

TOPICS ON FINANCIAL ENGINEERING (II), Spring, 2008

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I. Security Derivatives.

1. Exotic and American options: Knock-out barrier options, lookback options, corrected diffusion approximation of barrier and lookback options, pricing Asian options: a recursive integration approach, perpetual American put options, finite-expiration American put options, analytic approximation of American options.

2. Change of Numeraire: Foreign and domestic risk-neutral measures, forward measures.

3. Term-Structure Models: Affine-yield models, Heath-Jarrow-Morton model, forward LIBOR model.

4. Jump Processes: Basic properties, stochastic calculus for jump processes, pricing a European call in a jump model.

Reference: Shreve, S. E. *Stochastic Calculus for Finance II*. Springer-Verlag, New York, 2004.

II. Advanced and Research Topics (if time permitted).

1. Sequential Monte Carlo methods in stochastic volatility models and stochastic intensity models.

2. Statistical inference and computation in hidden Markov models (stochastic volatility models, (G)ARCH models, and stochastic intensity models).

Reference: Doucet, A., de Freitas, N. and Gordon, N. *Sequential Monte Carlo Methods in Practice*. Springer-Verlag, New York, 2001.