Advanced Dynamics
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Module No # 04
Lecture No # 18
Central Force Motion – II

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We will continue our discussions on central force motion.

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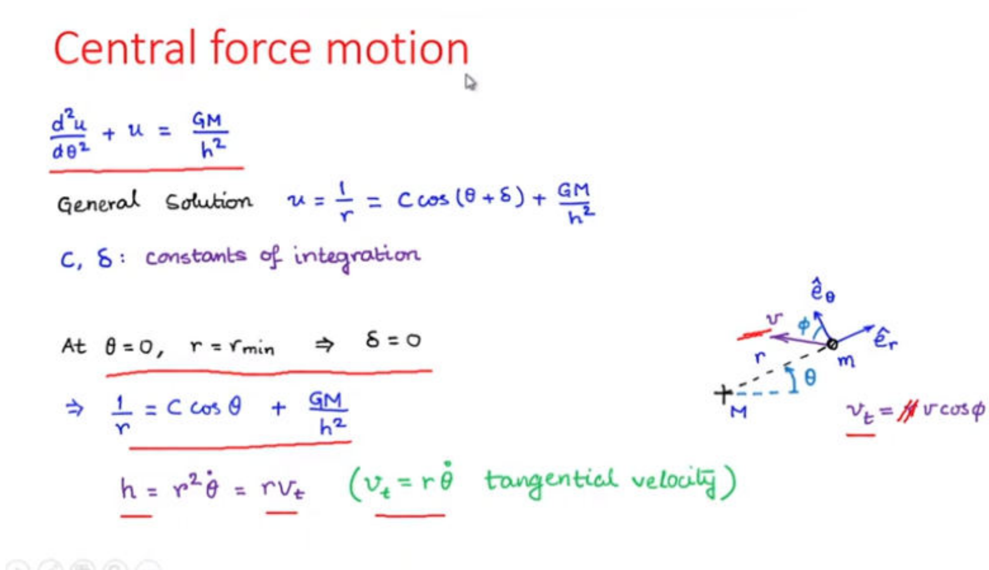

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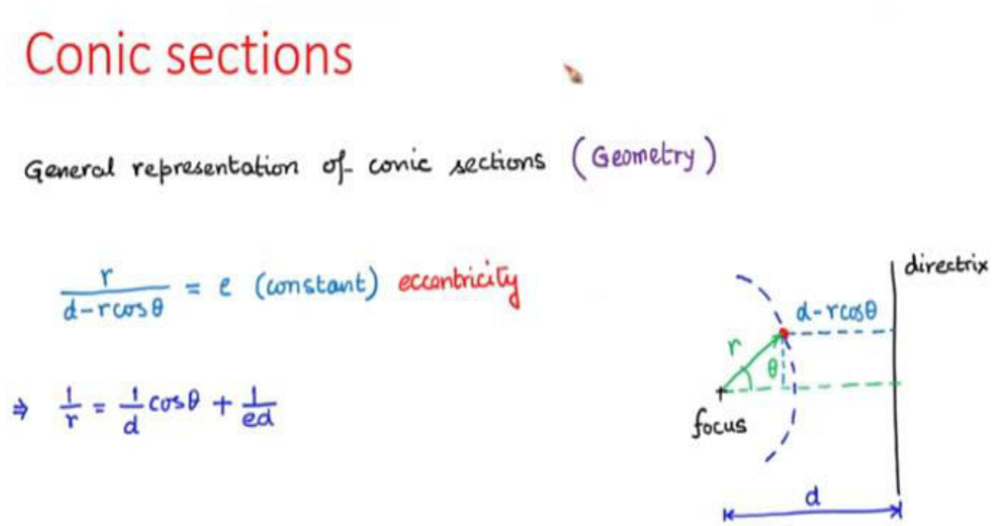

The 2 slides above recapitulate the discussions on the equation of motion of a particle in a central force field, and also presents its solution. This solution is compared with the general representation of conic sections.

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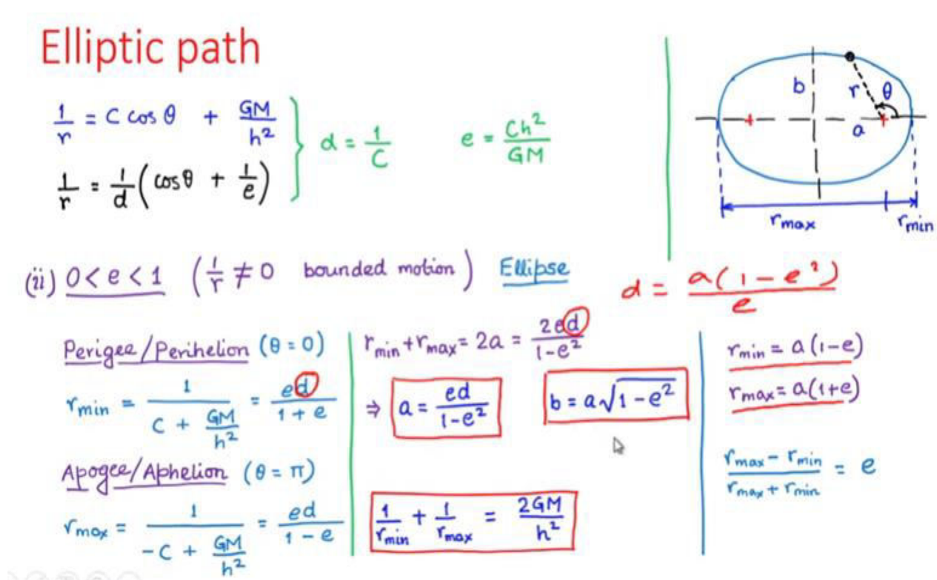

The above slide presents the characteristics of an elliptic path.

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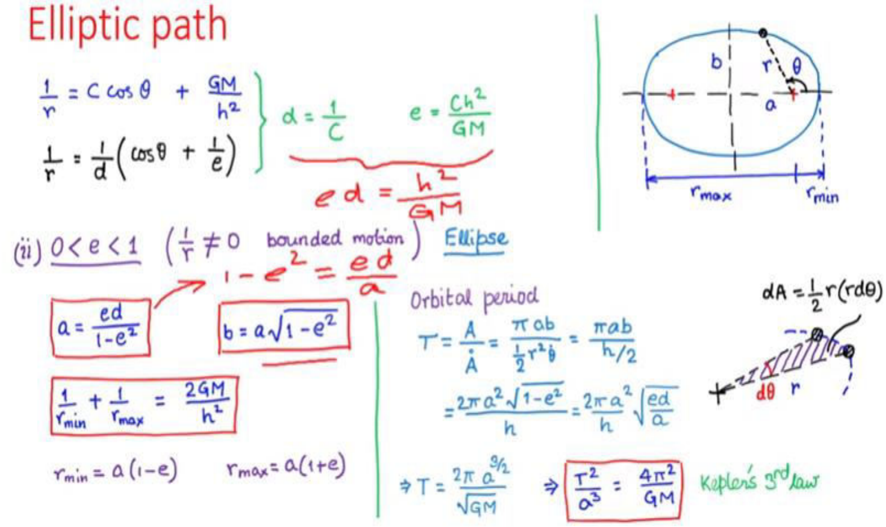

The expression of orbital time period in terms of the semi-major axis of the ellipse clearly shows the validity of Kepler's 3rd law.

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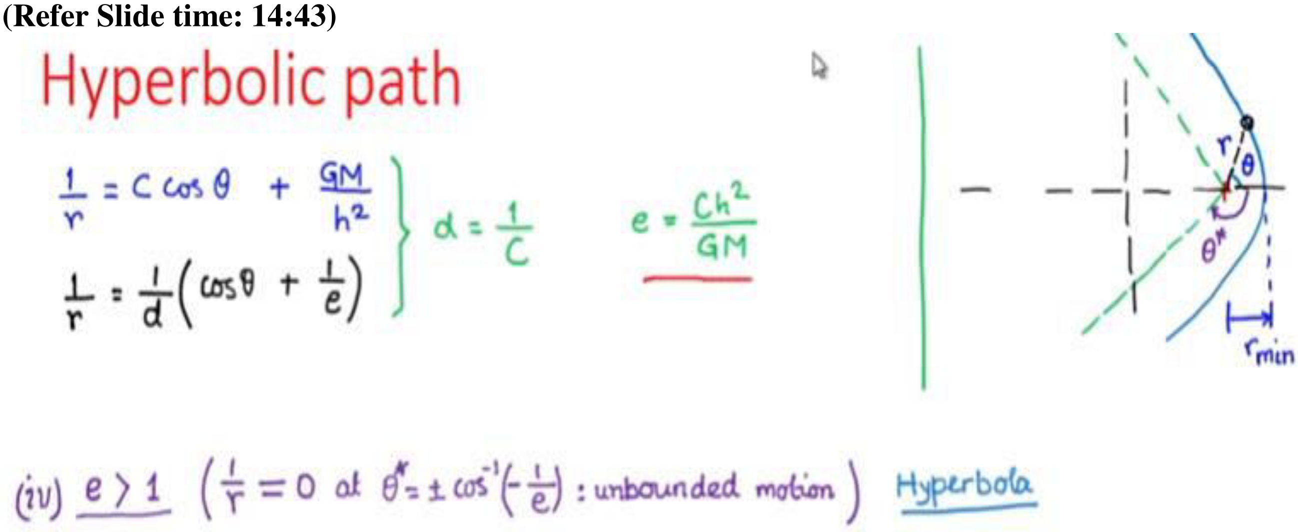

The characteristics of a hyperbolic trajectory is shown above.

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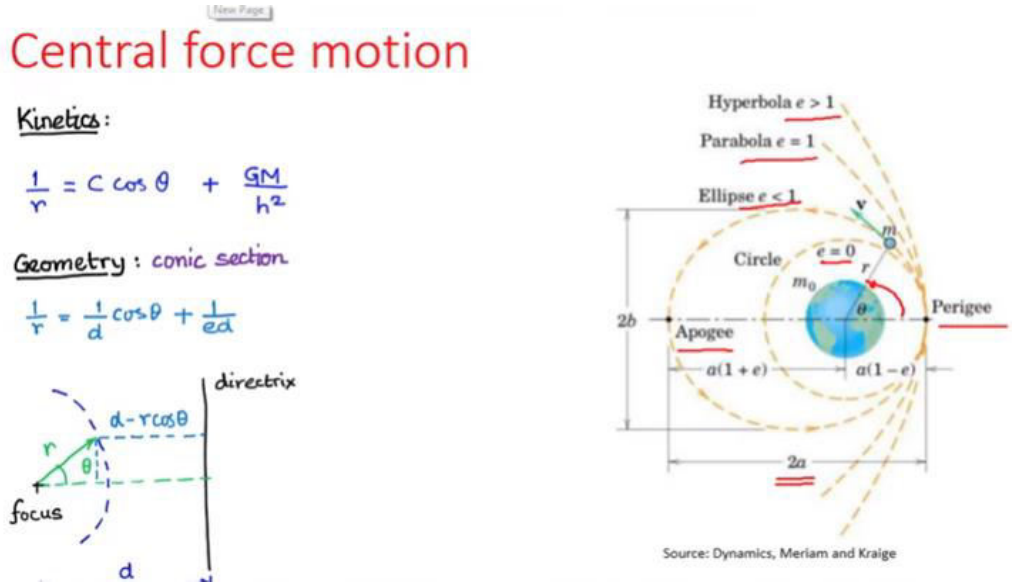

The above slide puts together all kinds of possibilities of motion of a particle under a central force field.

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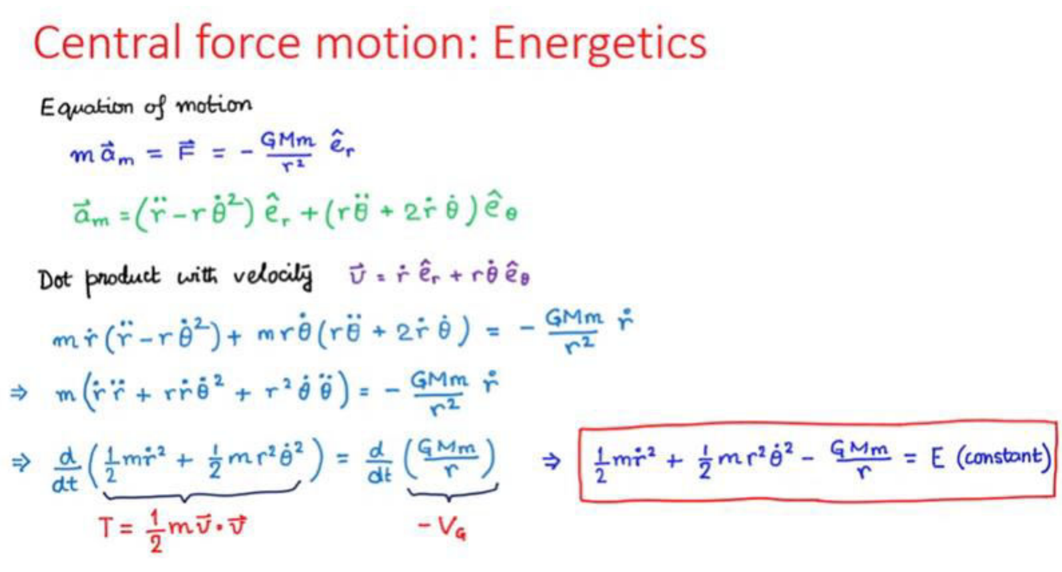

Now we come to the energetics. The energy relation is derived starting from Newton's 2nd law, as shown in the slide above.

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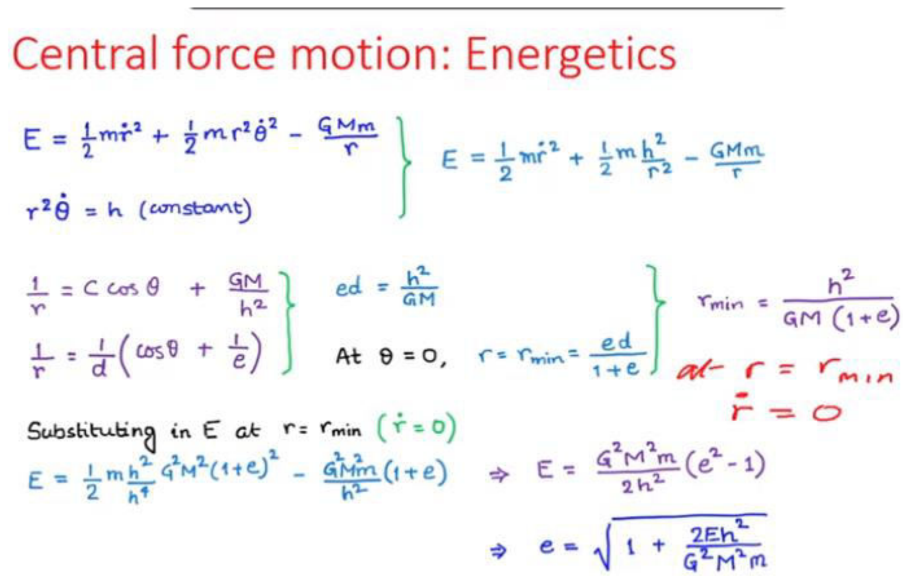

The relation of eccentricity in terms of the energy of the particle is presented in the slide above.

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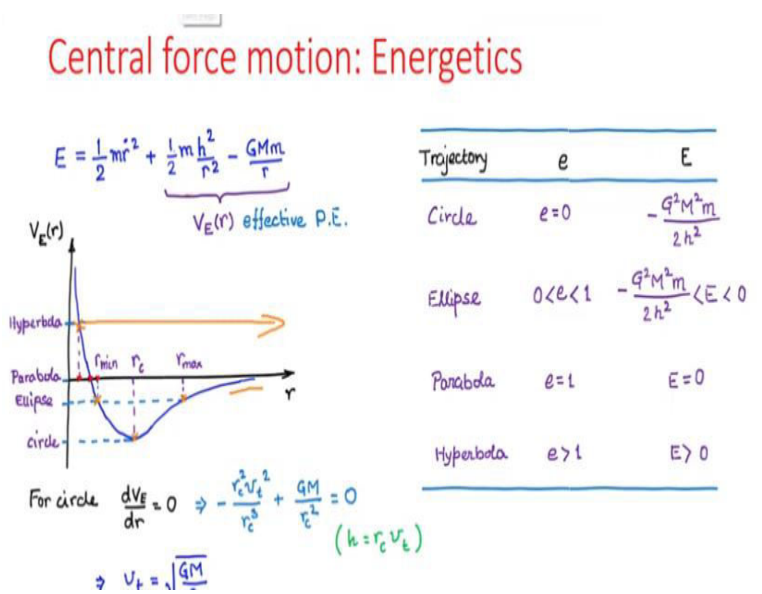

The table above summarizes the eccentricity of the path and energy of the particle on the different kinds of paths possible. It also shows the effective potential energy landscape, and the possibilities of various paths depending on the level of effective potential energy.

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The summary is provided above.