitance calculations with CCD devices. |   |   |
|  Do magnification, area and voltage calculations with CCD devices. |   |   |