# LECTURE ONE: Introduction to Light

wavelength of light decreases



as the density of the material through which it is travelling increases but the frequency Light entering a mineral slows down and the remains constant. wavelength ( $\lambda$ ) decreases

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## Wave Normal and Wave Front

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A wave front is a surface that connects the same points on adjacent waves. Wave fronts are one wavelength apart. A wave normal is right angles to the wave front and represents the direction the wave is moving in



## Isotropic VS Anisotropic Minerals

Minerals can be subdivided, based on the interaction of the light ray travelling through the mineral and the nature of the chemical bonds holding the mineral together, into two classes.

**ISOTROPIC:** (a) Same velocity of light in all directions, (b) Wave Normal and Light Ray are parallel, (c) Examples are volcanic glass and minerals of the isometric (cubic) system such as Fluorite, Garnet and Halite.

ANISOTROPIC: (a) Velocity of light is different in different directions, (b) Wave Normal and Light Ray are NOT parallel, (c) Anisotropic minerals belong to tetragonal, hexagonal, orthorhombic, monoclinic and triclinic systems

#### How does light move?

Wave theory, rather than particle theory, effectively describes the phenomena of polarization, reflection, refraction and interference, which

Wave Theory tells us that radiant energy like light has both electrical and magnetic properties and is therefore called **Electromagnetic Radiation**. The electric and magnetic components of light rays vibrate at right angles to each



## **Electromagnetic Spectrum**



#### Polarisation of Light

Light emanating from any source vibrates in all directions at right angles to the direction of propagation and is unpolarized. If the electric vector is constrained to lie within one plane then the light is plane-polarised and vibrates in only one direction.

