Formulas for expected returns and covariances:

(1) Let r_{it}= return of asset *i* for month t, t=1,...,T

(2) Then, the arithmetic average of asset *i* is $\overline{r_i} = \frac{1}{T}\sum_{t=1}^{T} r_{it}$

(3) The geometric expected return of asset *i* is $\mu_i = (\prod_{t=1}^{T}(1 + r_{it}))^{\frac{1}{T}} - 1$

(4) The covariance between assets i and j is $\sigma_{ij} = \frac{1}{T}\sum_{t=1}^{T}(r_{it} - \overline{r_i})(r_{jt} - \overline{r_j})$

Note: Use geometric returns for MVO, the arithmetic returns are need for the covariance computations.