Linear and Angular Momentum
(G = mass center; O = fixed point)

\[ L = mv_G \]
\[ H_G = I_G \omega \]
\[ H_O = I_G \omega + (r_G \times mv_G) \]

Principles of Impulse and Momentum
(G = mass center; O = fixed point)

\[ (mv_G)_1 + \int_{t_1}^{t_2} \sum F_i dt = (mv_G)_2 \]
\[ (I_G \omega)_1 + \int_{t_1}^{t_2} \sum (r_i \times F_i) dt = (I_G \omega)_2 \]
\[ (I_O \omega)_1 + \int_{t_1}^{t_2} \sum (r_i \times F_i) dt = (I_O \omega)_2 \text{ (fixed axis rotation)} \]
\[ (H_O)_1 + \int_{t_1}^{t_2} \sum (r_i \times F_i) dt = (H_O)_2 \text{ (O is a fixed point)} \]

Conservation of Linear Momentum

\[ \sum_i (m_i v_{G_i})_1 = \sum_i (m_i v_{G_i})_2 \]

Impact of Two Bodies A and B
(Contact Point, C; n = impact normal)

\[ e = \frac{(v_{CB})_{n2} - (v_{CA})_{n2}}{(v_{CA})_{n1} - (v_{CB})_{n1}} \]

Conservation of Angular Momentum
(O = fixed point)

\[ \sum_i (H_O)_1 = \sum_i (H_O)_2 \]