Bond Duration

It measures the sensitivity of a bond price to changes in market interest rates.

If a bond duration is 3: For every 1% increase in interest rates, bond price decreases by 3%

Depends on:

1. Time to maturity. Longer TTM means higher duration (a lot of the bond's value comes from cash flows far in the future, which are more affected by changes in interest rates)
2. Coupon Rate. Larger coupon lower duration (money is paid out earlier via interest payments, so you get your investment back faster and are less sensitive to interest rate changes)

https://www.youtube.com/watch?v=fU7NnRW66vw&ab_channel=RyanO'Connell%2CCFA%2CFRM

Calculate Macaulay Duration:

1. Given coupon, YTM, TTM
2. Compute cash flows: Nominal * coupon % for all years except the last where its nominal * (100% + coupon%)
3. Compute present value: Cash flow / (1 + ytm) ^ year
4. Compute the weighting of the present value for each year: present value / present value summation
5. Duration = for every year, sum of: year * weight of the present value (%)

Bond convexity:

https://www.youtube.com/watch?v=9GOfBq5Go9U&ab_channel=RyanO'Connell%2CCFA%2CFRM