Session 10 minutes:

- **Transit method:**
  - **Ingress and Egress**: The phases at which the planet either enters or leaves the portion of the star's disk that we are observing respectively. At 0° the view is called face-on and at 90° edge-on.
  - **Inclination** (i): The inclination is the angle that the orbital plane makes with the line joining earth and the star.
  - **Impact parameter** (b): Projected distance between the center of the stellar disc and the center of the planetary disc at conjunction. It can also be calculated using the light curve of the planet-star system.
  $$b = \frac{a \times \cos(i)}{R}$$
  where a = Semi-major axis and R = Radius of Star

- **Characteristics of exoplanets**:
  - **Radius of exoplanet** (R_a): Using Δf from graph, we can calculate R_a.
  $$R_a = R \times \sqrt{\Delta f}$$
  where Δf = fractional change in luminosity.
  - **Semi-major axis** (a): Using equation (i), we can find a.
  - **Mass and Density**: Using radial velocity, we can find the mass of the planet and subsequently calculate density using the radius of the exoplanet.
  - **Time period**: Using Kepler's law, we can find the time period of the transit.
  $$T = \frac{4\pi^2 a^3}{G \times M_s}$$
  where M_s = Mass of parent star.
  - **Temperature**: Using the star's temperature and Stefan-Boltzmann law, we can find the temperature of an exoplanet.
  $$T_p = T \times \left(\frac{R}{2a}\right)^{1/2} (1 - A)^{1/4}$$
  where A = albedo or reflectivity.
  - **Composition**: Using spectroscopy, we can find the composition of the atmosphere of an exoplanet.

- **Spectral analysis for atmospheric composition**: When an exoplanet passes in front of its star, the planet blocks a small bit of the star's light and a smaller amount of light passes through the atmosphere. Some of the wavelengths get absorbed by the elements present in the atmosphere. By studying the remaining light, we can find the composition of the atmosphere of the exoplanet.