Lecture 1

* Time value of money, DF = exp(-r\*T)
* Forward price = Spot \* exp( (risk free rate – dividend yield – repo)\*T)
* Future price > Forward if the underlying is positively correlated with the risk-free rate
* Future price < Forward if the underlying is negatively correlated with the risk-free rate

Lecture 2

* European <= Berm <= American
* Moneyness
* Option value = intrinsic value + time value
* Put call parity: Call(K,T) – Put(K,T) = (Forward price(T) – K) \* DF(T)
* Why not optimal to exercise American call when underlying has no dividend.
* In what situation that it might be optimal to exercise American call?
* Why it may be optimal to exercise American put?
* Assumption of Black Scholes.
* Black Scholes Formula for price, delta, gamma and vega and their profile.

Lecture 3

Learn the payoff and their delta, gamma and vega profile

* Protective Put
* Covered Call
* Bull spread
* Bear spread
* Butterfly spread
* Condor spread
* Ratio Spread
* Straddle
* Strangle
* Breeden Litzenberger formula

Lecture 4

* Definition of Brownian Motions.
* How to solve the lognormal SDE using Ito’s lemma.
* Learn the moment generating function for normal random variable.
* Learn what is a numeraire asset.
* What is black scholes implied volatility
* Describe how to use Newton Raphson to find implied volatility
* What is Bachelier model and Bachelier implied volatility
* Black Scholes implied volatility skew generated by Bachelier model.
* Shifted lognormal model as a model between Black and Bachelier.

Lecture 5

* Delta hedging using forward, spot and correlated asset.
* Trading the volatility
* How to replicate a digital call option using European options. Delta and vega profile.

Lecture 6

* What is implied volatility smile
* Call spread prices using Black, SLN and Bachelier with all calibrated to the same implied vol.
* SABR model and the effect of changing the parameters.
* Barrier options, KI, KO, American style and European style.
* In out parity and their greeks compare with the corresponding European options.

Lecture 7

* Derive the drift of FX in domestic risk neutral measure.
* Derive the drift of FX in foreign risk neutral measure.
* Derive the Margrabe option formula.
* Derive Quanto opton formula.
* Derive LIBOR in arrears.