**Optics**

* **Constants**
  + *c* (Speed of Light) = 3.0 x 10 8 m/s
  + *e* (Electron charge) = 1.602 x 10-19 C
  + *m* (Electron rest mass) = 9.106 x 10 -31 kg
  + 1 eV (Electron Volt) = 1.6 × 10 −19 J
  + *h* (Planck constant) = 6.626 x 10 -34 J⋅s
  + k (Boltzmann constant) = 1.3805 x 10-23 J/K
  + ϵ­­0 (Permittivity of vacuum) = 8.854 x 10-12 C2/N-m2
  + µ­0 (Permeability of vacuum) = 4π x 10-7 T-m/A
* ­**Topics**
  + **Introduction** **(note 1 ; ignore history unless you want to add it as a separate topic)**
    - Give brief introduction of light and introduce fundamental equations, units and constants (Ex. E = mc^2 + Ek, 1eV = 1.6E-19 J etc)
  + **Geometrical Optics (note 2)**
    - Talk about reflection and refraction. Introduce snell’s law and law of reflection.
    - Show diagrams of light rays reflecting and refracting on spherical surfaces.
    - Show diagrams of light rays interacting with thin lenses.
  + **Optical Instrumentation (note 3a & 3b)**
    - Talk about Stops, Pupils, and Windows (refers to this: <http://hyperphysics.phy-astr.gsu.edu/hbase/geoopt/stop.html>)
    - Explain the properties of Prisms
    - Relate Geometrical optics to Camera, Magnifying eyepieces, Telescopes and microscopes
  + **Wave Equation (note 4 first half)**
    - Harmonic Waves and Harmonic Wave Functions
    - Electromagnetic waves
    - Light polarization
    - Doppler effect
  + **Superposition of Waves (note 4 second half)**
    - Superposition principle
    - General superposition of waves with the same frequency
  + **Interference of Light (note 5)**
    - Two Beam interference; how 2 beams of light interact with eachother
    - Young’s double slit experiment
    - Dielectric films
    - Newton’s rings
  + **Optical Interferometry (note 6)**
    - Michelson Interferometers
    - Fabry-Perot Interferometers
  + **Coherence (note 7)**
    - Coherence: the correlation between phases of monochromatic radiations
    - Fourier analysis of a Finite Harmonic wave train
    - Temporal Coherence and Line Width
    - Partial Coherence
    - Spatial Coherence
  + **Fraunhofer Diffraction (note 8)**
    - Franhofer diffraction vs Fresnel diffraction
    - Single slit experiment
    - Double slit diffraction
    - Beam spreading
    - Resolution
  + **Diffraction Grating (note 9)**
    - Unblazed gratings
    - Blazed gratings
  + **Matrix Treatment of Polarization (note 10)**
    - Linear polarizer
    - Phase retarder
    - Rotator
    - Jones vector
    - Jones matrix

*Note: Use PC237\_summary a for topics 1 to 3 and use PC237\_summary b for the rest*